

ASSESSMENT OF WATER-LOGGING EXTENT USING RS AND GIS TECHNIQUES AND ITS POSSIBLE REMEDIAL MEASURES AT THE KOPOTAKSHO BASIN AREA, BANGLADESH

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ABSTRACT

Since 2000, water-logging had been a regular phenomenon for the hundreds of villages adjacent to the Kopotaksho River in Jessore and Satkhira district of Bangladesh. The analysis of satellite images revealed that over the years, water-logging problem has been increased, as in 1999, the water-logged area was about 865 hectares; in 2000, 2003, 2006 and 2008 it was about 12867, 12238, 11723 and 19467 hectares respectively. Upstream freshwater flow reduction, unplanned and unauthorized structural interventions and regular encroachment at the upstream and downstream of the Kopotaksho River were the main causes of this unwanted prolonged water-logging. Alternative drainage routes and Tidal River Management (TRM) technique were suggested for the long-term possible remedial measures and participatory TRM practice was identified as the best possible long-term remedial option to diminish water-logging problem at the Kopotaksho Basin Area.

Keywords: Water-logging, Sedimentation, Landsat TM, Participatory, TRM

1. INTRODUCTION

Water-logging has been affecting millions of people in Bangladesh during the past two decades leading to a large scale damages of crop, employment, livelihoods and national economy (Mirza *et al.*, 2005). Water-logging involves deterioration of drainage condition in coastal rivers of south-western Bangladesh causing difficulties towards maintaining livelihoods (Rahman, 1995). About two hundred years ago, the Mathabhanga River supplied fresh water throughout the year to the Kopotaksho River (Williams, 1919). After being cut-off from the Mathabhanga river, the Kopotaksho had been subjected to tidal domination, associated with increasing sedimentation by tidal pumping process, particularly in the dry season. Due to prolonged drainage congestion, both physical and social environment experiences immense degradation and the people of the congested area faces settlement,

economic and health (disease and sanitation) problems.

Unplanned and unauthorized structural interventions and constructions (roads, settlement) and regular encroachment of natural drainage system at the upstream and downstream of the Kopotaksho River due to over-population were the main causes of the unwanted and unexpected water-logging (Rahman and Rahman, 2009). Rising bed level, reducing cross-sectional area and conveyance capacity of the Kopotaksho River aggravated the spillage of River water along the bank of the Kopotaksho River resulting flood and water-logging situation for four to seven months in every year after the year 2000 (CEGIS, 2004).

The main objective of this paper was to identify the water-logging situation over the years, from the year 2000 to 2008, delineating root causes of water-logging problem and to proffer possible participatory remedial measure at the Kopotaksho Basin Area.

2. METHODS & METHODOLOGY

The satellite images of the study area from the base year 2000 to year 2008 were analyzed considering the hydro-meteorological parameters of the study area. Environmental losses due to water-logging were assessed through participatory sessions and analyzing the hydro-meteorological data. Social degradation assessed by the participatory field survey, via FGD, TGD and PRA sessions. The possible remedial measures to mitigate water-logging problem were justified at the participatory survey.

3. RESULT AND DISCUSSION

The main reason of the flooding in the year 2000 was an unusual upstream water supply and heavy rainfall over the south-west region of Bangladesh. Sudden flood of the year 2000 in the south-western region of Bangladesh had increased the intensity of water-logging at the Kopotaksho Basin Area (SWMC, 2000).

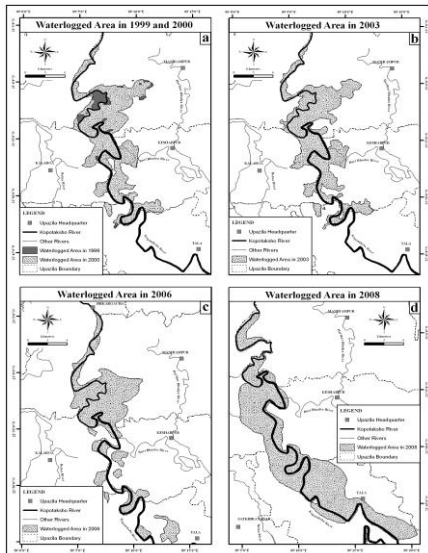


Figure 3: Waterlogged area over the years from 2000 to 2008; (a) Waterlogged area in 1999 and 2000; (b) Water-logging extent in 2003; (c) Waterlogged area in 2006; (d) Waterlogged area in 2008

The main causes of water-logging were increase of sedimentation rate on river bed due to upstream fresh water flow reduction, increase of sedimentation process due to construction of adversely affecting bridges, sluice gates and other local constructions along and over the Kopotaksho River, decrease of tidal dominant area due to downstream polders during dry season.

Table 3: Extent of inundation over the years (1999-2008) at the Kopotaksho Basin Area derived by analysis of satellite images

Water-logging Extent	Year				
	1999	2000	2003	2006	2008
Waterlogged area (in km ²)	8.65	128.67	122.38	117.23	194.67

If this decrepit scenario of Kopotaksho river continues, within next decade, the Kopotaksho river would have been abandoned up to the Sibsa reach at its downstream. In 2008, about 200.00 km² land of 41 unions, about 75,000 households and 0.4 million people were severely affected by water-logging in Jessore and Satkhira district (Uttaran, 2008). About 50,000 people were subsisted in shelter center due to the loss of settlement for three months. Jessore-Satkhira highway was inundated up to a month. About 90% respondents of the water-logging affected area in participatory sessions suggested implementing Tidal River Management (TRM) technique in Jethua and Krishnakathi beel to revive the flow of Kopotaksho river to eradicate water-logging problem.

The Kopotaksho river still get connected with Mathabhanga and Bhairab river at the monsoon. An alternate drainage route at the upstream of the Mathabhanga with the Ganges River had been suggested as if the water flow subsists permanently the water flow of Kopotaksho River fluxed away the deposited sediment at the lower reach of its path.

4. CONCLUSION

The extent of water-logging over the years, from the year 2000 to 2008, had been increasing with satellite image analysis and participatory field survey. According to the people's view and ecological perspectives, participatory TRM technique will be the best possible long-term remedial option to revive the previous water flow regime of the Kopotaksho River and to reduce the water-logging up to a great extent at that Kopotaksho Basin Area, some people also had suggested River dredging in specific locations with khal excavation, inter-linking with adjacent Rivers and establish re-connectivity with the Mathabhanga River, etc.

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