

Local Stakeholder Analysis of Tidal River Management (TRM) at Beel Kapalia and the Implication of TRM as a Disaster Management Approach

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Abstract: Beel Kapalia is basically a marsh land or natural depression which lies in Monirampur upazila under Jessore district to the direction of south eastern from Dhaka. Mitigation of water-logging problem getting suspended sediment deposit gradually under a simulated manner is the driving mechanism for adapting Tidal River Management (TRM) project in the vicinity of the area. Besides, annual rainfall to the respective catchment area resulting flooding problem may be alleviated under proper disaster management program via introducing TRM as a selective approach. But, a lot of disputes and social movement have been arrived considering the demerits of TRM project including destruction of shrimp culture, which could be conducted by channelling the tidal water to marsh land, wetland ecosystem adversity, and assortment of an approximately 750 hectares marsh land and so on. This paper mainly focuses on the feasibility analysis of TRM project influencing to the local community. The field data is being collecting by pursuing social survey as questionnaire method to reveal the inherent perspective of the local people in this regard. Result show that about half of the people have been putting a negative attitude and rest of the sample having a mixed judgments regarding TRM project installation on the respective area. This paper provides an overview regarding the significant implication in an effort to introduce TRM project development in area studied and the finding could be helpful to pursue TRM project analysis in other area to be studied.

Keywords: Tidal River Management, Water Logging Problem, Disaster Management

1. Introduction

Bangladesh is a land of river and it has approximately 310 rivers. The total length of river is 2400 Km. Bangladesh has 57 trans-boundary rivers [1]. Bangladesh is an over populated country and the population is increasing fast so that the food security is the main problem in the present context. In 1959 the East Pakistan government had taken Coastal Embankment Project (CEP) enclosing all the tidal influence within 90 polders. Of them, 39 polders (10, 14,100 acres) are in Khulna-Jessore region enclosed within 1566 km of embankments with 282 sluice gates. After 15 years of CEP implementation of the southwest region [2] siltation started to clog one by one polder at sluice gate and first beel Dakatia became water logged. To solve the water logging problem, Khulna Coastal Embankment Rehabilitation Project (KCERP)

was first approved for beel Dakatia [3]. The Khulna-Jessore Drainage Rehabilitation Project (KJDRP) was constructed in 1993 with the financial support from ADB [4].

TRM is a sediment management system and to manage the sediment is an important element of river basin management [5]. The main purpose of TRM is to remove the sediment in a controlled system and sediment management is the most challenging aspect of it [6]. TRM is an environment friendly project, cost effectual and economically feasible process [7] to solve the water logging problem in the study area. To control of riverbed sedimentation in tidal basin, TRM is only applied in tidal rivers in the southwest delta of Bangladesh. In the Netherlands, the United States and Belgium, similar water management practices can be found in tidal rivers, forming – in some cases - an economically and environmentally sustainable alternative to dredging or (in the

case of the Potomac river) pollution control [8].

The main objective of the study is to analyze the perception and acceptance of local level stakeholder to solve the water logging problem in Beel Kapalia, Jessore, Bangladesh through TRM as a management tool. The specific objectives are i. to recognize the main concept of TRM (Tidal River Management), ii. to find out the problems of people living surrounding the village Kapalia, and iii. to analyze the significance of TRM as a disaster management approach.

2. Materials and Methods

2.1. Study Area

The study area is the village Kapalia. It is located at Monohorpur union of Monirampur upazila of Jessore district in the division of Khulna. The main attraction of the study area is Bhabodah sluice gate situated in Bhabodah village near Kapalia on the river Shri. Kapalia is a highly populated village and its total population is 3123. Total household of the village is 746 [9].

2.2. Methods

In this study both primary and secondary data were collected in order to focus on the objectives of this study. The population data and the volume of the study area were collected from the upazila statistical bureau, Manirampur, Jessore. Other sources of data are books, governmental reports, various NGO reports, magazines, international reports, scientific journals, maps, and news articles. Primary data was collected by using questionnaire survey to the respondents among the villagers in the study area. Personal interview among the villagers in the study were followed randomly in

order to fulfill the required field work of the thesis. There were interviewed 61 participants in the village Kapalia. During the period of taking interview, it was in keen attention in the process of listening, paraphrasing, probing, and note taking.

2.3. Basic Concept of TRM

Tidal River Management (TRM) system is the tidal storage basin which allows natural tidal flows up and down in the river system which is applied on a beel. A beel is a natural depression in the flood plains that generally contain water throughout the year [10]. During high tides, the large volume of water flows into the beels and huge siltation occurs in the beel area [11]. Some basic tools are required for the implementation of successful TRM. These are embankment enclosure, effective planning and operation of TRM, consultation with the community people, provision for compensation to the affected landowners, sustained provision for operation and maintenance.

TRM is necessary to control the natural flow of river water and removing the water logging problem. The high tides of river bring silt with water and fill the river basin. As the silt increases in the river basin – the water holding capacity of river decreases. So there increase the possibility to occur flood and water logging crisis. The Figure 1 shows the TRM model modified from Shampa and Pramanik (2012).

The silt deposition causes low tide and lowered the water storage capacity in the river. It is normally introduced a compartmentalized polder or enclosure system in the south west tidal areas in 1960 under Coastal Embankment Project (CEP) [13]. To solve these long water logging problems, the Khulna-Jessore Drainage Rehabilitation Project (KJDRP) was implemented during the year 1994-2002 [14].

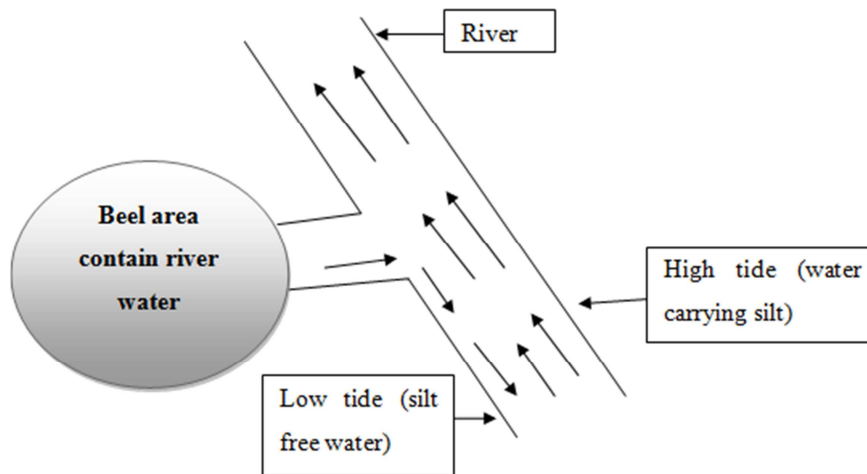


Figure 1. Mechanism of TRM [12].

3. Results and Discussion

3.1. Socio-economic Status of the Study Area

The people of the study area were involved various

economic activities. So their occupations and economic condition were different according to their income. In the study area, four major economic groups were defined. These were the rich group, the medium rich group, the poor group, and the very poor group. From the field survey, Table 1 indicates that the rich group, medium rich group, and the

very poor group symbolized 19.68%, 18.04%, 18.02% respectively. According to the field survey, the major economic activities of the village Kapalia were agriculture (about 34.42% respondents). The service holder, with about 26.23% was the second major economic activity and then followed by Business (about 14.75%). Other economic activities included fishing, shrimp culture, day labor etc. (Table 2).

Table 1. Wealth stratification of the respondents.

Economic groups	Percentage (%)
Rich group	19.68
Medium rich group	18.02
Poor group	44.26
Very poor group	18.04

Table 2. Occupational classification of the respondents.

Occupational group	Percentage (%)
Farmer	34.42
Service holder	26.22
Shrimp farmer	9.83
Business	14.75
Day labour	11.47
Others	3.27

3.2. Local Perceptions on Climate Change

Most of the rivers in the study area and surrounded lands, located on the south west coastal region of Bangladesh, are tidal naturally. It is on the lower part of Bangladesh. Tidal river water carry large amount of suspended solid and silt up the river bed gradually. Therefore, it becomes water logged during the rainy season. It causes frequent flooding of the area. According to the survey the same outcomes were found. About 40% of the respondents perceived that the flooding intensity was increased. About 47.56% of the respondents perceived that the rainfall trends has been increased and the cyclone intensity was less in the study area (about 45.90% of the participants responded).

The rainfall is a major cause of water logging. Though the study is surrounded by many rivers such as Shri, Mukteshwari, Teka etc. and the river bed is filled up with silt day by day. So the water carrying capacity is decreasing and results in water logging situation. The quantity of rainfall was increased (about 40.50% people agreed) with opposite opinion was the decreasing pattern of rainfall, about 31.14% of the respondents perceived.

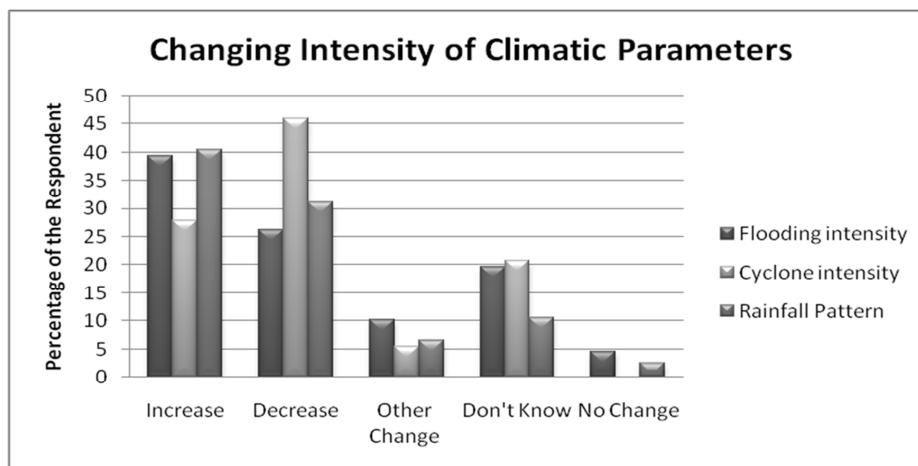


Figure 2. Changing intensity of the Climatic Parameters.

According to respondents of the village, the intensity of cyclone was very low with different opinion. About half respondents responded the decreasing intensity of cyclone. Oppositely, about one fourth of participants perceived the positive relationship and others didn't have any idea on cyclone intensity trends in the study area.

3.3. Positive Sides of TRM

Tidal River Management (TRM) is needed to flush away the silt from reservoirs to keep them functioning, to improve the natural flow of river water, to increase flood protection capacity, formation of new alluvial land in tidal wetland through silt deposition, mitigate climate change induced sea level rise. At last it can be called as sustainable solution to water logging and drainage congestion [12]. TRM prevents silt deposition on the riverbed and ensures the drainage and

smooth navigation in river channels [14].

In Bangladesh, TRM approach adopted in 1993 named Khulna Jessore Drainage Rehabilitation Project (KJDRP) was planned by the Bangladesh Water Development Board (BWDB) for siltation management involving community participation that can bring about sustainable changes in the waterlogged area [14]. The wide spread impact of water logging are destruction of private and public infrastructure such as houses, water and sanitation, roads, market places, school and colleges, and embankments. People loss their existing crops and agricultural equipment, business capital and other livelihood tools. This also cause a lot of suffering to the local people in accessing food, clean water and a safe and secured environment. TRM is urgently needed in the study area because of following reasons:

To Increase natural flow

TRM is a most effective project to mitigate water logging

problem. TRM will bring sustainable changes in the water logged area. About 63.93% respondents perceived that the application of TRM would increase the natural flow of river water.

Drainage Congestion

Due to clogging of river bed there may be occurred water logging problem, an environmental disaster, causing immense suffering to the people. An effective solution of this problem may be the implication of TRM project. According to the field survey, more than half of the respondents supposed that if the TRM project were applied then the drainage congestion would be decreased.

Decreasing the effect of sea water level

The polar ice is melting gradually and the sea level is rising fast. It has been predicted that the southern coastal part of Bangladesh will be under water in near future if the sea level will rise 1 meter. The study area is located in the south western part of Bangladesh and it is in a threatened part of our country and it is in a vulnerable condition now. To tackle this problem, the application of TRM can be a solution. About 60.66% of the participants responded that if TRM were applied then the effect of sea level would be decreased.

3.4. Negative Impacts of TRM

Though TRM is the most effective solution of disaster management like water logging problem, then the TRM project has negative impact also. In the past two TRM projects were applied in two different beels at beel Kaderia and at beel Khukshia. But the people faced some negative effects in the study areas.

Affected occupation

Though the land owners get a handsome amount of money then it affects various occupational people. Most of the people about 34.42% of the respondents were famers

according to the field survey. If TRM is applied the most affected persons will be the farmers about 63.94% of the respondents found in the field survey and the second larger affected people will be the shrimp farmers about 27.87%. The other affected occupational people will be the day labours, who have no land.

Relationship between TRM and agriculture

Agriculture, fish farming, fishing, shrimp culture, and wage based labour market occupy a large part of a country's economy. Home based fish and vegetable farms will be damaged. Its tremendous impact on the labour market specifically people involved in agriculture, fish, and shrimp farmers and the livelihood of day labour. Agriculture will be affected until the soil dries up sufficiently for planting crops and this will take 3 to 5 months more.

Destruction to the shrimp cultivation

Many of the people cultivate shrimp in the study area. According to the field survey, about 52.46% of the respondents gave perception that the shrimp cultivation is increased in the study area and the cultivation will be affected severely. If TRM is applied there will be no shrimp cultivation and the business of shrimp will be hampered.

Damage to agricultural sector

Food is a main fundamental demand of people. In the study area most of the people are farmer about 34.42% (Table 2) and cultivate their own lands. If TRM is applied to these 700 hectors of lands, all the agricultural lands will be water logged and there will not be grown any kinds of crops. If the crop production inhibited then there will be arisen many problems such as food scarcity, malnutrition, and so on. Figure 4 shows that 42.63% of the respondents have more than 2 bigha of lands, 19.68% of the respondents have no land, and 14.75% of the respondents have more than 3 or 5 bigha of lands.

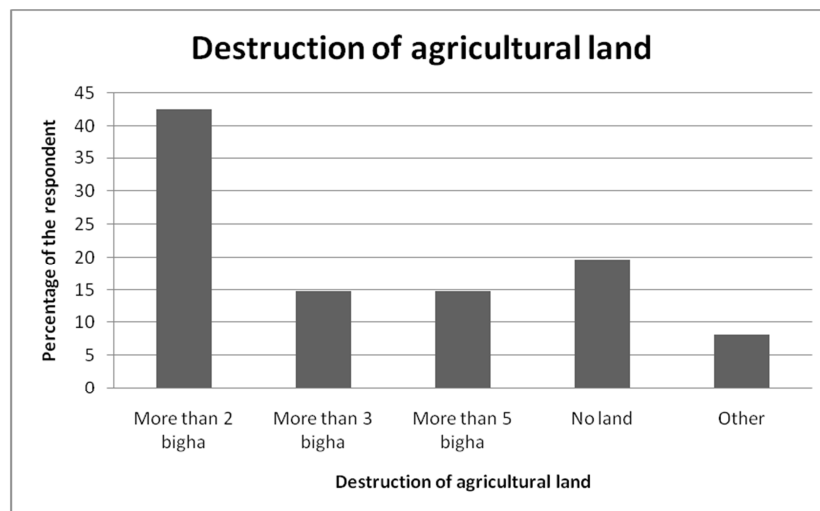


Figure 3. Destruction of agricultural land in the study area.

3.5. Analysis of the Perception of Local Stakeholder

Compensational conflict

Because the people of beel Kaderia have not been given any compensation and the people of beel Khukshia have

given a little compensation. According to the field survey the people of beel Kapalia do not want to take any risk of getting compensation. Beel Kapalia consists of 1200 hectors' of land and the Bangladesh Water Development Board (BWDB)

wants 750 hectares of land for TRM. The owner of those lands will be given 96 thousands taka per acre in two years as compensation. But the people of beel Kapalia were not satisfied. In the field survey about 60.65% of the respondents

showed that the compensation is less to the owner of land and 22.96% of the respondents showed that the compensation is enough to the owner of land (Figure 4).

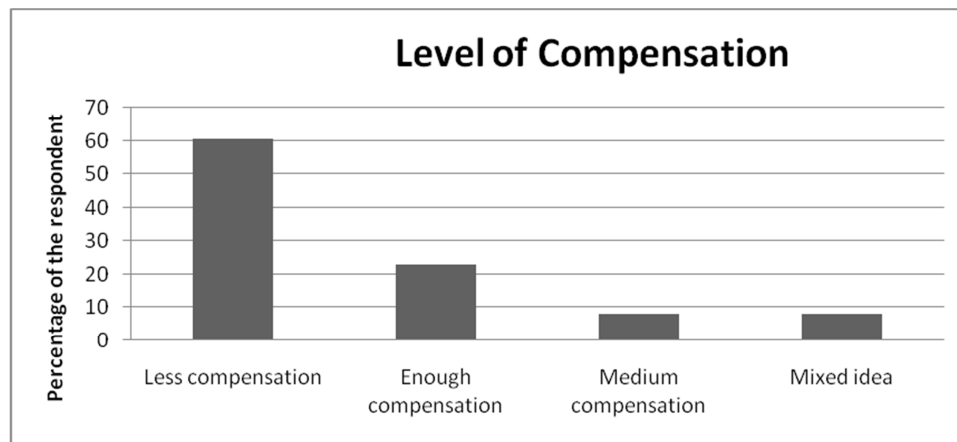


Figure 4. People perception for level of compensation.

Acceptance / perception on TRM

The people of the beel Kapalia don't want to trust on BWDB's words. In the past, Bangladesh Water Development Board applied another TRM project on beel Kaderia for 4 years since 2000 to 2005 on 600 hectares of land. But in 2005 it has been seen that, for siltation the water logging problem became more intense than before. In beel Khukshia, the TRM is applied in 2006 for 3 years but it took 6 years' time for TRM. So there was created negative impact and frustration

on the people of that area [15].

Only BDT 8.8 million has been distributed among the land owners while a total of BDT 155 million has been sanctioned for the new TRM project. For Beel Kapalia the BWDB gave the administration BDT 155 million for disbursement among 2,226 farmers in compensation against 1,588 acres of land, including vested property, for the years of 2011 and 2012. Here 198 farmers had applied for compensation money and of them, only 85 farmers got the compensation [16].

Table 3. People acceptance and perception about TRM.

People Perception on TRM	Yes (accept TRM)	No (Don't accept TRM)
Increase natural flow of river water	Yes	
Decrease drainage congestion	Yes	
Don't distribute the compensation properly		No
Decrease the sea level	Yes	
Create more intense water logging		No
To the farmers		No

4. Conclusions

The literature reviews and field survey evidence that the river bed of Hari-Teka-Mukteshwari is silted up and causes drainage congestion in the study area and becoming an environmentally disaster prone area as it is located in the southwest coastal zone of Bangladesh. Due to the change of the frequency and magnitude of the climatic parameters and river bed siltation, the socio-economic and health status are also affected. Being a disaster prone country and various environmental disasters like water logging, silting up of rivers and salinity intrusion are become very common. Of them the major cause of flooding is the silting up of river bed and it result in water logging [17].

From the above study, it is clear that the problem of water logging have been created since after 15 years of the implementation of Coastal Embankment Project (CEP) by the East Pakistan Water and Power Development Authority

(EPWAPDA). To solve the water logging problem and to produce more crops, the KJDRP was the most effective program by the Bangladesh Water Development Board. Now TRM is the most sustainable project to solve water logging.

References

- [1] Rashid, F., 2010. Development of Eco-efficient Water Infrastructures in Bangladesh. In: Bangladesh Water Development Board, Third Regional Workshop on Development of Eco-efficient Infrastructures in Asia and the Pacific. Bangkok, Thailand (Accessed on 1 December, 2013).
- [2] Sahriar, S., 2010. Tidal River Management: An Innovative Approach for Eradicating Drainage Congestion in Coastal Area, Dhaka, Bangladesh.
- [3] Kabir, D. M. H., 2006. Water Logging in Southwest Coastal Region: A Case Study of Khulna Jessore Drainage Rehabilitation Project from People's Perspective of Bangladesh, Volume 3, No 2.

- [4] Kibria, Z., 2011. Tidal River Management: Climate Change Adaptation and Community Based River Basin Management and in Southwest Coastal Region of Bangladesh, Published by Uttaran, Dhaka, Bangladesh. Available at: http://www.internationalrivers.org/files/attached-files/uttaran_cimate_adaptation.pdf (Accessed on 11 April, 2013).
- [5] Anon., 2011. Water Logging in Satkhira District: An Analysis of Gaps between Needs and Response.
- [6] Khadim, F. K. et al., 2013. Integrated Water Resource Management (IWRM): Impact in South West Coastal Zone of Bangladesh and Fact-Finding on Tidal River Management (TRM). *Journal of Water Resource and Protection*, 5, 953-961, Available at: <http://dx.doi.org/10.4236/jwarp.2013.510098> (Accessed on 11 April, 2013).
- [7] EGIS, 1998. Environmental and Social Impact of Khulna Jessore Drainage Rehabilitation Project, Dhaka, Bangladesh.
- [8] Die, L. D., 2013. Tidal River Management: Temporary Depoldering to Mitigate Drainage Congestion in the South West Delta of Bangladesh. M. Sc., Minor thesis. Netherlands, Wageningen University, (Accessed on 11 April, 2013).
- [9] GoB, 2013. Yearbook of population statistics of Bangladesh 2013, Monirampur, Jessore, Bangladesh Bureau of Statistics,
- [10] Wester, P., Bron, J. undated. Coping with water: Water Management in Flood Control and Drainage Systems in Bangladesh
- [11] Ullah, W. M. and Rahman, R., 2002. Tidal River Management: A Sustainable Solution to Drainage Congestion in the Coastal Region in BAPA, Bangladesh Environment, Dhaka.
- [12] Shampa and Pramanik, I. M., 2012. Tidal River Management (TRM) for Selected Coastal Area of Bangladesh to Mitigate Drainage Congestion, *International Journal of Scientific and Technology Research*, Volume 1, Issue 5, ISSN 2277-8616.
- [13] Paul, A. et al., 2013. Tidal River Management (TRM) and its Implication in Disaster Management: A Geospatial Study on Hari- Teka River Basin, Jessore, Bangladesh, Volume 4, Issue 1, ISSN 0976-4380. Available at: <http://www.ipublishing.co.in/vjggsarticles/volfour/EIJGGS4012.pdf>. (Accessed on 28 November, 2014).
- [14] Institute of Water Modeling (IWM), 2007. Monitoring the Effects of Beel Khuksia TRM: Basin and Dredging of Hari River for Drainage Improvement of Bhobodah Area, Dhaka, Bangladesh.
- [15] Nandy, G., 2011. Entrapment: Food Security under IFI's Intervention in Water Resource Management: A Case of pre and post KJDRP Situation. 1st ed. Bangladesh. IRV assisted by ACTIONAID Bangladesh and IFSN.
- [16] Shuvo, M., 2013. Tidal River Management Project at beel Kapalia: Fear over Compensation Dissuades Farmer. *The Daily Sun*. 1th Dec. (Accessed on 5th December, 2013).
- [17] Tutu, A. A., 2005. River Management in Bangladesh: A People's Initiative to Solve Water-logging, International Institute for Environment and Development (IIED), London, No. 52. Available at: <http://pubs.iied.org/pdfs/G02131.pdf>. (Accessed on 1 December, 2013).