

THE LAST OF THE TIDAL RIVERS OF SOUTH WEST

A journey of Uttaran and Paani Committee.



MISEREOR
• IHR HILFSWERK



Uttaran

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FOREWORD

The idea of nature based solution Tidal River Management (TRM) over the years has proven to be as one of the best possible solution to revive the tidal rivers in the south west coastal areas of Bangladesh. The demand of TRM though



popularized by Uttaran always remained as a movement of the mass people of area. Uttaran since 1989 have been aiding the movement of the local people and helped them establish the biggest civil society body of the area “Paani Committee”. As a rights based organization Uttaran knew that a formal platform is essential to constructively engage with the government. The platform gave the local people a voice who wants to pursue nature based indigenous solution against structural measures in the face of water logging.

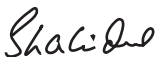
Over the years, as the ecosystem, economy, culture, society and people have changed Uttaran and Paani committee’s role have also evolved. Initially, Uttaran and Paani Committee largely opposed structural solutions to water logging problems but now a negotiated approach and constructive partnership is adopted by the platform. Long term involvement for establishing a sustainable water management system, Uttaran and Paani Committee gathered both technical and local knowledge. Uttaran now understands the necessity of creating a balance between scientific and technical measures and nature based solutions. We also understand that without institutionalizing people’s participation the balance cannot be achieved. It has always been one of Uttaran’s top priorities as millions of people depend on it.

The area has seen death of many tidal rivers due to massive unplanned structural dictation of the rivers. It is until very recently that the Government has accepted the people’s plan at a small scale and pursuing nature based solution TRM to end water logging and revive the tidal rivers once again. Paani Committee and Uttaran’s successfully advocated to the government for adopting Tidal River Management which the government later scaled up in Khukshiya and Kedariabeel of Hari River basin area and Pakhimara Beel of Kapotakkho River basin area. The joint effort of Uttaran and Paani

Committee on community participation and inclusion of community knowledge on formal water governance was accepted by the government of Bangladesh. Later on, TRM was included as a key mitigation strategy against water logging in various government projects and policy tools such as 20 year master plan on Polder 1, 2, 6 and 6-8 and Bangladesh Delta Plan 2100.

It is clear that everyone from academic to practitioners, from government to non-government organizations, all agree that the rivers of the south west coastal region needs to protected in order to ensure that the human civilization and natural ecosystem thrive. At this moment all the stakeholders have also came to a common ground that the TRM is the best possible solution we have in order to restore and revive the rivers of the south west and mitigate the water logging crisis. But the on field implementation of TRM comes with various policy gaps and flaws mostly regarding compensation and participation. Uttaran and Paani committee are also working to overcome this crisis and working along with the Government to find the best possible actions that can be taken to implement TRM more effectively.

The book looks into the various policy gaps which questions TRM implementation process and also documents the history of Uttaran and Paani Committee in the journey of advocating for people's demand. The critical observation that the book presents will open new opportunities in the effective implementation of TRM. My Special thanks go to all the members who have contributed to in writing this document. I express my hearty gratitude without whom gathering the required information would have been impossible.



Shahidul Islam
Director, Uttaran

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Chapter 1

Background and Context



1.1 INTRODUCTION

Governance discourse in water management has shifted in recent years from a top down, bureaucratic and technocratic approach, towards a more participatory and softer approach (Thompson, 1995). The transition is rapid and Bangladesh is also going through it. The twentieth century water management practice in Bangladesh involved the construction of large infrastructure to support the growing population, agriculture, industries and infrastructural development. As a part of the former approach the Coastal Embankment Project (CEP) was initiated by the former Pakistan Government which involved the construction of 39 polders, 282 sluice gates and 1500 KM of massive coastal embankment in the south west coastal region of Bangladesh (Kibria, 2011). The idea behind such massive construction was to increase agricultural production of the coastal area and reduce/control the damage from flooding and tidal surges. Without any arguable doubts these kind of large infrastructural change brought significant benefits to the economy but at the same time it also had enormous negative impact on the environment and society. ***CEP has massively changed the tidal***

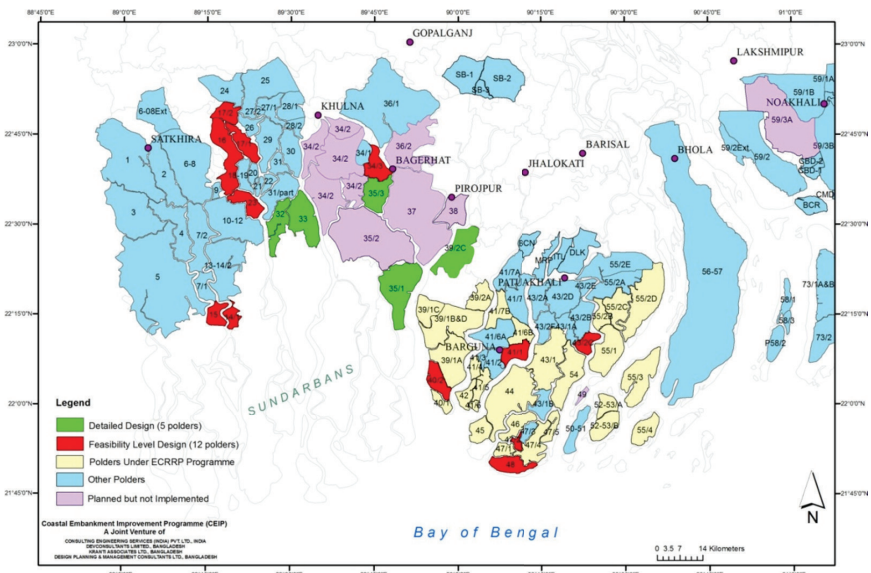


Figure 1: Polders of South West Bangladesh (BWBD, 2013)

ecosystem and created many environmental problems such as water logging which causes sufferings to a million people every year and almost six million people overall are affected. (Uttaran; Committee, Paani; CEGIS; IWM, 2013). Similarly many examples of environmental or social problems created due to the centralized technocratic approach can be drawn from various parts of the world like in China where 1 million people who have lost their household and land due to the construction of Three Georges Dam (Earthscan, 2000) or the loss of freshwater fauna in the USA (A. Ricciardi, & J. B. Rasmussen, 1999).

The transition in the discourse is a shift from this technocratic solution to softer measures that are taken at local levels to solve problems created by infrastructure construction in the twentieth century (Gleik, 2003). Changes can also be observed in the governance system of water management projects in Bangladesh as the former system was centralized while now an attempt is being made to make it more decentralized, local and participatory. The adoption of policy measures like Guidelines on Participatory Water Management (GPWM, 2002) and Tidal River Management (TRM), a soft solution rooted in indigenous knowledge, to mitigate water logging problems created by the CEP, by the government of Bangladesh and later on giving effort to scale it up by involving civil societies are fine examples of such transition.

But the transition has not been an easy journey for the Government of Bangladesh or its implementing body the Bangladesh Water Development Board (BWDB). The new approaches of water management require rigorous participation of stakeholders. This creates new challenges during the designing, planning and implementation of project. During the transition period this complexity can lead to conflict as shifting would require a change in mind-set from the implementers, planners, designers, engineers and also of the local stakeholders. In the late 90s of the 20th century when such transition began, it caused massive movement of the local people and fostered emergence of TRM. The movement also gave birth to Paani Committee, a civil society body; which was facilitated by Uttaran, a local NGO in south west coastal region. At the beginning both Uttaran and Paani Committee were critiques of Bangladesh Water Development Board (BWDB) but as time went on both parties became closely linked with each other.

The impact of climate change in Bangladesh is fast approaching and already many coastal areas and ecosystems are hit by it, a change in the governance system is much desired for facilitating people oriented solutions to such massive problems. The country is currently ranked as the sixth most vulnerable country to climate change and is geographically prone to natural disasters which is likely to further increase in the coming years (Eckstein, Künzel, & Schäfer, 2016). One meter rise in sea level could result inundation of 17% of the country and most of the coastal areas (Harris, 2014). Many scholars have already identified TRM as an ecosystem based adaptation to climate change (Roy, Hanlon, & Hulme, 2016) (Sakkhar, 2014) (Kibria, 2011). Others have also mentioned that governance remains the key challenge in implementing TRM for climate adaptation and scaling it up (Mutahara, Warner, Wals, Khan, & and Wester, 2017).

This paper talks about the drivers that influenced a change in the water management discourse from the perspective of historical and time frame analysis, the emergence of Paani Committee and the role of Uttaran and Paani Committee in the current water governance of south west coastal Bangladesh. More specifically, the paper talks about the how Paani Committee and Uttaran helped ensure governance, social stability and peace during the implementation of TRM in the Pakhimara Beel of Kapotakkho River Basin area of Tala upazila in Satkhira district. The paper also analyses the National Water Policy 1999, Guidelines on Participatory Water Management 2002 and the recent Bangladesh Delta Plan 2100 to find out the gaps in these documents (Mark, 2011). Moreover, the implementation irregularities from policy to reality are also identified in this paper using the implementation of TRM as case studies. It will also help us understand the governance flaws which is bottle-necking the TRM process. In the end, the paper also discusses and points out the way forward for ensuring a participatory and multi-level water governance system for the future and how this will help to address future problems such as climate change.

Chapter 2

The Unique Context of South West Coastal Region



The southwest coastal region is comprised of Khulna, Jashore, Satkhira and Bagherhat district. The area is a very dynamic with two full tidal cycles a day (Kibria, 2011). It is a brackish water zone with some areas having very high soil/water salinity and has a very complex, highly interactive and rich ecosystem (Uttaran; Committee, Paani; CEGIS; IWM, 2013). With the Sundarbans in the south, the area is naturally very rich in biodiversity and highly productive. The area is in the lower part of the Ganges delta and lies 1 meter to 3 meter above the sea level, making it vulnerable to climate change induced sea level rise (Agrawala S., Ota, Ahmed, Smith, & Aalst, 2003)

The area is mainly tidal fed with high tide bringing in huge amount of sediments from the Bay of Bengal and thus continuing the Delta formation process. There is no upland flow connection. Shift in the Ganges course due to tectonic movements in late 19th and early 20th century and later the construction of Farakkha Barrage in West Bengal India has resulted in the death of rivers such as Mathabhanga and Hisna and turning other rivers like Gorai into seasonal rivers (Islam & Kibria, 2006).

Recurring natural disasters increases the vulnerability of the coastal people to current and future shocks. The area is geographically vulnerable to coastal flooding, cyclones, tidal surges and river erosion (Agrawala S., Ota, Ahmed, Smith, & Aalst, 2003). These disasters regularly affect the life and livelihood of around 44 million inhabitants of the coastal districts of Bangladesh, making the coastal areas one of the most vulnerable places on Earth (Mallick, Ahmed, & Vogt, 2017). The socio-economic condition turns these natural hazards into major disasters. Satkhira district has a poverty headcount ratio of 46%, while the ratio for Khulna and Jashore of 39% each against the national mean of 31.5%, thus making the area poor and more vulnerable (World Bank, 2016). Major cyclones have damaged the area extensively. For example, Cyclone Bhola in 1970 alone killed around half a million people (Kerry, 2005). More recently, Cyclone AILA, 2009 and Cyclone SIDR in 2007 have destroyed properties worth 2.0 billion USD and claimed life of more than 5000 people (Mallick, Ahmed, & Vogt, 2017).



A house surrounded by shrimp farming

2.1 Rivers of the south west

coastal Bangladesh is perhaps best termed as the engine of the area. The estuarine rivers are unlike other parts of the country. In other parts of the country, the rivers only flow in one direction, downstream. But the coastal rivers flow in two directions mainly due to tidal actions. During high tide the river flows upstream and when low tides start, the river reverses its flow direction and moves down. This tidal action happens twice a day and the time differences between a high tide and low tide is 5 hours and 54 minutes.

The south west coastal rivers are little more different than other tidal rivers of the country from the other coastal districts. Unlike the tidal rivers of Barisal and Chittagong, the rivers of the south west Bangladesh do not have any connection with the upland flow (Kibria, 2011). The only river which is used to supply upland flow was Mathavanga River which got de-linked from the Ganges centuries ago due to a series of natural events starting from the 18th 19th and 20th century (Islam & Kibria, 2006). Later, in order to reduce the severity of current of Mathavanga River, British Colonial engineers sank large boats with full of soil on the place of origin of the river so that they can use the river for transportation (Islam & Kibria, 2006). After that slowly the river dried out due to upstream sedimentation and got permanently disconnected from the Ganges. Rivers like Kapotakho,

Betna, Bhairab Noboganga and other rivers of the south west coastal region received water from Mathavanga River. Since the closing of the Mathavanga, these 4 rivers along with all the other estuarine rivers that flow through the region like nets creating a strong river network systems, have become solely dependent on tidal waters and surface runoff during the monsoon (Islam & Kibria, 2006).

The high tide saline water brings in huge sediments from the Bay of Bengal which was deposited on the vast tidal flood plains till the 70s. This in one hand enriched the soil and on the other helped to continue the delta formation process (Agrawala S. , Ota, Ahmed, Smith, & Aalst, 2003). The faster the river flowed; more sediment is carried with it. When the water velocity is reduced, water loses its capacity to carry anything and thus dropping the huge load of sediments carried by the tidal water. The water velocity ceases near the inner edge of the river and once the tidal water enters into the vast tidal flood plains, thus dropping the load in the tidal flood plains and inner edge.



Fisherman in action

2.2 Ecosystem of the tidal flood plains

The unique tidal rivers and its vast flood plains has formed a complex and sensitive brackish water ecosystem which supported a wide range of aquatic and terrestrial biodiversity (Kibria, 2011). This means that both fresh water and saline water dependant species coexisted in the region. The largest mangrove forest Sundarban lies in the south of the region which is a Ramsar Conservation site and also world heritage.

The flood plains were used by hundreds of different kinds of saline and freshwater fish as their breeding and grazing ground. Several marine species used the mangroves, tidal rivers and the tidal flood plains to breed. Moreover, the south western rivers were once home to large schools of Irawaddy Dolphins and also Ganges Dolphin (Smith, Braulik, Strindberg, Ahmed, & Mansur, 2006). The floodplains supported a good population of freshwater species which used to breed and during the monsoon when the whole system became flooded; they grazed and interacted with the riverine and predatory species. Thus the aquatic ecosystem was dynamic and rich.

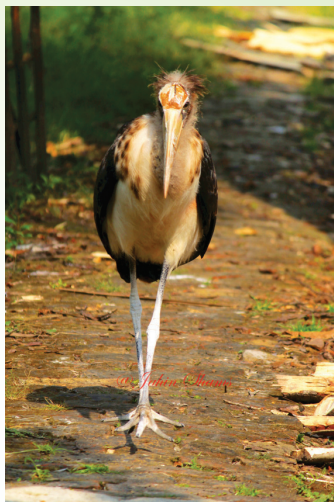
Along the river lied patches of mangrove species mostly Kewra trees (*Sonneratia*) which were dependent on the saline waters brought in by the tidal actions. Inside the flood plains and other areas fresh water dependent tree species were found. The diversified species of tree and fishes supported a wide range of local and migratory birds. Vulnerable species like the lesser adjutant, greater adjutant, and masked finfoot used these floodplains and large trees to nest. Similarly, summer and winter migratory birds came here to spend a cycle of their life. Predatory birds, raptors liked the region for its abundance of food and nesting ground.

This abundance of food also supported a large number of predatory mammals. The globally endangered fishing cats were once common inside the tidal flood plains which are now very hard to find. The populations of different kinds of civets, Bengal fox, Asiatic Golden Jackal were seen in plenty.



Masked finfoot

Photo: Sayam U Chowdhury



Lesser Adjutant

Photo: Jahin Shams Sakkhar



Asiatic Golden Jackal

Photo: Jahin Shams Sakkhar



Ganges River Dolphin

Photo: Elisabeth Fahrni Mansur

2.3 Communities and Livelihood

Just like the wildlife, human civilization thrived by using the tidal rivers and the tidal actions. Human being is living here for thousands of years. The people of south west Bangladesh had made great use of the tidal rivers, its sediments and the tidal actions. The human settlements were free from the tidal actions. They understood the size of the tidal prism and built their houses accordingly above the tidal flood plain (Islam & Kibria, 2006). The agriculture was done inside the tidal flood plains.

There are basically two types of land in the region. Low lying tidal flood plains which are commonly known as “*Beel*” area and the relatively high lands. The low lying flood plains were used by the locals to cultivate one crop in a year and the relatively high lands produced more than one crop. The locals had great innovative ways to manage the rivers. Experts commonly misunderstand and term it as water management. But the locals here managed the sediments quite nicely and used it as resource. Traditional river management practice throughout the Bengal delta was mainly about managing around 1037 million tons of sediments that is brought by hundreds of rivers (Islam, Begum, Yamaguchi, & Ogawa, 1999). Sir William Willcocks, a British Water Expert, was the first person to understand this and also noted that the prime issue of river basin management in Bengal delta is effective management of sediment (Kibria, 2011).

Traditionally the local communities used an indigenous concept of sediment management for ensuring agriculture. The local communities constructed temporary embankment along the river and their lands during the monsoon. These embankments are known as “*Ashto Mashi Badh or Dasher Badh*” (eight month embankment). During June-July, when the monsoon starts, this embankment was constructed by the locals and in December- January the embankments were breached. The local communities used to cultivate Aman paddy which normally grows during monsoon and harvested a month before the start of winter (Kibria, 2011). The locals knew the tidal difference properly. They constructed the embankment accordingly. In between construction of embankments, the local communities constructed wooden flap gates to drain out excess monsoon water. Besides, Aman paddy requires high volume of water and grows along with the water level. During the winter, the locals also harvested winter crops.

In the dry season, January to June, the embankment mostly remained open. During this time of the year most of the marine species breed and moved into the open tidal rivers and flood plains (Islam & Kibria, 2006). Traditionally, the locals did not cultivate anything during this time of the year. Thus the embankment was not necessary. Besides, during this time of the year the sediment concentration in the river increases. Thus an open system helps river to drop of sediments in the tidal flood plains. This in one hand ensured the delta formation process and maintained the river navigability (Kibria, 2011). During the monsoon, sediments could not settle inside the river bed due to high surface runoff due to rainfall. That is why; this kind of integrated water resource management is best termed as effective management of sediments. The management of rivers were context based and completely locally managed. But this indigenous and local water governance system fell apart after introduction of formal water governance system in the 1960s.



Fishing Attempts in a silted river

Chapter 3

Institutional Water Governance and the Coastal Embankment Project



After the partition of Indian subcontinent, the Jamindari systems in East Pakistan were abolished. With that the community based water governance system became weaker. In 1954-55 two major floods struck all over East Pakistan which forced the Pakistan Government to take remedial action (Uttaran; Committee, Paani; CEGIS; IWM, 2013). In order to control further flooding and increase the agricultural production, the former government of Pakistan decided to construct embankments on the rivers. With suggestions from the Dutch Government and American experts, the former government of East Pakistan formed the first formal institution for water management which was formerly known as East Pakistan Water and Power Development Association (WAPDA). WAPDA undertook a 20 year master plan for the coastal areas for controlling flood and increasing agriculture production. Coastal Embankment Project (CEP) was then implemented under the master plan through which coastal polders were constructed all over the coastal area.

Under the CEP, the government constructed permanent embankments on both sides of the estuarine rivers in order to stop saline water entering into the flood plain. This was a Dutch technology known as the polder system and the project was funded by the US government. The plan was to increase the agriculture production inside the tidal floodplains by converting these brackish water ecosystems into freshwater ecosystems. (Islam & Kibria, 2006) Under the project, state agencies constructed high embankments on both side of the river and multiple sluice gates on the embankments. A total of 142 polders were constructed along the coastal belt and more than 7500 km of coastal embankment were constructed, among which 39 polders, 282 sluice gates and 1500 KM of coastal embankments were constructed in the south west coastal zone (Kibria, 2011).

Polder is a low-lying land that has been reclaimed from the sea or river and is protected by embankments surrounding it. The technique is very common in the Netherlands where a huge quantity of land is protected using polder technique. In the 1960s, polders were introduced in the coastal areas of Bangladesh. A polder can have multiple numbers of beels inside it. Through the introduction of polder system and continuous promotion of agriculture along with it, the agricultural production of the country increased significantly. Throughout the 1970s and till the mid-1980s, the agricultural production in the country increased rapidly (Kibria, 2011). Polders also were effective in blocking off potential damage

from tidal surges and cyclones. For example, no cyclone after the 1970 Bhola Cyclone has caused such catastrophic damages even though some of them were equally powerful and due credit should be given to the coastal polders. But after that, the upper portion of the southwest coastal zone of Bangladesh started to experience a new disaster known as water logging (Kibria, 2011).



A dysfunctional sluice gate

3.1 Impacts of CEP and Starting of a New Disaster

Construction of polders on the tidal rivers de-linked the rivers from their floodplains. The sensitive and complex brackish water ecosystem was changed and converted into a complete fresh water dependent ecosystem (Kibria, 2011). The main problem that came up from this intervention was sedimentation of river beds and loss of biodiversity. Since the tidal floodplains are now not connected to the rivers anymore, the high tide water cannot find a way into the tidal floodplains. As a result, the sediments that are brought in by the water cannot find a way inside the floodplain either. The sediments started to deposit in dead ends and inner edge of the river where the water velocity is ceased (Kibria, 2011). The mouth of hundreds of small canals is now blocked with sluice gates; tidal waters cannot find a way up the canals either. Thus, sediments started to deposit on the mouth of the sluice gates as well. Sediment deposition on the river beds and sluice gates slowly rose up the river beds and turned the sluice gates dysfunctional (Islam & Kibria, 2006). The polder system completely stopped the delta formation process here thus leading to subsidence of land inside the polder as well.

Within 10-15 years of poldering many rivers in the south west coastal region became sedimented and their navigability decreased sharply. This created a drainage shortage. During the monsoon, rain water from inside the polders could not find ways out into rivers since the mouth of the sluice gates are silted (Uttaran; Committee, Paani; CEGIS; IWM, 2013). Additionally, due to massive sedimentation, the river beds quickly rose above the floodplains and embankments remaining the only line of control in between, thus when rain waters falling inside the flood plains or polders became stagnant inside and resulting in water logging.

Water logging first started in the dead end points of the rivers like Bhabadah area of Jashore district. Bhabadah is a place where a 21 and a 9 vent sluice gate is installed side by side. The whole Bhabadah area is shared between Manirampur and Abhoynagar, Upazila of Jashore district. The area is the floodplain of the Sre-Hari river basin. Thousands of hectors of agricultural land and households became water logged and the water logging disaster slowly became an annual event gradually expanding all over the south west coastal Bangladesh. Every year water logging is happening and affecting around 6 million people here (Sakkhar, 2014).

Water logging generally lasts for 5-6 months but in some places it can go for 8-9 months and even a whole year. People's agricultural land remains inundated for long periods of the year. Thus, those three crop lands have again being converted into one crop or no crop land. People in the region were already vulnerable to natural disasters and the new man-made disaster has created a severe humanitarian crisis.

Similarly, as the floodplain now has no connection with the river, many riverine species and marine species which used these floodplains as breeding ground started to become extinct. The number of fish species has reduced to around 212-222, which shows that near 30-40 species are either extinct or nearly extinct (Uttaran; Committee, Paani; CEGIS; IWM, 2013). The mangrove patches on the river banks gradually disappeared due to high salinity in the river thus a lot prey birds and raptors and migratory birds are slowly becoming extinct from the area. The rivers are producing very little amount of fisheries. And the inundated floodplains are being converted into aqua cultural land by mostly absentee and rich landlords. Thus an ecological crisis can be observed here as well which is putting pressure on the life and livelihood of the resource poor.

Within a few years of CEP, the democratic water governance system that was practiced by the local people for centuries was lost and till now it remains as a key loss for the society. The rivers which were economically



Unplanned constructions leading to death of rivers

significant for transportation became slowly dead and now transportation through them is impossible.

The saline tolerant rice varieties that people grew in this part of the country became extinct due to the introduction of HYVs. The introduction of shrimp culture forced stopped the HYVs production as well. On one hand, people were living in meters under water due to water logging and on the other hand HYVs and agriculture production reduced significantly. After the CEP, the return period of big flood became shorter in most of the country (Islam & Kibria, 2006) (Uttaran; Committee, Paani; CEGIS; IWM, 2013). But in the south west regions new areas were becoming inundated every year. The delta formation process has stopped due to lack of sedimentation inside the flood plains (Sakkhar, 2014). Most of the rivers of the south west coastal Bangladesh are either dead or on the verge of dying.

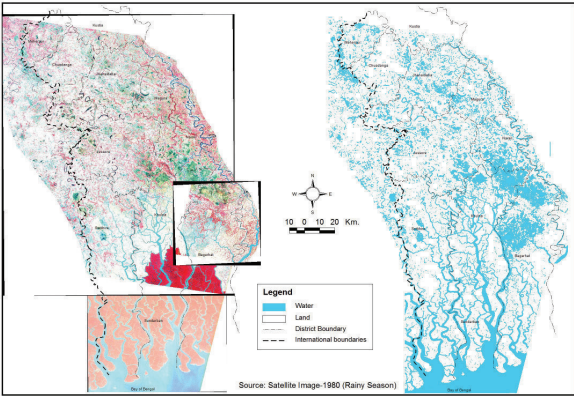


Figure 2: water logging situation in monsoon 1980

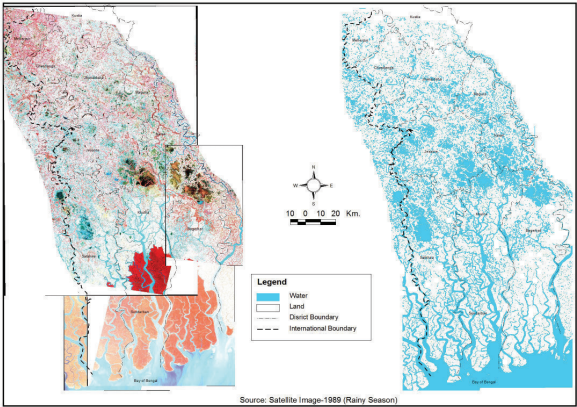


Figure 3: water logging situation in monsoon 1990

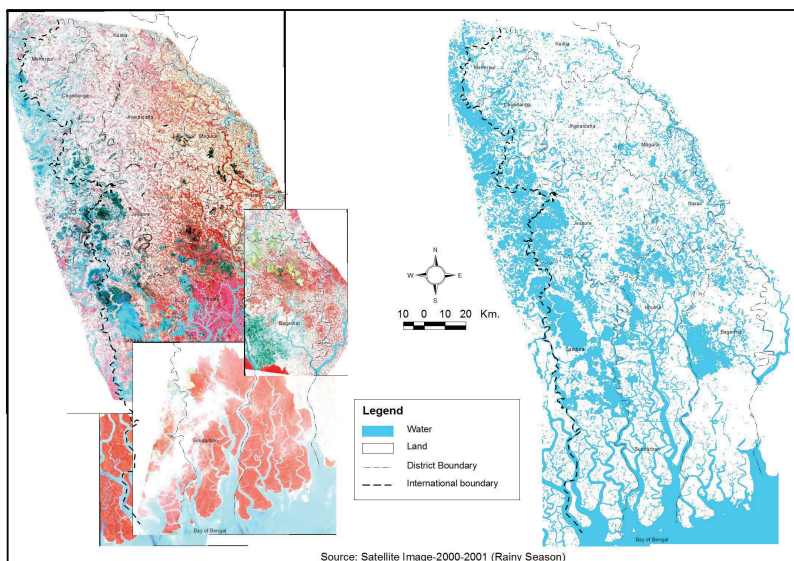


Figure 4: water logging situation in monsoon 2000-2001

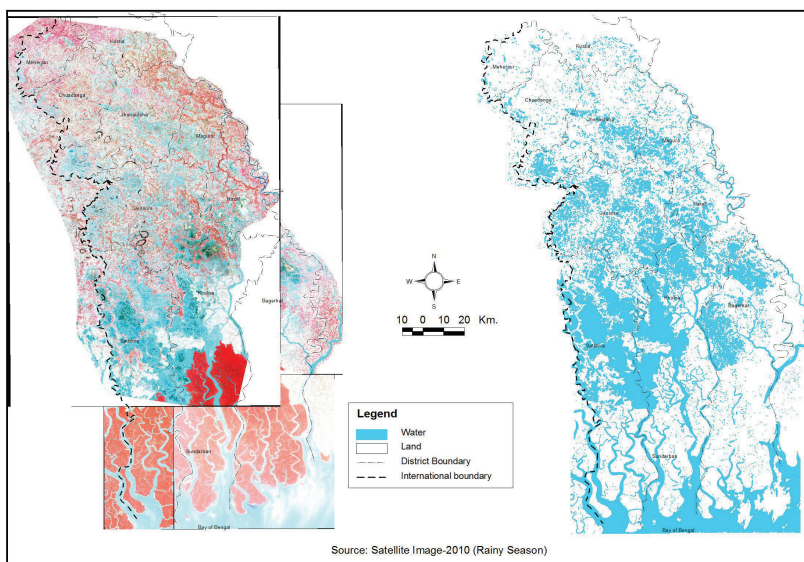


Figure 5: water logging situation in monsoon 2010

3.2 Causes of Water Logging

Along with the Coastal Embankment Project (CEP), many other reasons are fuelling the water logging crisis. Every year newer area is becoming water logged and thus it is very important to identify the causes of water logging.

Coastal Embankment Project: As explained before, the CEP project is the most important reason for water logging in the south west coastal Bangladesh. Sedimentation of river beds has caused death to many rivers of Khulna, Jashore, Bagerhat and Satkhira district. These rivers used to drain the monsoon water which they cannot do any more thus resulting in water logging. Similarly the sediments also ensured the delta formation process. The 1st draft of the Bangladesh Delta plan (BDP 2100) identified CEP as one of the key reasons of water logging. But blaming the CEP as the sole reason for water logging is sloppy thinking since CEP has been quite useful in other parts of the country.

Lack of upland flow: The south west region has been disconnected from the main flow of the Ganges, more than a hundred years ago. As mentioned earlier that Mathavanga, was the only river which connected the south west rivers with the main flow of the Ganges. But since the death of the Mathavanga River a hundred years ago, the rivers here are only driven by tidal actions and an open river-floodplain interaction. After the introduction of Coastal Embankment Project this open system was destroyed and the rivers were de-linked from their floodplains.



An encroached river

Since there are no upland flow on the south west Bangladesh, the silt deposition process here was rapid (Kibria, 2011). In the south west, the velocity of the water during low tide is lower than the high tide due to lack of upland flow. Since the tidal water is not getting into flood plains, thus dropping the entire sediment load on the river bed at the points where high tide water velocity reduces. And there is no upland flows like the rivers of the south central which would wash all of it away during the low tide. The rivers here quickly lost its navigability resulting drainage shortage.

Land Subsidence: Similarly, as the land formation process is now disrupted, so the lands in the south west coastal region are gradually going down. Dr.Munirul Haque, Director of the Institute of Delta Research Institute of Dhaka University, has found in a study that most of the area of wetland is subsiding by 3-4 mm each year (Haque & Alam, 1997). Before the implementation of Coastal Embankment Project, sediments carried by the rivers used to deposit in the floodplains, so the rate of land formation was higher than the rate of land subsidence. However, the process of land formation, as a result of sedimentation had completely stopped with the construction of coastal embankment. In last 4-5 decades as to continuous subsidence of land within the WAPDA embankment is gradually going down and thus contributing more towards water logging in the area.

Shrimp Farming: The polder system was introduced with an aim to increase the rice production within the flood plains by stopping saline water. But during the 80s the tiger shrimp revolution started in the coastal belt. Tiger shrimps are rapid growing species which requires saline water and there was a global market for shrimp. Local rich people, absentee landlords and muscle men leased huge amount of land from the local people and some of it by force and started shrimp culture. They let saline water into their lands through the flood plains. This reduced the rice production. HYVs are not saline tolerant and since the shrimp farmers are allowing saline water from the rivers to come in huge areas downstream of the south west coastal region were converted into shrimp farms. State was supportive to this even though their original plan of increasing rice production of the area was completely contradictory. Slowly, due to seepage and excessive salinity majority of the lands inside the polders of the lower part of Satkhira, Khulna and Bagherhat district came under shrimp cultivation. Majority of these lands were leased from the small farmers by the absentee landlords or local muscle man with very minimum rent. Shrimp culture is less labour intensive



rice farming. This increased the vulnerability of the ultra-poor marginal farmers and the landless. Additionally, fresh water scarcity in the area increased as the fresh water sources (pond and shallow aquifers) gradually turned saline.

The shrimp farmers with high political influence also brought drainage canals, small rivers (which were necessary to drain out water from the polders) under shrimp farming. Thus the drainage shortage problem increased. In some areas it can be seen that water from 1000s of hectares of land is only being drained by one canal whereas there are a number of other canals within the polder which are being converted into shrimp farms. The shrimp farmers also control the gates for bringing in saline water for their land. Thus, silts also enter and canals inside the polders also become silted further causing drainage congestions particularly during monsoon

Unplanned Infrastructure: After the Coastal Embankment Project, a lot of other infrastructures like roads and bridges were constructed in the area. While these roads were important to ensure the economic development but some of it were done in an unplanned way which further deteriorated the water logging problems. A lot of canals were closed during the polder construction and more were closed due to construction of roads which aggravated the drainage problems. Culverts were constructed on top of small canals but the size of the gap was smaller than the width of the canals

which was a barrier to water flow. Many bridges were constructed disregarding the actual width of the river. The river width increases during the monsoon and at high tide. But to reduce the cost of the bridge the rivers were narrowed down which further worsened the drainage problems. The pillars of the bridges also became a barrier for the water flow which is increasing the sedimentation rate as well. Additionally, the government regularly leases out small canals and rivers to powerful



Sediment accumulation under a bridge

landlords and other local people for fish cultivation. They put nets and barriers in their leased area and create obstruction of water flow.

Climate Change and Sea Level Rise: Climate change and sea level rise is perhaps the biggest threat to the coastal people. Several reports claim that sea level rise will permanently inundated 13-17% of the land mass of the country and will force around 20 million people from the affected area to migrate away. On one hand, the rivers of the south west are losing its water carrying capacity and on the other hand the sea level keeps on rising. As a result new areas are coming under tidal actions. The land subsidence is also reducing the gaps between sea level and ground thus people are becoming more vulnerable to water logging. Additionally, change in annual rainfall pattern is also fuelling water logging. In recent years it was observed that the number of days with rainfall in early monsoon has increased. Thus water logging is setting in much quicker than previously.

3.3 Sufferings of the people due to water logging

Water logging has destroyed the lives of many ultra-poor families in the coastal area. Each year millions of people are directly suffering from water logging and on a broader scale six million people of the south west coastal areas are vulnerable to it. Being inundated under water for more than six months every year has destroyed their livelihood forcing people to migrate away from the area and causing massive humanitarian crisis. Being a local organization, Uttaran over the years have responded to the sufferings of the people and provided humanitarian aid. The following section is written based on the experience of Uttaran.

Most of the agricultural land of the area is within the low lying floodplains (converted as polders) which are getting inundated every year. The water logging persists more than six months and in some places it goes on beyond nine months to a year. The local people during the water logging time are unable to grow their crops. Households, roads, graveyards everything in the water log affected areas remain inundated for a long period. People from water log affected areas hardly find any land which is not inundated by water. Every year thousands of agricultural labour migrates away from the area in search of work (Uttaran; Committee, Paani; CEGIS; IWM, 2013). The agricultural lands become unavailable for any agricultural production. The people go to nearby cities in Satkhira, Khulna, and to major cities like Dhaka, Chittagong. They are forced to change their occupation to different sectors, particularly in the informal sector. Some of them are pulling rickshaw van in the big cities, while a group of them are also working in garments for a low wage rate. People from the area are also becoming contracted workers in brick field. As they move towards the bigger cities, the informal job sector is increasing and those who are not finding any jobs are getting involved in various criminal activities. Similarly because of their pressure in the urban areas, the slums are increasing where they are living with very poor quality of life.

Those who do not migrate from the area live a horrid life. Most of them catch fish in the water logged area for the whole day and gets very little in return which is sometimes not enough to support their families with even two meals. People whose households get inundated during the water logging, are forced to take shelter in high ground living either under plastic sheets donated by NGOs or in local primary or high school premises. Living in

those makeshift plastic shelters can be very hard considering the temperature during the monsoon is pretty high and there is continuous downpour almost every day. Male members from these households will have to move at least 15 kilometres a day in search of work which they do not get every day (Kibria, 2011). And after the day's work when they come back home they bring so little that hardly provides them a good meal. The unemployment rate increases rapidly locally and forces people to be involved in a lot of unusual activities.

Water logging also causes health hazard; people suffer from a lot of diseases. Latrines, tube wells and all other WASH infrastructure gets inundated during the time. So the stagnant water becomes polluted with waste from latrines and other areas. As the water remains stagnant for a long time, the quality deteriorates rapidly. This increases drinking water scarcity in the water logged area. Moreover, people living and drinking contaminated water suffer from diseases like Diarrhoea, Cholera, skin rashes and etc. Children and women are particularly most vulnerable during this time. Likewise, as the whole area remains inundated, wild animals like snakes and other species also look for higher ground. This makes people more vulnerable to snake bites. In the makeshift shelter snake bites are very common and over the years during the water logging many people have died from snake bites.

Children and infants are very vulnerable to drowning. Since there are almost no works in the area, so both the male and the female of the house go away for the whole day in search of work. Sometimes families have to leave their infants home since it is tough to carry them in a water logged situation. Drowning accidents have become very common. Over the years many children have drowned and died. Perhaps the most emotional way to explain the suffering of the people is that during water logging period, one will not find a piece of land to bury the dead. So these people will often bury their relatives who died in other places where it is not affected by water logging and most of the times this is often in another Upazila or District.

During the water logging period, most of the local school and college become shelter houses for the affected families. Thus the education during this time completely stops. Children spend most of their time at home. The adolescents try to help their parents by looking after their baby brothers and sisters and also trying to earn something for their families. After the disaster

when school starts, many students do not return to school. This is happening for years and years. The dropout rate in the schools in water logged area is very high.

To some people livestock is sometimes the only income source for them. People are forced to sell their livestock at a very low price. As there are no grazing lands for livestock so people find it difficult to keep them. Besides, during this period it becomes difficult for one to provide food for their families let alone livestock. Those who do not sell, they take their livestock with them in temporary shelters and live in horrific and un-hygienic manner. Still, a cattle or chickens or ducks are the only assets of thousands of ultra-poor families which they are either forced to sell or these livestock die of disease due to water logging.

Local transportation system during the water logging period totally breaks down. Each year hundreds of paved and unpaved road is either completely or partially destroyed. On one hand, Government takes one step forward by developing the area through infrastructure construction but on the other hand water logging and other disasters forces the development process two steps backward. With communication system almost broken it becomes difficult for the locals to even look for work. During the water logging period highways become “boat ways” that is roads where buses and trucks used to run on, boats become the only option. Thus the relief operation run by government and non-government organizations becomes difficult to execute. Similarly, it becomes tougher for the local to do their daily chores, transport the sick and other activities.





"Water logging impacts across different sectors"



Chapter 4: **The Emergence of TRM**



The state and the people have been in conflict in trying to solve the water logging crisis of the south west coastal Bangladesh. When water logging was becoming a recurrent event in the Bhabadah and Beel Dakatia, of Jashore and Khulna district, people demanded a solution which would stop such calamities. Initially people thought that this is a very small and temporary problem but with every passing year, people realized that this will have a huge impact in their lives and immediate actions need to be taken. Thus on popular demand Government of Bangladesh over the years have taken up several projects to address the water logging problems of the south west coastal region.

In 1986, the Government carried out a survey to find out about possible solutions of water logging, which was funded by Asian Development Bank. Based on the survey, Government of Bangladesh undertook a project titled “Khulna Coastal Embankment Rehabilitation Project (KCERP). The project was financed jointly by UNDP and Asian Development Bank. The project offered hard-core engineering solution to the problem. The project aimed to remove water logging from 31,900 hectars of land from polder 25, 27 and 28 surrounding Beel Dakatia. But the local people had other ideas. During that time people’s participation was not taken into consideration and the concept of sediment management was not taken into consideration. The local people did not accept the KCERP project and started to oppose it since the beginning and as a result in 1990 the project was cancelled (Islam & Kibria, 2006).

The locals had another idea to solve water logging crisis and to demonstrate their knowledge, the local people breached the embankment of Hamkura River in 4 points, to allow the tidal actions to come inside the polders of Beel Dakatia. As a result, the river and the floodplains were once again re-connected. The sediments brought in with the tidal waters were deposited within the floodplain, inside Beel Dakatia. Within a few years, 200 hectares of land emerged from the water log affected area. But perhaps the major result came through was the change in the tidal river. The river’s navigability increased significantly and it became wider in the four years. Hamkura River remained open and kept on getting bigger and bigger, thus increasing the tidal prism. More and more area came under tidal actions. Few areas rose above the flood plains but other areas started to get inundated due to tidal water twice a day. An acute shortage of livelihood was observed in Beel Dakatia and other nearby areas. People

shifted their occupation from agriculture to catching open fishes offered by the river (Islam & Kibria, 2006).

Unfortunately Government's implementing authority did not quite understand this unique concept of sediment management. Thus Government undertook a similar project titled CERP-2 in polder 24, 25, 27 and 28 which covered around 100,600 hectares of land. Fortunately for the local people the project got cancelled before even the activity started.

In the meantime, water logging started to spread further. Water logging spread across the Hari and Bhadra River basin area adjacent of Beel Dakatia. The local people became desperate for a solution and in 1993-94 Government formulated the controversial Khulna Jashore Drainage Rehabilitation Project (KJDRP). This is perhaps the landmark for water management projects taken in this region and one that changed the water management of south west coastal Bangladesh.

Asian Development Bank financed the KJDRP project. The objective of the project was to remove the water logging of 8 Upazilas of Jashore and Khulna district covering 100,600 hectares of land. The project implemented by Bangladesh Water Development Board in partnership with Department of Agriculture Extension and Department of Fisheries. The total budget of the project was 62 million USD. The main goal of the project was to increase agricultural production and farm based employment by removing water logging. The project proposed to construct regulators across most of the rivers of the targeted region. The experts of Bangladesh Water Development Board believed that water logging problem could be solved by completely de-linking the whole area from tidal actions.

The project was designed in the first two years and from 1996 the project went into the implementation phase. There was also some emergency work that was done during the designing phase. During the designing phase people's participation was not considered since it was not mandatory back then. Thus the learning of the people's intervention in the Hamkura river basin area was not included within the designing of the project. The project involved only structural measures. Under the project, Bangladesh Water Development Board planned to construct 4 big regulators in 3 big rivers. The project also planned to make small regulators on multiple rivers to stop tidal waters coming inside the flood plain.

At the beginning of the project, under the emergency work, in 1994 the cut points were closed in Hamkura River to stop tidal waters from getting inside the rivers, thus into the villages. This was necessary since the polders of Beel Dakatia on the bank of Hamkura River remained open for a long time which forced people to lose their livelihood. But within a few months of Hamkura River got silted again and within years it died. Now, the Hamkura River is only a history and can only be found in the old maps and people are living on the river bed.



Before the starting of the project, the design of the project was shared with the local people of the Hari and Bhadra river basin area and other people living in the project area. When the local people came to know about the technical options suggested by the project, the locals clearly understood that this project is very similar to the CEP and result of the project might be devastating for the whole south west Bangladesh.

After the designing of the project, a copy of the project description was provided to ADAB which was a national platform for the local NGOs of Bangladesh. ADAB asked Uttaran which was a local NGO of the south west coastal Bangladesh, to look into the project details. Uttaran also asked for the local people's help to understand the total design of the project. Paani Committee (a civil society organization, formed and facilitated by Uttaran) in their discussion with the local people in the area identified the possible

damage that might be caused by the project. During these discussions, the local people also told Uttaran and Paani Committee about the experience of the Hamkura River. Being local organization, Uttaran quickly understood, what was the concern of the local people and solution they were suggesting and thus Uttaran took stand for the local people and together with Paani Committee it carried out advocacy program to ensure that the voice of the people is heard at the top level and their demand is met.

At the same time, BWDB went on with the project activities and constructed regulator vents on the Shoilmari River in Dumuria Upazila. The plan was to use Shoilmari river to drain water from the upper areas and also from catchment areas of the Hamkura river. The local people protested against this initiative but it was in vain. With construction of the regulator vent on Shoilmari river, the movement gained new momentum.

When BWDB started to construct regulator vents on Teabunia point on Upper Salta River, Uttaran and Paani Committee along with local people protested against it and this time the local people were stronger and determined to stop the Teabunia regulator at any cost. The Teabunia Regulator Vent was forced to be called off and similarly the Modhukhali Regulator was also stopped by the local people. Uttaran in the meantime kept on engaging the civil society nationally to understand the impact that will be brought upon with the implementation of KJDRP.

In the monsoon of 1997, the water logging was huge just like every other year in the Bhabodah area. The local people this time just had enough. After stopping the construction of regulators on the rivers, the local took initiative in their own hand. The local people breached the embankment of Hari River in Beel Bhaina. Meanwhile, Uttaran with the help of ADAB and Collision of Environmental NGOs submitted a letter to regional head of ADB to carry out a separate Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) on the on-going KJDRP project. Uttaran also asked ABD to consider people's option into EIA and SIA. Uttaran managed to convince ADB to run the EIA and SIA. ADB commissioned Centre for Environmental and Geographic Information Services (CEGIS), an autonomous body of Water Resource Ministry, to conduct EIA and SIA on KJDRP and the people's initiative of allowing tidal flow in Beel Bhaina.

CEGIS conducted the studies and stated that the activities proposed by KJDRP were indeed unfit of solving the water logging crisis of the south

west coastal region. The reports recognized people's initiative of allowing the tidal waters to come inside the flood plains and named this unique indigenous concept as Tidal River Management, TRM. The reports said that the TRM is the best solution for tackling the water logging problems of the south west coastal region and remarked "*TRM is technically sound, economically viable, environment friendly and acceptable to people (CEGIS,1998).*" Thus due to people's pressure and the EIA report Bangladesh Water Development Board cancelled of the structural intervention offered by KJDRP and accepted the indigenous concept of sediment management known as TRM.

In 1998 BWDB took over the Beel Bhaina TRM and government of Bangladesh decided to upscale the TRM process across the water logging affected areas of the south west Bangladesh. The local people were really grateful to the Government of Bangladesh for finally recognizing the importance of sediment management and going forward with the TRM process.

4.1 What is TRM

Defining Tidal River Management is very simple. In fact TRM is a just a simple natural technique of sediment management that the local people of the south west coastal Bangladesh have been doing for centuries. TRM means allowing tidal water entering into an appropriate floodplain in a controlled manner for a fixed period of time, so that the sediments brought in by the tidal waters is deposited on the floodplain and the water velocity within the river is increased, thus keeping the river navigable. From the definition we can point out that TRM is controlled, well managed temporary de-poldering.

Unfortunately, this simple concept of sediment management is often misunderstood by expert. Sir William Willcock was the first person to recognize this. He observed (1930) that the key to river management in the Bengal was effective management of sediments. TRM can be explained in various ways. The easiest way to explain is, beels are converted into a tidal basin storage which will be used to store the tidal waters brought in by the high tide. The velocity of the tidal water ceases inside the basin area; thus all the sediments that are brought in by the tidal water are dropped inside the basin area. This will slowly rise up the basin area above the river bed. Similarly, as tidal water gush in and out of the basin area, the sediments dropped on the river bed will be washed away. This will increase the

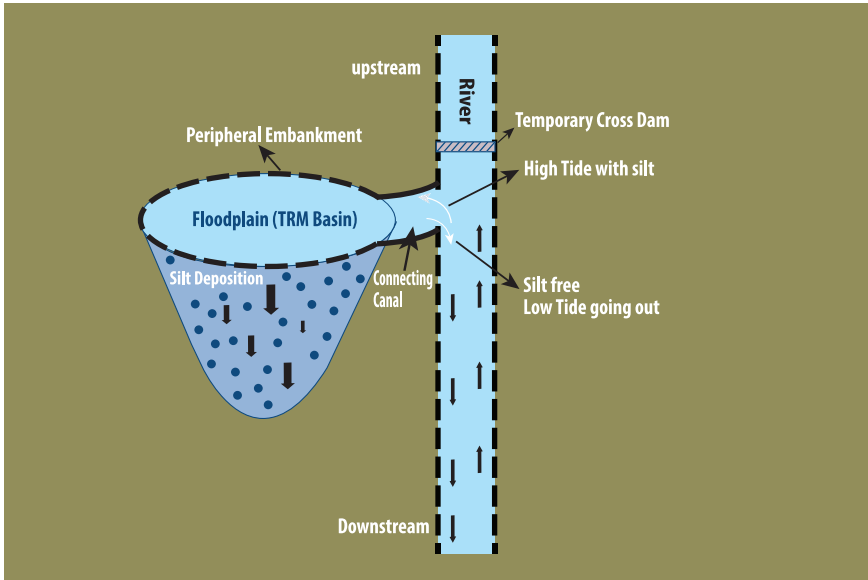


Figure 6: a simple illustration of TRM process

navigability of the river, thus the drainage capacity will increase and water logging from the catchment area of the river near the tidal basin will be removed. Once tidal basin has been raised up to a satisfactory level, cut point is closed again and a new tidal basin will be opened for the same process further upstream or downstream the river.

The main purpose of implementing TRM is to remove water logging by increasing the drainage capacity of the rivers. Raising land inside the flood plains is just one of the many by-products of the TRM process. Following are the benefits that were witnessed during the implementation of TRM

- A. **Increased Navigability of the River:** With the TRM process it is possible to remove sediments from the river beds naturally. As high velocity water flows in and out of the canal, so the sediments that lies in the bottom of the river is washed away (Scouring) along with it. This increases the depth of the river. Similarly high velocity of the water causes river bank erosion, resulting in the river getting wider and wider. This increases the navigability of the river.
- B. **Rising of floodplains:** The floodplains inside the TRM basin area raises along with TRM process. As sediments are dropped here, so

the delta formation process again restarts. Within four to five years a basin area as large as 600 hectares can easily be raised up to two to three meters with the help of the TRM process.

- C. **Removal of water logging:** The drainage capacity of the river enhances with the increase in navigability of the river. Similarly as the floodplain rises due to sedimentation, the land quickly rises above the river bed which makes the drainage process easier. The combination of these two helps mitigate water logging from the catchment area of the river.
- D. **Restoration of River Ecology:** Since the floodplains and river again becomes connected, so the wild fisheries increase inside the floodplains. Similarly, the fish in the river also increases. As the fish increase so their predators also return. River and wetland birds increase in the area as well. Fishing cats and other predatory mammals return in the area as well. Saline tolerant plants are also seen to grow on the river banks once again. The river ecology which died along with a dead river is again restored.
- E. **Adaptation to Climate Change:** It is expected that with one meter sea level rise, most of the south west coastal region will be permanently inundated as a high percentage of the south west Bangladesh is at sea level or just meter above it. But with TRM it is possible to raise land up to 2 meters within four to five years. Moreover, the rivers also get wider and deeper with TRM process which will enable the area to adapt to some stage with the sea level rise. Still further research is required to find out more about this. But judging from the already completed TRM this can be said. Additionally, the wider river can also reduce the impact caused by tidal surges or bores during cyclone. Keeping in mind, that climate change will increase the frequency and intensity of natural disasters like cyclone and flood, TRM can be a very good option to minimize the damage.
- F. **Increase Capacity of the Locals to adapt with Natural Disasters:** With the implementation of TRM the recurrent disaster of

water logging will stop. The local people who suffered heavily due to water logging will be in a better position. The financial loss every year had made them very vulnerable and with a better financial position their adaptive capacity with other natural disasters like cyclone and tidal surges is likely to increase. Besides, their livelihood will not be disturbed by water logging anymore, they will be able to do more savings and increase their capacity to adapt to climate change.

- G. **Increase of ground water table:** The groundwater table increases inside the floodplain. Since during the TRM process, tidal water regularly enters the floodplain twice a day so seepage occurs and groundwater tables are filled once again. This causes the ground water tables to rise up and makes it easier for the locals to use groundwater
- H. **Land subsidence:** Since the area is subject to regular land subsidence as the delta formation process. So with the TRM process, the rate at which land subsidence occur can be covered quite easily and proper rotation wise TRM process will ensure the delta formation process as well.
- I. **Reduction of sedimentation within the Sundarban:** Heavy sedimentation in Sundarban area can be harmful for the trees since the pneumatophores become clogged due to sedimentation which might cause the trees to die. With the TRM process, as sediments are being 'trapped' into the flood plain so the sedimentation within the Sundarban area can be reduced. In the TRM process, murky high tide water full of sediments enter the floodplain or basin area, drops its sediment load inside and clear water goes out during low tide.
- J. **A democratic society can be established:** The TRM process requires massive people's participation and it increases the societal relationship between the local people. The local people and the local authority also work together with this process, which cements strong relation between them. Moreover, the TRM process also helps to mobilize the local resources. Overall a democratic society is established with a perfectly implemented TRM process.

4.2 Basic Requirements of TRM

The basic requirements of tidal river management process which are described below:

- **Selection of Appropriate Basin Area:** Selecting of a basin area is vital and one of the most important steps of the TRM process. The basin area has to be located very near to the river so that river water can easily be allowed into the basin. The basin should be big enough to hold the total volume of water that is brought in by the tidal rivers during high tide. The basin should be selected in just that point on the river where there is an average velocity of high tide.
- **Construction of Cross Dam on the river:** A temporary cross dam should be constructed on the selected river so that high tide cannot go beyond the point of the tidal basin. This will ensure that all the water carried by the river go inside the basin area and ensure proper sedimentation. The cross dam will be removed during the rainy season to ensure the river discharge the upland runoff freely.
- **Peripheral Embankment along the Basin area:** Peripheral embankment is one of the key elements of the TRM process. Normally, the local people live along the periphery of the tidal basin. As the basin will be flooded twice a day with tidal water, the TRM process has to ensure that the tidal water does not get inside the village and is only limited within the basin area. Thus a peripheral embankment needs to be constructed along the basin area. While constructing the embankment, the concern of tidal surge during storms will have to be kept in mind and as well as the maximum difference between high tide and low tide. The peripheral embankment has to be wide enough to withstand the forces of the tidal waters during tidal surges and also the height has to be enough so that tidal water does not get inside the village. The peripheral embankment should also have some outlets to drain water from inside the villages into the beel, thus to the river.
- **Suitable Cut Point:** A suitable cut point must be selected on the embankment to allow the tidal water to come inside the polder which is the selected basin area. The cut point needs to be big enough so that it does not become a bottleneck. Local consultation must be taken into account before selecting the cut point location and opening the cut point.

- **Construction of connecting channel (if necessary):** A connecting channel may need to be excavated if there is none to connect the river and tidal basin. Sometimes this can be a little difficult since land along the river banks are occupied by the local people. The implementing authority might have to compensate the land owners since their land will be unusable even after the TRM process is over. So it is better to find out Khasland for excavating a connection channel for the TRM process. Local consultation is always suggested here in order to ensure that the concerns of the local people are addressed properly.
- **Excavating a network of canal within the basin area for effective sediment management:** This is important to ensure that the tidal water is distributed throughout the basin area. If the tidal water does not reach all the corners of the basin area then there will be dissimilarity between the raised grounds due to sedimentation. It is important to ensure that the tidal water have enough velocity when they enter the basin to go to the furthest corners and drop their sediment load evenly all over the tidal basin. If the area near the cut point of the basin is sediment first then the far most corners will be left out and TRM process will remain incomplete. Thus, a network of canals within the floodplain is necessary. The canal network will ensure effective sediment management within the polders and when the TRM process is completed, the people will have raised fertile land for their agriculture.
- **Compensation for the affected landowners:** During the TRM process, it is not possible to do any agriculture or aquaculture within the basin area, since the basin gets inundated. It absolutely necessary for the state to compensate the local people who owns the land inside the basin area. Generally, a TRM process can go on for three to seven years and the landowners lose their main source of income. Most of the affected landowners are marginal farmers whose entire livelihood depends on their land. Since their only source of income becomes obsolete during the TRM implementation so the compensation amount needs to be competitive and timely, so that the affected landowners will not have anything to say against the TRM process. Government follows the land acquisition and reacquisition policy to provide the compensation for the affected farmers.
- **Creating alternative livelihood opportunities for the basin dependant people:** A lot of people living along the catchment area

of the basin are directly dependent on the basin. Not all the people living along the basin owns land inside it. In fact a greater number of people work as day labourers. There are other people who extract natural resources from the selected basin for their livelihood. For example, there might be people who fish on the open water bodies inside the basin area or people who collects reeds (wild grasses), shells etc and sells in the local market for their livelihood. When the basin areas will be brought under the TRM process, these people will lose their jobs, particularly the agricultural labourers. Thus alternative livelihood is required for them in order to ensure their living and life. One of the best ways to provide alternative livelihood for the affected families is to involve them with the earth work of the TRM process. For example the labours can help construct peripheral embankments, cross dam, excavate canals and also work for maintenance.

- **Rehabilitating the families who were affected due to river bank erosion or other causes:** During the TRM Process, the velocity of the water in the river increases which causes the river to become wider and deeper. River bank erosion is a common phenomenon during this time which might leave a few families homeless. Thus it is absolutely necessary to relocate them in a different area. State can provide Khasland to the affected families to rehabilitate. It is worth mentioning that most of the people living along the river bank are poor or extreme poor households and high percentage is landless. There might be people living inside the basin area who will need to be relocated in order to ensure proper TRM process.
- **Regular maintenance:** Structural measures constructed for the TRM, for example peripheral embankments, canals, needs to be regularly maintained in order to ensure effective TRM process. The peripheral embankment can be damaged if there is any cyclone, so provision for rehabilitation of the embankment needs to be included in project design. The connecting canals or the network of canals might get sedimented and hamper the TRM process. The canals need to be monitored and excavated regularly to ensure free flow of water.
- **Excavation of River above the cross dam:** The river above the cross dam needs to be manually excavated using machines during the TRM process. This will ensure that drainage of the upland run off is not slowed, which might result in water logging. When the TRM process will be over, the tidal water will move further upstream, increasing the tidal prism and ensuring free flow of high tidal waters.

- **Rotation of Basin:** Once the selected tidal basin is full and the raised to expectation, then the TRM process needs to be shifted to another basin of the river. If the basins are not shifted immediately after the closing of the previous one, the river will again get sediment by the sediments brought in by the tidal water. So the TRM process is a continuous process and needs to be regularly shifted from basin to another.
- **People's Participation:** This is the most important step of TRM. Without active participation from the local people it is not possible to implement TRM. From selection of Beel, and appropriate cut points to finalization of compensation amount and construction and maintenance of embankment in every step participation is equally important. It has been observed that TRM was the most effective where there were more people participate

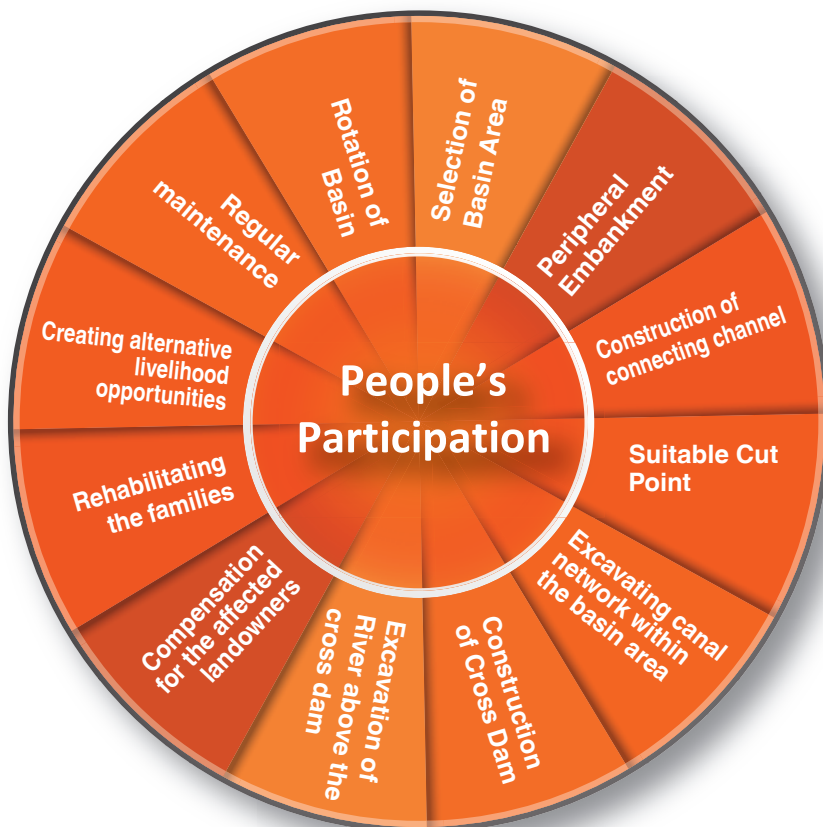


Figure 7: Steps in TRM process

4.3 Result of TRM in Beel Bhaina of Hari River Basin area

Local communities introduced TRM in Beel Dakatia of Hamkura River basin area. The locals breached the embankment to let stagnant water out of the floodplains. In the process, the lands inside Beel Dakatia rose above the floodplains and within years the Hamkura River became a big wide mighty river. However, the result was not enough to encourage policy makers to adopt the local people's knowledge.

The results of TRM in Beel Bhaina set a new trend for water managers to believe in the natural process to solve water logging crisis of the south west coastal Bangladesh. The Hari River basin was opened by the local people in 1997 and within four years the results were outstanding. In 1997 the river was flowing a meter above the sea level and by 2000, the depth of the river increased by 11 meters in the downstream area of the breaching point. The graph prepared by Institute of Water Modelling(IWM) in 2001 illustrate the remarkable changes. The land inside BeelBhaina was raised by 2 feet on an average. Near the breach point the land raised by 6 feet but on the far end the land raised by half a feet to 1 foot. This was because the tidal water did not have the velocity to reach the far end of the basin area. Thus those areas were not silted

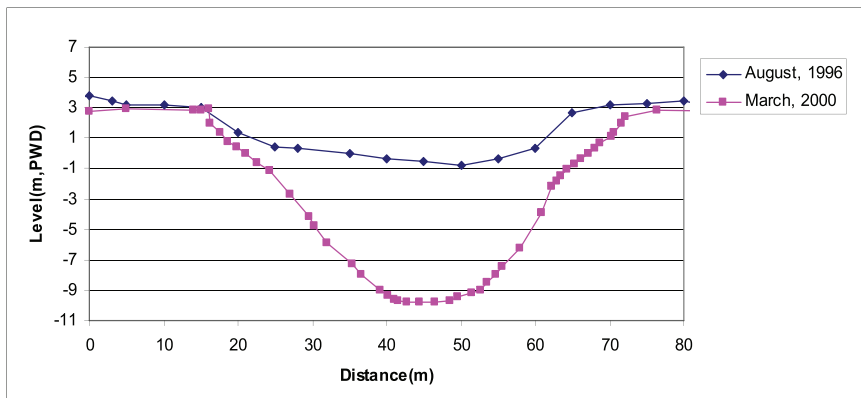


Figure 8: Result of TRM in Hari River (Source: IWM)

Government recognized the TRM process of Beel Bhaina as soon as the EIA and SIA reports were released by CEGIS. After that the government monitored the situation of the Beel Bhaina till it was operating. The movement of the people to ensure sustainable water management started

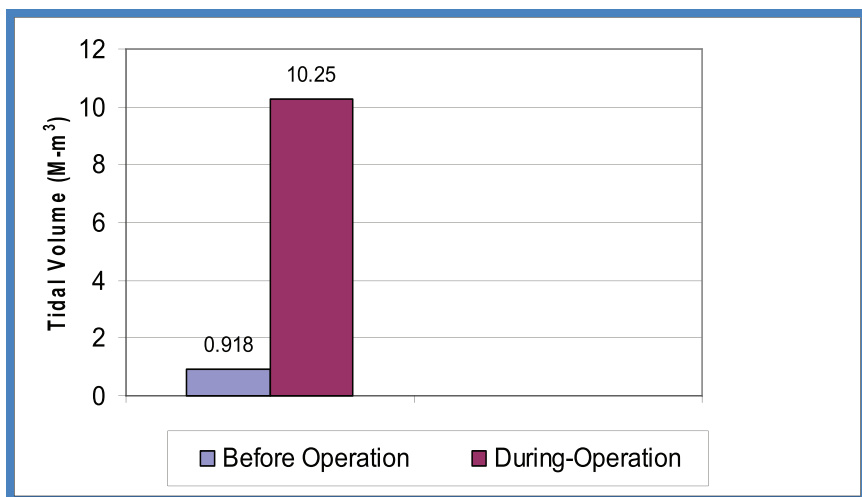


Figure 9: Result of TRM in Hari River (Source: IWM)

a paradigm shift in water management sector of Bangladesh, one that later changed multiple government policies and the perspective of water managers in the country. Two important aspects of TRM implementation came out of the Beel Bhaina TRM which are: a) necessity of providing compensation to landowners inside the basin area b) construction of peripheral embankment to protect nearby villages. The local people demanded that since TRM will be implemented in other river basin areas as well so these two issues should be given priority in order to ensure that the local people’s suffering does not increase from it.

4.4 Scaling Up of TRM

After the people initiated TRM of Beel Bhaina along the Hari River basin area the government of Bangladesh decided to scale up the TRM process in other river along the south west coastal Bangladesh. The government and the people came to an agreement that TRM is the best option to mitigate water logging from the area. As a result of such agreement, Government decided to implement and scale up TRM. But unfortunately only one river basin area other than Hari river basin area has been brought under the TRM process so far. In 2011 the government started a project on the Kapotakkho river basin area where TRM is ongoing. But unfortunately, TRM in the Hari river basin area is now temporarily off due to conflict between state and the local people over compensation. So currently only one TRM basin in the whole south west coastal Bangladesh is under operation.

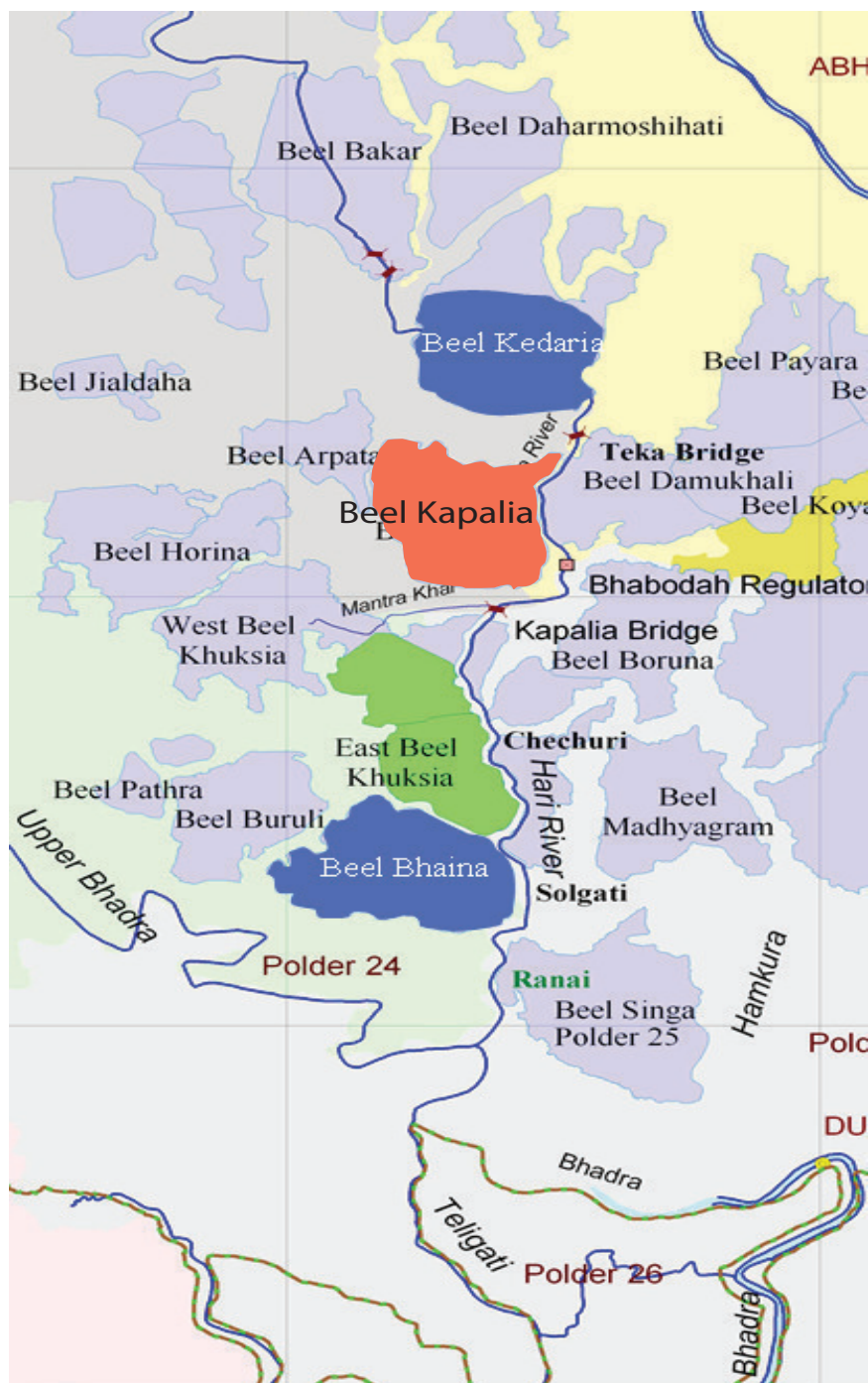


Figure 10: TRM site along the Hari River

4.4 Hari River basin

Hari is the first river where the government of Bangladesh has formally started to implement TRM. So far the government has implemented three TRM along the Hari River basin area. The local communities implemented the first TRM in Beel Bhaina under polder 24. In 1999 the government of Bangladesh accepted the concept of TRM and took over Beel Bhaina from the local people. The TRM beel remained open until 2001 and the results were amazing. After the implementation of TRM in beel Bhaina, three scientific organizations, CEGIS, IWM and SMEC, carried out thorough research on the process of TRM where they identified the results of TRM and also the shortcomings within the process. Based on the findings of these studies and the demand of the local people, it was suggested that the government should include the provision of providing compensation to the land owners inside the beel area and a peripheral embankment needs to be constructed along the beel area to stop tidal water entering in surrounding villages. The research findings and local opinions also suggested that the process should be continuous and needs to be done in rotation. Otherwise the river will once again become silted if at least one basin area is not operational all the time. Thus after the completion of TRM in Beel Bhaina the government of Bangladesh shifted the TRM process upstream in Beel Kedaria. Beel Kedaria comes under polder 24 of Abhaynagar and Manirampur Upazila of Jashore district. Beel Kedaria is around 16 Km upstream of Beel Bhaina. The total area of the Beel was 1700 hectares and the TRM was done in 600 Hectares.

4.5 Kedaria TRM

In 1993-94, a Dutch organization Royal Haskoning DHV published a research report on Kedaria tidal basin. The report suggested that Beel Kedaria tidal basin should be converted into a permanent basin. The idea was that this would increase the velocity of the water within the river. But the research report did not consider the concept of silt. When silt will keep on depositing within the basin area for a long time then at one stage the basin area will not be able to hold up any more silt and silt will again start to deposit within the river bed. The research report suggested that the silt deposited in the basin can be excavated on a regular basis to continue the process. The research also suggested that the silt carried by the river can also be pushed back during low tide but how this can be done is not

elaborated. Besides, if sediment goes back during the low tide, it will also harm the Sundarban area.

The issue of peripheral embankment was included in Beel Kedaria TRM but unfortunately, compensation for the affected people was not included in the process. There was confusion within the BWDB about whether they want a permanent tidal basin in Kedaria. Thus the process of compensation remained unsolved and was not provided. No cut point was created within the embankment for Kedaria tidal basin. BWDB planned to use an existing thirty vent sluice gate in Bhabadah area and a connecting canal for ensuring tidal action within the basin area.

The TRM in Beel Kedaria was very unattainable since the TRM was done through the Bhabadah regulator. In fact, due to failure of TRM in Beel Kedaria, the Hari River quickly lost its navigability which resulted in water logging in the catchment area. Since the tidal water was allowed inside the flood plain using only a sluice gate and connecting canal, it created a funnel like shape which reduced the velocity of the water within the river and canal. The main concept of TRM was to increase the velocity of the river water. But here it did not happen due to the funnel like shape. As a result the connecting canal and the river gradually became silted in between the year 2003, 2004 and 2005. The Hari river once again started to lose navigability and the final pin in the coffin was laid in late 2005 when the local people closed the sluice gate with the help of the local authority to stop tidal water coming inside the basin area so that they can grow rice on their land. Since there were no compensation plan and the local people were in livelihood crisis, so they were forced to do this. This step brought a massive devastation in the local area. Within a few months the connecting canal and the river were completely silted and the monsoon of 2006, the people living in the catchment of Hari River basin area witnessed one of the deadliest water logging ever. Water logging soon spread and more than five upazilas in Khulna and Jashore district became inundated.

4.5 Khukshiya TRM

To quickly solve the water logging situation the government shifted the basin from Kedaria to East Beel Khukshiya. East Beel Khukshiya is just above the Bhaina basin area and is a very important basin of the Hari River. The total size of the basin was around 900 hectors and the basin was

opened in August 2006. Initially the government planned to use the 8 vent sluice gate for allowing the tidal water inside the floodplain. But the local people knew about the situation of Beel Kedaria, where a sluice gate was used to allow tidal water. They breached the embankment and opened a larger cut point upstream of the sluice gate to allow tidal water into the basin area. Popular demand of the local people of Beel Khukshiya forced the government to provide compensation for the landowners inside the basin area. At that time, compensation of BDT 10000 per acre of land was decided by the government. Peripheral embankment for protecting the villages around the basin area was also constructed under the project. The TRM in Beel Khukshiya basin helped to mitigate the water logging crisis of the Hari and Upper Bhadra river basin area.

But there were many implementation gaps in the TRM process. First, the peripheral embankment was not constructed as per design. The peripheral embankment had no outlets through which water from other 27 beel area and nearby village could find a way into the khukshiya basin thus into the Hari river. The villages along the periphery of the basin became water logged in the first year. Additionally, the peripheral embankment was not constructed according to the design. The height and width of the embankment was not as per design. Every year during monsoon the embankment collapsed in some places and inundated people's household with tidal water. Moreover, during 2007 and 2009 cyclone AILA and SIDR also damaged the embankments heavily. The implementing agency did not repair the embankment properly.

The issue of compensation did not go well in Beel Khukshiya either. First of all the amount 10000 taka in a year for an acre of land was very small and was certainly not enough to meet the people's demand. Secondly, the process of collecting compensation through the land acquisition and reacquisition policy proved to be very complex for the land owners. Not only that, the compensation process involved a lot of mismanagement. This discouraged land owners to collect compensation from the government. Only 21% people were able to collect compensation, that too for just two year.

The basin area of Khukshiya was supposed to be open for 3 years. But instead the basin area remained open for nearly 7 years. It was closed in

January 2013 with the local people leading the closure process. Sedimentation inside the basin area was not evenly distributed since the tidal water did not reach the far ends of the basin. Thus it took longer time for the basin to be silted than predicted. Besides, due to unplanned sedimentation, areas near the cut point became quickly silted making it difficult for tidal water to reach the far ends of the basin. But still the result of TRM in beel khuskhiya was tremendous. During this time, the height of the land inside the basin was raised by 2 feet on an average, with the areas near cut point were raised by 2 meters and the areas in the far end were raised by only a feet. Similarly, Hari river regained its navigability. The depth of the river after the TRM of Beel Khukhiya increased by around 10 meter and the river became at least 2-3 times wider. Since TRM has started in Beel Khukshiya water logging was mitigated from Hari river basin area, but this was until 2015. In 2015 some areas around the Hari River basin became water logged which was very small. From 2016 onwards water logging has once again retured in the floodplains of Hari River.



The current condition of Telegati River

4.6 Beel Kopalia

After the closing of beel khukshiya, government planned to move the TRM upstream in Beel Kopalia. Local people demanded that the compensation should be paid before the TRM starts. Government and the local agreed for a compensation amount for Beel Kopalia, at BDT 50000 per acre per year. But the local people stood firm for their demand that the compensation needs to be paid before the TRM beel is opened. The locals were aware of the suffering of the people of beel khukhiya in the last 7 years. They stood their ground without any compromise. Government officials tried to convince the locals but they were unable to gain their trust. In fact the locals were so frustrated with their experience with government officials that they became aggressive towards them. In 2013 when the Chief Whip and other high level government officials went to visit Beel Kopalia, the locals stopped them and aggressively attacked them. Things became violent very quickly as the local people burned down several vehicles and chased the government people out of the area.

The movement of the local people was strictly against the compensation mechanism. They demanded that compensation should be provided prior to TRM implementation. They were not against the TRM process. But unfortunately vested interest groups and their political and media cohorts misinterpreted the incident. They portrayed the grievances as a movement against TRM. Thus till now Government has failed to open Beel Kopalia or any other basin along the Hari River.

Therefore over the last six and a half years, the Hari River is on the verge of dying. Water logging once again started in the basin since 2016. In 2017 the situation was dreadful as close to a million people along the catchment area of Hari, Sre, Upper Bhadra become water logged. At the moment, the situation is in a deadlock. Every year, local political leaders for excavate a small portion of the river to appease their vote bank and present it as makeshift solution to water logging. The Ministry of Water Resource is reluctant to start TRM in Beel Kopalia, although projects are ready. There is a clear lack of leadership among the relevant authorities, political parties and even within local society to solve this stalemate.

4.7 Kapotakkho River Basin Area: TRM in Pakhimara Beel

Nearly 2 million people live in the catchment area of Kapotakkho River. The river is economically and culturally significant for the people living in here. However, by 2009 the river was almost dead due to heavy siltation. Heavy water logging on the catchment area of the river throughout the 2000s resulted in massive humanitarian crisis. More than a million people were directly affected a result of the water logging crisis. For a long time the people living in the catchment area of the river are demanding to restore the dying river and start the TRM process to save the locals from repeated water logging. In May 2009, the local people started a TRM initiative in Beel Jethua of Jalapur Union which operated till December 2009. Uttaran and Paani Committee also helped the local people for that initiative. In only 7 months, the navigability of the river downstream of TRM site increased and for almost two years the drainage capacity of the river has improved. Based on the popular demand of the local people and due to dying condition of the river, Government of Bangladesh finally issued a project of worth BDT 262 crore to save the river and remove water logging. The project had two main components which are: a) 90 Km of the Kabodakh river will be re-excavated and b) implementation of TRM in Pakhimara beel of Jalapur and Keshra union of Tala Upazila under Satkhira district. The project was scheduled to end in July 2015 and then extended for two more years.

The total size of the TRM beel was around 672 hectors. In the TRM process government planned to excavate a 1.5 km long link canal to connect the basin with the Kabodakh River to ensure tidal movement. Peripheral embankment was also constructed to safeguard the surrounding villages of the beel area. The compensation amount was decided through local consultation. The amount was BDT 43127 for a 1 acre of land for a year. However by 2015, the project was nowhere near the finish line. BWDB responsible for the implementation of the project managed to excavate 73 KM of river and failed to start TRM. The local people were not happy. The TRM basin was not prepared according to the design. The link canal was very small and the peripheral embankments were poorly constructed. By 2015, people who gave land for the link canal did not get the compensation let alone the land owners of the beel. There were no alternative livelihood options within the project for other project affected people either. The

tension between BWDB and local people intensified and another “Kapalia” situation was looming large.

Under this condition, BWDB formed two committees in Tala upazila under the leadership of UNO and at Satkhira district under the leadership of the Deputy Commissioner. Uttaran and Paani Committee were selected as members of the committee. After the formation of the committee, BWDB asked Uttaran in June 2015 for mobilizing the local community so that TRM can be started as soon as possible. Uttaran then assured the local people about facilitating the process of accessing compensation, providing alternative livelihood to those who were not eligible for compensation, rehabilitating people who land lost due connecting canal. Uttaran promised to fight for the demand of the local people and put forward their demands to the government. This helped to create a favourable situation for the starting of TRM. In July 2015, finally TRM started in Pakhimara Beel.

The TRM is still under operation at the location. The project has finished and extension phase is now being processed. Since 2016, there has been no major water logging problems in the catchment area of Kapotakkho River basin. In the downstream of TRM basin the river is now more than 60 feet wide and in many places have reached a depth of more than 50 feet. So far around 80% people have received compensation and the 34 families who were displaced are rehabilitated in a nearby area where the government of Bangladesh provided the land and Uttaran with its own funding and support from international partner Misereor have provided housing for the families. Uttaran provided livelihood support to the people affected by the TRM process. Areas which remained water logged throughout the year such Islamkati union of Tala Upazila, is now completely free from Water logging as the river is draining water. Umbrella species such as dolphins and shark are also being regularly found in the river which was not seen in the river in the past 15 years. The overall fish production in the river has increased and fisher folk community are getting good catch every day.

Unique problems were faced during the implementation of Pakhimara TRM. First, 15-20% landowner will not receive any compensation even though they are the owners. They lack legal papers for their land and due to complex the legal administration system and informal land governance system it is difficult and time consuming for them to collect the legal

documents. Second, according to government records there were no connecting canal in the map where it has been excavated. The locals excavated this canal for drainage purpose. People have houses, gardens and graveyard near the connecting canals. Many graveyards were destroyed during the excavation of connecting canals and when the canal became wider. This was a culturally sensitive issue. Besides, according to the Acquisition and Reacquisition of Immovable Property Ordinance 1982, graveyards cannot be acquired by the government. But here technically these graveyards are now lost under the connecting canal. So even though the government has not acquired this land but still the land owners have lost it and they will not receive any compensation for this either. Finally, the earth work in peripheral embankment were very poor which resulted in erosion of river bank and peripheral embankment leading to humanitarian crisis.



Kapotakkho TRM site



Kapotakkho River Before TRM



Kapotakkho River After TRM

Chapter 5

The Role of Uttaran and Paani Committee



Uttaran was established in 1985 with a goal to establish a society with class, caste and gender equality. Being a local organization, Uttaran have learned and promoted local knowledge for managing environment and ecosystem. Initially, Uttaran's focus was humanitarian aid since water logging was regular event in the south west. Uttaran responded to the water logging crisis in Satkhira, Jashore and Khulna areas throughout the late 1980s and early 1990s. Slowly, Uttaran learned that the water logging disaster is not a natural one but an outcome of failed water governance and mismanagement of the river system. While trying to understand the dynamics of formal and informal water governance in south west Bangladesh, Uttaran gained deeper understanding about the informal water governance sector that was active before the pre-polder era and how it changed after the 1960s. Through the process, Uttaran learned how the involvement of the community in decision making processes has also reduced. Projects such as KCERP and KJDRP were rejected by the people of the south west Bangladesh since these were not designed considering the local ecosystem and the demand of the community.

As mentioned before, the community people in a semi-organized way were advocating against such government initiative. Since they did not have any chance to be involved in designing of such large infrastructure based program which affected their life and livelihood adversely, local people through various initiatives started to voice their grievance. They also proposed alternative nature based indigenous solution against structural measures. However, there were no active platforms through which they could reach decision makers for constructive engagement. Through 1988, 1989 and 1990 water logging across the region became very severe. And the frustration of the local people increased immensely. The local people then asked Uttaran to find alternatives of relief operation. Uttaran with the help of local people who were leading the protests in different region formed a small committee in 1989. The committee invited the elected Member of Parliaments and 3 ministers from the water log affected areas to solve the crisis to which they promised to take measures within a month, however they failed to do so. The local leaders then once again pushed Uttaran to take alternative measures. During that time, Uttaran had small

Cash for Work Program which was used to excavate a few canals for an alternative drainage plan. This plan was developed through mass community engagement. Immediately, 51 villages from Tala, Keshobpur, Dumuria and Manirampur Upazila of Satkhira, Khulna and Jashore districts were free from water logging. However, this was immediate and Uttaran and local leaders were looking for a sustainable solution from the government side as well.

As a rights based organisation Uttaran knew that a formal platform is essential to constructively engage with the government. Thus through the process, by July 1990 Uttaran organized the community leaders and greater civil society leaders into an organization which is now popularly known as Paani Committee. Initially Paani Committee for 8 Upazilas of the area were formed and 1 apex body of the committee was established. During the same time frame, the Beel Dakatia movement against KCERP project started and the members of Paani Committee were also involved in it. Uttaran brought all these small movements under one large umbrella. From the experience of movement of Beel Dakatia, and based on local knowledge Uttaran and Paani Committee, understood the concept of an open tidal system (later named as Tidal River Management). Uttaran organized a conference in Khulna where stakeholders from academia, development activists and partners and community leaders, journalists, Paani Committee members were present. This is where the initial concept of TRM was adopted among the local community, local leaders, Paani Committee members, development activists and the academia.

Since then Uttaran and Paani Committee have been jointly advocating for mitigating the water logging crisis of south west coastal region by taking a nature based approach. Paani Committee and Uttaran's successfully advocated to the government for adopting Tidal River Management which the government later scaled up in Khukshiya and Kedaria Beel of Hari River basin area and Pakhimara Beel of Kapotakkho River basin area. The joint effort of Uttaran and Paani Committee on community participation and inclusion of community knowledge on formal water governance was accepted by the government of Bangladesh. Later on, TRM was included as a key mitigation strategy against water logging in various government

projects and policy tools such as 20 year master plan on Polder 1, 2, 6 and 6-8 and Bangladesh Delta Plan 2100.

Over the years, as the ecosystem, economy, culture, society and people have changed Uttaran and Paani committee's role have also evolved. Initially, Uttaran and Paani Committee largely opposed structural solutions to water logging problems but now a negotiated approach and constructive partnership is adopted by the platform. Long term involvement for establishing a sustainable water management system, Uttaran and Paani Committee gathered both technical and local knowledge. Uttaran now understands the necessity of creating a balance between scientific and technical measures and nature based solutions. We also understand that without institutionalising people's participation the balance cannot be achieved. The following illustrates how the role of Uttaran and Paani Committee has changed along with the achievements.



Paani Committee members in action

5.1 The evolving role of Uttaran and Paani Committee

- Uttaran and Paani Committee now act as a bridge between local people and the Government of Bangladesh. The organization amplifies people's voice in policy discussion and at the same time help people understand technicality of formal governance interventions.
- Uttaran and Paani Committee together with the local people analyse various government proposed programs and projects. Based on community consultation, Uttaran puts the demand of the local people to relevant authorities and provides constructive feedbacks and alternative solutions. Uttaran and Paani Committee bargains with relevant authorities to ensure that the demand of the local people are properly reflected in project design and implementation. Uttaran and Paani Committee organize local people and arrange regular stakeholder dialogue so that their voices are directly heard by the authorities. Uttaran also facilitates and supports local initiatives and movements for sustainable river basin management.
- Uttaran and Paani Committee now help the BWDB and other relevant in designing, planning and implementing various water management projects. For example, Uttaran is helping the implementation of TRM in Pakhimarabeel of Kapotakkho river basin, or helping BWDB in designing the excavation of Salta River. At the moment due to years of working with and against BWDB, a mutual respect has developed between the organizations. BWDB and Uttaran and Paani Committee now responds quicker to each other's demand.
- Uttaran also connects the local people with Academia which ensures that local knowledge, perspective and demands are reflected in important research documents contributing to formulation of national and international policies.
- Uttaran and Paani Committee together have successfully ensured that the concept TRM is well adopted in government's policies and programs.
- Creating and facilitating movement for up scaling of TRM across the south west region.

- Providing humanitarian assistance to project affected people when there were no compensation provided by government (Kedaria, Khukshiya).

5.2 Achievements of Uttaran and Paani Committee

- Successfully advocating for adoption of TRM as a concept to mitigate water logging and for ensuring sustainable river basin management in south west coastal Bangladesh.
- Persuading government to scale up TRM across multiple river basin in South West.
- Throughout 2008, Paani Committee organized many meetings along the catchment area of Kapotakkho River to mobilize the local people. The current political government Awami League, responded to the demand of the local people. In 2008, the president of Awami League, now the honourable Prime Minister of Bangladesh, Sheikh Hasina, through a teleconference made strong commitments to restore the river based on which the project was taken in 2011.
- Creating an alternative regional plan in 2013 with CEGIS, IWM based on community consultation across 11 river basin of south west coastal region.
- Becoming a member of TRM committee at the Upazila and district level.
- Formally being asked to mobilize local people on behalf of BWDB in favor of TRM.
- Uttaran and Paani Committee ensured that 80% people receive compensation for the 1st year and around 60% people receiving compensation for the second year in Pakhimara TRM site. It is important to mention that, in Khukshiya TRM site only 21% people received compensation. Uttaran and Paani Committee, financially supported 600 marginalized farmers with BDT 1300 and technically supported the every land owners for collecting their legal documents, filing application, opening bank accounts and for reducing the bureaucratic delay and hassle.
- Rehabilitating 34 families who were displaced due to erosion caused

by the link canal in Pakhimara TRM site. The land was provided by the government of Bangladesh. The housing was constructed by Uttaran with the help of Misereor, Germany.

- Providing alternative livelihood support to the project affected people who were not eligible for compensation.
- Getting invited by the Ministry of Water Resources as a local strategic partner in a national SDG platform.
- Getting involved designing and planning of water management projects in the area.



Chapter 6

Flaws in TRM Implementation



So far, 3 TRM basins have been done by the government of Bangladesh. And there was Beel Kopalia on the Hari River Basin that the government of Bangladesh could not open. Some common implementation flaws are noticed in almost all the current and previous TRM processes. These implementation faults that need to be solved before the government can further implement TRM in other river basin areas. Although discussed in details in the previous chapters here, the summary of the implementation flaws within the TRM process will be highlighted.

- **Compensation:** The main issue that the TRM process faces is regarding compensation issue. This is the sole point of conflict in all the implemented TRM and also in Beel Kopalia. Government failed to compensate the affected landowners prior to start of the project. Thus the local people protested to ensure that they are compensated. The conflict is certainly not with the TRM process but with the compensation issue. The main reason for this compensation issue is regarding the policy under which it is given. The policy itself is time consuming and complicated for uneducated land owners. Moreover, the issue of mismanagement should also be blamed along with the policy. The details of the policies will be highlighted in the Policy Analysis Chapter.
- **Implementation not in accordance with the design:** In the TRM of Khukshiya basin and Pakhimara basin had some technical flaws within the implemented design. The peripheral embankment in both the basin was damaged during spring tides and cyclones. Moreover, initially the number of outlets for draining water out of the surrounding area of the embankment was not adequate in Beel Khukshiya. In Pakhimara beel the outlets did not drain rainwater out, instead, tidal water coming in through the outlets submerging the villages. The connecting canal that was excavated for the Pakhimara basin was not in accordance with the design. The design opted for a much wider and deeper canal. But according to locals and Paani Committee the canal was actually 40% of required width. This resulted in river bank erosion along the canal and 34 families lost their homestead.
- **Unequal distribution of sediment in the basin:** A network of channel is generally created to ensure that the tidal water reaches every corner of the basin and sediment deposition is similar throughout the basin.

But in all the basins the rate of sediment deposition is higher near the cut point compared to the far ends. For example in Beel Khukshiya the areas near the cut point were raised by 2 meters or above whereas in the far ends only a one to two feet were raised. According to theory and design, the network of channel should function in such a way that the tidal water should have enough velocity to reach every corner of the basin which will ensure equilibrium in sediment deposition.

- Limited people's participation: TRM is a unique and indigenous concept of adaptive water management which evolved from the local people. People's participation is essential to replicate TRM ensure that the process runs smoothly. But in most cases the government of Bangladesh and its implementing authorities have overlooked this concept, which often led to tension and conflict. Local people dependent on the basin for their livelihood by working as labor lose their income source due to TRM process. These people can easily be involved with the earthwork of the TRM process, for example the construction of peripheral embankment or excavation of connecting canals and rivers. But implementing authorities do not take it into consideration. People's participation is required to ensure easier compensation and decision regarding when and where to create the cut points or connecting canal in order to avoid a conflict between the state and the community. The policy clearly states that people's participation for such adaptive water management is absolutely necessary but in practice the implementing agencies ignore the people.
- Use of sluice gates or flap gates as cut points: Sluice gates or flap gates cannot be used for creating cut points. First of all, the sluice gate is small compared to what the size of the river will be when the TRM process is over. Thus the tidal water will face obstacles while entering the flood plain and lose its velocity and sedimentation on the mouth of the sluice gates will be seen. This was seen in Beel Kedaria which remained open for four years but did not provide satisfactory result. To make matters worse, using sluice gate can cause further water logging.

Chapter 7

Policy Gaps



The experience of implementing TRM exemplifies the change of water governance discourse in Bangladesh. The transition from bureaucratic and technocratic approach, towards a more participatory and softer approach is an interesting opportunity to study the gaps in policies. TRM is a new concept for the government and implementing agencies. It demands special and separate policy for itself. The TRM process requires active participation of the local people and an easier compensation method. But the current policies are complex and create a different dimension of problems. It puts the state and the locals into two different poles, creating mistrust and conflict. It is important to analyse the participation and compensation policies to identify gaps and suggest alternatives.

7.1 Participation Policy

Guidelines for Participatory Water Management 2001:

The objective of the guideline is to ensure increased participation of the stakeholders in water management, so that the local stakeholders can have a decisive role at all stages of water management. The National Water Policy (1999) is synchronized along with this guideline.

The Guideline identifies seven different stakeholders are identified under the section 3.1, which are:

- Local stakeholders
- Water Management Organizations (WMO)
- Local government institutions
- NGOs/ community level self-groups
- Private sector service providers
- Implementing agencies
- Other public sector agencies

The Guidelines describe the roles and responsibilities of each of the stakeholders. But a lot of other important stakeholders who have significant contribution on water management have been overlooked. For example, the role of media and civil society are completely overlooked. Tidal River Management was brought forward by the combined movement of the popular civil society organization Paani Committee and the local people.

This issue was then hugely covered by the print and electronic media. The media visibility and debates created pressure on the government which forced them to study the TRM process and accepting this unique concept of water management. But the Guidelines do not outline specific roles for media and civil society.

Section 3.2 of the guideline states that “The beneficiaries and the PAPs can be women and men belonging to the households of farmers, fishermen, small traders, craftsmen, boatmen, landless people, destitute women or any other member of the local community. Through the process of participatory water management it will be ensured that the PAPs are appropriately compensated for any loss or negative effect that the PAPs will not be worse off due to project/sub-project/scheme intervention and the issue will be monitored.” The guideline clearly states that all the project affected people will be compensated. But in Hari and Kapotakkho river basin area we have seen that only the farmers who owns land inside the TRM basin area were provisioned for compensation. But there were many other landless and marginal people dependent on the basin who were negatively affected by the project and they were not brought under the provision of compensation. The section also said that PAPs will be compensated but does not delineate any process through which these people will be compensated.

About the participation of the local stakeholders the guideline clearly states that Water Management Organization (WMOs) will be formed. Under the section 3.3 of the guideline, it states that the WMOs will be the institutional framework through which participation of the local community will be ensured. WMO for the project taken along the Hari river basin area were formed but no such organization for the Kapotakkho river basin area was formed. At the start of the project, CEGIS tried forming a few organizations in the project area but those were never activated. Additionally, no formal or informal organization was formed with the PAPs of the Kapotakkho restoration project particularly in the TRM basin area. There was no formal mechanism in place to ensure the participation of the local people. When the implementing authority of the Kapotakkho River Restoration Project failed to open the TRM basin in 4 years, it formed a committee comprising of the civil society organization.

In section 5.1 three stages of Water Management Organizations were

suggested based on the size and the complexity of the project which are: Water Management Group (WMG) for village level, Water Management Association (WMA,) as an apex body WMG for projects upto 5000 ha or a mid-level organization for projects over 5000 ha and Water Management Federation WMF as an apex body for projects over 5000 Ha.

In section 5.2 of the guideline states that “the membership of the WMG will be open to women and men belonging to the households of farmers, fishermen, small traders, craftsmen, boatman, aquaculturist, landless people, destitute women, PAPs etc within the project/ sub-project/ scheme area who are influenced directly or indirectly and positively or negatively from the project/ sub-project/ scheme and they will be treated as general members of the WMG.” This is also similar for the formation of Water Management Association and the representatives of WMG will become a general member of the WMA. The WMF will be formed with the members representing the WMA. But from this point we can see that there is no space for local influencers or opinion pullers like teachers, lawyers, religious leaders, journalists and others. There is no space for media personnel as well. Previously we have seen that the civil society and the media along with the local community has started movement for the establishment of TRM and for ensuring better involvement. The local communities, civil society and media together formed a popular organization named Paani Committee. The committee had different tiers and from previous track record it can be seen that the organization played a very effective role in ensuring popularizing the concept of TRM and better management of TRM basin than the existing WMO set up by the implementing agency.

In section 4 the guideline states the steps in which participation is required. In section 4.1 the guideline identifies stakeholder participation in six different stages of a project cycle which are:

- a. Identification/ Pre-feasibility study
- b. Feasibility study
- c. Detailed planning, design and stakeholder institution building
- d. Implementation and Trial operation
- e. Operation and Maintenance
- f. Monitoring and evaluation

But when local people in TRM basin of Pakhimara beel were asked about these stages of participation only they could only talk about the first two stages. Since no WMO were formed for this basin so the local participation was not at all satisfactory in the last 4 stages described above. But in the case of the projects implemented in the Hari River basin area, the local's participation in the project was ensured through the formation of local stakeholder institution. Since there was almost no participation from the local people in the TRM of Pakhimara beel, the project was in jeopardy at one stage. The basin is operational but there is no visible participation in the project area.

According to section 3.5 of the guideline, NGOs should be involved with the water resource management projects. The guideline states “The NGOs/Community Level Self-Help Groups available at the local level will be relied on to assist the participatory process of the local stakeholders for water management activities. These will also render assistance in respect of assessment of negative impacts of PAPs and identifying mitigation measures” But since the adoption of the policy the implementing agencies have never opened any room for NGOs in the TRM projects to work with them to carry on such activities. In 2015, Uttaran took a step forward in order to ensure that the TRM process of Kapotakkho river basin area operates smoothly and asked for the permission of the Bangladesh Water Development Board to carry out social mobilization and facilitate the compensation providing mechanism. But this has happened due to long involvement of Uttaran in the water management sector and Uttaran's strong desire and commitment to mitigate the water logging crisis of the south west coastal Bangladesh

In section 4.3 page 13 the policy states “Visualize Production plans for each category of beneficiaries and Compensation and Mitigation plans for each category of project Affected Persons (PAPs)”. But no such compensation and mitigation plans or production plans were prepared during the already implemented TRM processes. In fact, this guideline is not followed for providing compensation to the affected people.

7.2 Compensation Policy

The compensation of the project affected people are provided through the Acquisition of Immovable Property Manual 1997. The manual was developed under the Acquisition and Reacquisition of Immovable Property Ordinance 1982. But the experience of TRM PAPs to collect compensation under the process described in the Manual has been very difficult. Only a handful of PAPs from the Hari river basin area and the Kabodakh river basin area has managed to collect compensation.

In a TRM process, two types of acquisition of land takes place. The Ministry of Water Resource passes the task of acquisition to the Ministry of Land and the land is then acquired by the district commissioner of the area. Some lands are acquired permanently for construction of connecting canals, and other necessary constructions and other lands where the tidal actions happens are acquired temporarily which is also known as reacquisition. The rules for collecting compensation is the same for both the process.

This rule was used to give compensation to affected farmers in the Beel Khuksiya of the Hari river basin area. Only a few of the affected farmers received compensation over the 7 years of the project and that is also for 2 year. When TRM was shifted to Beel Kopalia of the Hari river basin the local people demanded the compensation prior to the start of the project. But the implementing organization and the district commissioner failed to give the compensation prior to the start of the basin and thus the project stopped and conflict between the state and people escalated, causing massive movement against the project. The Kapotakkho River basin area started in 2011 and the compensation of the project was supposed to be paid within 2012 and 2013. But unfortunately, so far only 31% of the affected people have received compensation for one year. The ordinance of the 1982 and the manual of the 1997 was once again followed to provide compensation to the affected land owner. It is understood that the main problem regarding the implementation of TRM is compensation and so far we have seen that the policy is becoming a main factor in distributing the compensation properly.

According to the manual of 1997, the following documents are required to be submitted to the Deputy Commissioner by an interested person to

collect compensation for being affected due to a project. These documents are:

- The first document that is required is the mutation copy for which an application needs to be filed at the AC land office.
- The applicant would then require the current survey record
- The land tax needs to be paid and the receipt of all the cleared tax needs to be submitted
- If the land was bought from some other person, then the main copy of the deeds needs to be submitted. If the land was possessed hereditarily, the WarishNama needs to be submitted.
- Land records document
- A detailed description of the land according to the current SA record
- A photocopy of the notice
- A form
- BDT 1170 for the inclusion of name

Compiling these documents is a very lengthy process. First of all, the farmers of Bangladesh normally do not keep all these documents with them properly. So they need to collect these documents from relevant authorities before submission of application. Creating each of these documents from the local land offices can be very difficult, since the farmers are not aware about how to create them. They ask brokers to prepare these documents for them which requires a lot of money. Along with paying the brokers, farmers sometimes also need to spend further amount of money to speed things up. In this way it can be seen that around three to four thousand taka is spent in processing the documents before filing the application. Additionally, the land owners of Bangladesh do not always pay the land tax on due time. They must clear all the due amount of tax before they can apply for compensation.

After collecting and compiling the documents, another lengthy and bureaucratic system awaits the farmers. The farmers or affected landowner needs to file an application to the Deputy Commissioner. The applied file then moves across several tables at the upazila, district and union level before the money is sanction by the Deputy Commissioner. The steps of

collecting compensation are provided below:

- File Application to the E service centre of the DC office
- Application forwarded to LA office
- LA officer signs the received application
- LA office staff check the submitted document and prepare the file
- the prepared file again signed and sealed by LA officer
- Application forwarded to UNO
- UNO office will forward the application to the AC land office
- Application then forwarded to Union land office
- Union land office will check the documents and call the applicant and then prepare a report'
- The report along with the application will be then sent back to AC land office
- The file will then move to UNO office
- The TRM compensation committee in the UNO office will then sign the documents and send it to the LA office
- The LA surveyor then checks the report
- The surveyor then puts the amount demanded by the applicant and send it to the LA officer
- The LA officer then signs the file
- A cheque is then issued by the accounts division after receiving the file
- A lawyer is then called along with the applicant and the cheque is then transferred

From the above points it is very clear that the process very time consuming. Brokers are needed to speed up the process in every step and sometimes at the lower level the farmers have complained that they have to bribe the related officer to ensure that their file is processed. Because of the bureaucratic process it is often seen that the small land owners are reluctant to file the application. The small land owners say that sometimes

they have to spend more than the amount of compensation offered to them. It creates a major problem for the Land office as well. The compensation for the second year is normally not released until every affected landowners receive their compensation. Thus the process is further delayed and the situation worsens.

Same documents and the same process are followed for the permanent acquisition of land. It is important to mention that according to the Acquisition and Reacquisition of Immovable Property Ordinance 1982, the government will pay 1.5 times more than the average value of the land at the time of acquisition. The locals say that the value of the land that is offered to them for permanent acquisition is not satisfactory and the price should have been more. The ordinance also state that graveyards and such places cannot be acquired. But in the Pakhramara Beel of the TRM basin graveyards and such places were washed away due to force of the current of the link channels. And since the LA department cannot acquire such lands, then what will happen to those land is not clear. Neither the LA department or the local people have clear answer. Besides, the ordinance also states that the affected landowner whose lands have been acquired will receive the compensation for both the land and any property on it like trees, buildings etc. But there is no such initiative to compensate for these properties.





Betna river at Assasuni Upazila



Hamkura river now



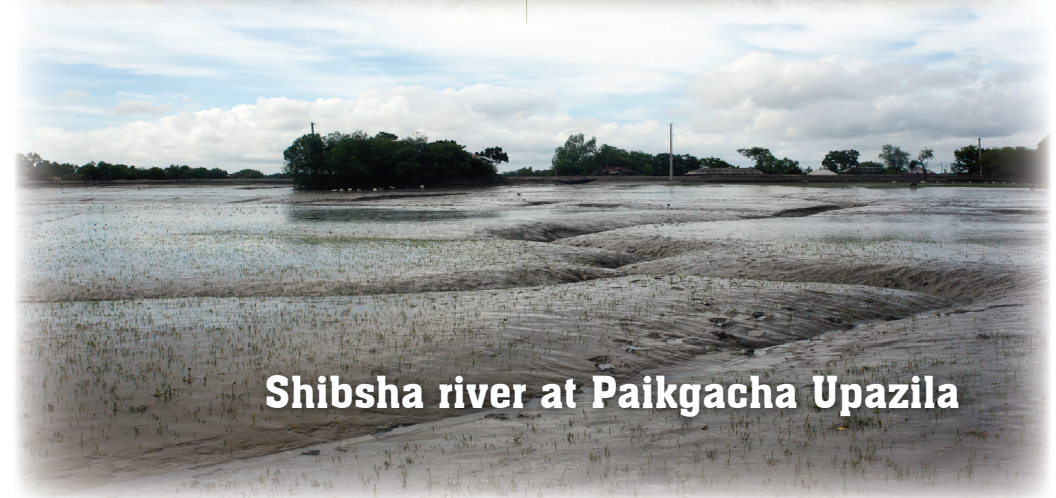
Shibsha river at Paikgacha Upazila



Haria river at Dumuria Upazila



Marichap river at Debhata Upazila



Shibsha river at Paikgacha Upazila

7.3 Bangladesh Delta Plan 2100 and the Way Forward

7.3.1 Bangladesh Delta Plan 2100

It is very important to come up with a long term planning in the sector of water management which integrates both local and technical knowledge and ensures the participation of the local people so that negative environmental and social impacts of such projects can be mitigated. At the same time the plan has to have long term visions to deal with the area specific issues of climate change. Bangladesh Delta Plan 2100 on paper promises to be perfect fit to solve the need for a long term policy paper. Unlike many previous master plans which have failed to reach its desired goal, BDP is a very comprehensive, zone, sector wise plan which has done well to identify problems and opportunities for specific areas and sector and provides a road map for development.

7.3.2 BDP 2100: Admirable Promises

Chapter 6.6 coastal zone strategy of the BDP 2100 begins by saying that the coastal areas of Bangladesh is spatially diverse and there is huge potential for the area which contribute to the national interest. To achieve these potential the BDP 2100 suggests “integration and inclusion” are required for new and existing intervention. This is commendable from the authors of BDP as many previous long term master plans have ignored the diversity of the coastal zone and has failed to integrate and include local knowledge and local people into it.

Water logging has been identified as a key issue for the coastal area for both 2015 and 2050. BDP 2100 have also identified that while there may be many reasons for water logging in the south west coastal Bangladesh but the key reasons of water logging is sedimentation caused by the presence of polder hampering the natural flow of tidal rivers which is further aggravated due to the lack of O&M of the polders and unplanned infrastructure within it. This analysis from the BDP authors is commendable since it recognizes that polder is a problem and is the key cause of water logging in the area. Previous documents or government authorities have not always mentioned the polders being the cause of water logging (Sakkhar 2017).

7.3.3 BDP 2100: Is It Participatory?

BDP 2100 then identified 9 strategies under the section “Sub-strategy CZ 1.1: Diminish drainage congestion” to improve the water logging condition of the area. Out of these 9 strategies 6 of them are directly related to the south west coastal areas. Among these strategies Tidal River Management (TRM) has been identified as a key strategy to improve the drainage situation of the area. BDP suggested that 7 TRMs need to be conducted in polders near Khulna and also further scope of TRM in the area needs to be studied with impact assessment and strategic directions. The paper defined TRM as a technology which “was introduced in Bangladesh, in order to tackle the problem of water logging which involves taking advantage of natural tidal movement in the river and adjacent low lying flood plains. TRM allows natural movement of tide from the river to an embanked low lying area (beel) through a link channel.” (page 300). The paper also mentioned that TRM was first applied through the KJDRP project. The description may give impression that TRM is “discovered” by another techno-bureaucratic intervention. However, Tidal River Management (TRM) is a participatory bottom up solution to water logging problems of the southwest Bangladesh and not a technique that was introduced by the KJDRP project as suggested by BDP 2100. By stating that TRM was introduced through the KJDRP project completely ignores the history of TRM and people’s movement for TRM.

BDP 2100 also has a lack of understanding on what TRM. TRM is a river based technique but BDP suggest only 7 TRM for the coastal areas and that too on polder basis. TRM stands for tidal *river* management and not really tidal *polder* management. It is in fact a soft measure to solve the problems caused by the polders itself as defined by the BDP 2100. Many have called TRM a controlled and small scale de-poldering

Concerns are also raised regarding the process by which the BDP 2100 was developed. More than 90% of the Paani Committee members who were involved in the local water governance process for a long time are unaware about the strategies proposed under BDP 2100. In fact majority of the people of south west areas are unaware about BDP 2100 and its relevant strategies. The strategies, though some may be admirable, are not prepared through community consultation and neither are they validated through a proper representative stakeholder process. 2% of the national

GDP are going to be spent for this and it will decide the life and livelihood of millions which is why Uttaran and Paani Committee believe that it must always uphold democracy and serves people's interest otherwise there will be no difference between BDP 2100 and previous master plans. People expect it to be holistic, transparent and participatory in nature so that diverse interests of different stakeholders are met and the economic development of Bangladesh continues. However, discussion on BDP 2100 is still not in public domain nor it is in academia (Khalequzzaman, 2016). It is important for the planners to rethink and edit the document if necessary to minimise this kind of problems so that the benefits of BDP 2100 is equally shared among the people of Bangladesh and unlock the full potential of the country.

7.3.4 Uttaran and BDP 2100

Uttaran at this moment is looking to engage with BDP 2100 documents and process and looking to create a space for local people to voice their concerns, appreciations and alternatives. Uttaran is currently translating the important and relevant sections of BDP 2100 in the context of south west coastal region. Uttaran plans to disseminate the information to the local people. After that, Uttaran will organize a series of consultation meetings with the local community to understand their concerns and demands and place it to the relevant authorities of the government of Bangladesh. Uttaran strongly believes that without public discourse and discussion about 2100 in public domain it will be unwise to roll out such an ambitious, timely and definitely a necessary plan.

Chapter 8

Recommendation & Conclusion



It is clear that everyone from academic to practitioners, from government to non-government organizations, all agree that the rivers of the south west coastal region needs to be protected in order to ensure that the human civilization and natural ecosystem thrive. At this moment all the stakeholders have also come to a common ground that the TRM is the best possible solution we have in order to restore and revive the rivers of the south west and mitigate the water logging crisis. It has also been proven by several government, non-government and scientific organization that TRM is very environment friendly and highly appreciated by the local people. This paper identifies various policy gaps which questions TRM implementation process. If the gaps within the policy frameworks are covered then the full potentiality of the TRM process can be unlocked and such questions will not arise.

This paper recommends the following changes:

- **Compensation:** Compensation is the key problem of the TRM process. Currently the compensation is being provided through the Acquisition of Immovable Property Manual 1997 under the Acquisition and Reacquisition of Immovable Property Ordinance, 1982. But we have witnessed that under this manual compensation process becomes very bureaucratic and complex since farmers need to submit a lot of supporting documents and it is time consuming. We have also seen that, under this process only a few people in the Hari and Kabodakh river basin area could access compensation and. Besides, if compensation is being provided through this process, then only the landowners are compensated but other affected people are not. Thus there are clear problems with this process and one that creates conflict. But the problem can be overcome through the Guidelines for Participatory Water Management 2001. According to section 3.2 and 4.3 of the guideline it is clear that compensation needs to be provided to *all* the project affected persons and a compensation and mitigation plan should be integral to project design. Since the TRM process is a water management project under the Ministry of Water Resources, it is logical to use the water management guideline to ensure compensation of the TRM affected people. This paper strongly recommends following the Guidelines for

Participatory Water Management 2001. If this guideline is followed, then a clear plan and process can be created under which the compensation can be provided and all the project affected people which will include all kinds of people including landless and land owners to be compensated. Thus this will help to mitigate the conflict regarding the compensation mechanism and ensure smooth operation of the TRM process.

- **Participation:** Participation of the local people is absolutely necessary to ensure effective implementation of the TRM process. Since TRM was initiated by the local people the process naturally demands strong local people's participation for ensuring a proper TRM. The Guidelines for Participatory Water Management 2001, under the section 4.1 identifies the stages of a project where the local stakeholders will participate and following on in section 4.2, 4.3, 4.4, 4.5, 4.6 & 4.7 it states that how the participation will be done in different stages of a water management project. But the experience of TRM in the Hari and Kapotakkho river basin area suggest that the guideline is not clearly followed. In the Hari river basin area we have seen that the guideline was partially followed. But in the Kapotakkho river basin area the guideline for participation was overlooked for which people are unsure about their role in the TRM process and created further conflict. So the paper suggests that the Guidelines should be strongly followed in order to ensure strong people's participation and effective TRM implementation.
- **Civil Society and Media:** Since the media and civil society have played an important role during the emergence of TRM and ensuring effective water management in the south west coastal Bangladesh, the paper recommends inclusion of civil society and the media as key stakeholders.
- **Compensation for every year:** In the field level it has been observed that the land owners who have collected compensation under the TRM process in Hari and Kapotakkho river basin area have only managed to collect it for one year. But since a TRM process generally lasts up to 6-7 years and sometimes it might take up to 10

years, so it is unjust to provide compensation for only a year. This paper recommends that compensation must be provided throughout the project duration.

- **Basic Requirement of TRM:** The paper discussed the basin requirement of the TRM process like construction of peripheral embankment, link canals, effective sediment management etc. If one of these basic requirements is not implemented in accordance with the design, the TRM process will be affected and the people will suffer. For example, if the peripheral embankment is not constructed as suggested in the design, then it may break and the people of the surrounding villages will suffer. The paper strongly recommends that the basic requirements of the TRM should be followed in accordance with the design.
- **Rotation of the Tidal Basin:** The paper recommends rotating the tidal basin immediately after the completion of a basin. Otherwise, the river will again become vulnerable to silt deposition and will lose navigability and cause water logging. For example, the case of Hari River, as water logging has once again returned to the Bhabadah area after not being able to rotate the TRM basin to Beel Kopalia from Beel Khukshiya.
- **Formation of a Regional plan:** According to the National Water Policy, WARPO was supposed to prepare a regional plan for the south west coastal area. But unfortunately, the role of WARPO is not that visible at the moment and such plan was never prepared. Thus the paper recommends formulation of a regional plan for south west coastal region.
- **Formation of a unique policy for TRM implementation and a separate body for the south west coastal Bangladesh:** The tidal wetland of the south west coastal Bangladesh and its river are very unique compared to other tidal rivers of the country. Around 5 million people live here and the civilization of the area depends on this unique river ecology. So for ensuring the protection of the civilization in south west coastal region a unique policy is required. The policy

frameworks will ensure effective TRM mechanism in order to restore the rivers. The region has very unique ecology with the Sundarban being at the heart of it, a separate regional body or organization is recommended by this paper to ensure protection of this unique ecosystem and the human civilization.

- **Stakeholder Forum:** A Multi stakeholder forum must be established including members from Affected Communities, CSOs and NGOs, Local Government Authorities and Institutions, Govt. Departments (Land, Fisheries and Agriculture), Research and Academic institutions (CEGIS, IWM, BUET etc), and members of Implementing Organization Bangladesh Water Development Board. The forum will monitor the activities of implementing organization, will advocate to enforce Government policies in planning and implementation of the project. Additionally Implementing Organization must be accountable to the forum.

The rivers of the south west coastal Bangladesh are basically tidal rivers or estuarine rivers. Once upon a time these rivers were connected with the main flow of the Ganges but over the years due to natural process and human intervention the tidal rivers of the area are only driven by the tidal action. The area has very unique brackish water ecology and home of the mysterious mangrove forest Sundarban. Around 5 to 6 million people reside in this tidal floodplain and the human civilization was built in parallel with this distinctive rivers. The survivability of the human civilization, the livelihood of the local people and this exclusive biodiversity all depends on the survivability of these tidal rivers. But due to human intervention in late 60s, the rivers of this area are threatened to extinction. For the last 20-25 years human induced water logging has destroyed the life and livelihood of the 6 million people of the south west coastal Bangladesh. Faulty design and embankments for controlling flood and salinity has caused the tidal rivers to be sedimented and lose its navigability, which is leading to death of rivers in this area. Local people have shown the government that using local knowledge and nature based solution in the form of Tidal River Management (TRM), it is possible to restore the navigability and the ecology of tidal rivers of the south west Bangladesh. Government of Bangladesh adopted the local knowledge but due to lack of proper policy

frameworks and knowledge of the local area, the TRM process is not being implemented properly. But it is true that TRM has been able to successfully increase the navigability of the river, mitigate water logging and proven as a good option for climate change adaptation. It is important to scale up this distinctive concept of sediment management in all the rivers of the south west coastal Bangladesh.

For protection and sustainable management of this unique ecosystem, its rivers and human civilization, it is important to create a special policy for and establish a unique organization for this area. Then the rivers of the area will live, water logging will be mitigated and people's life and livelihood will be ensured. In future, the south west coastal Bangladesh will become one of the most resourceful zones of the country.

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