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## Physical and Social Assessment of the Waterlogged Area and Suitability of the “Inclusive and Adaptive Tidal River Management Technique” to Alleviate Waterlogging in Southwest Bangladesh

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### Abstract

Bangladesh has often been considered as the land of extremes in terms of natural processes. The statement is justified by the presence of world’s largest delta, one of the largest river systems carrying a huge amount of water and sediment discharge as well as prevalence of a number of natural hazards. These characteristics make the region very dynamic and sensitive to changes. Bangladesh is one of the most densely populated countries in the world and human development activities to accommodate the large population have caused major disruptions to the dynamics of the natural system. The study focuses on such a case where anthropogenic activities, such as polderization, dam construction etc. have disrupted the natural land building process and have caused persistent waterlogging in the southwest region of Bangladesh. The rivers in the region are naturally characterized by active deposition of sediment in riverbed causing reduced drainage capacity. Moreover, construction of coastal polders that de-linked the flood plains from the rivers, and diminished upstream flow during the dry season deteriorated the sedimentation problem in the region. The study delineates different hydrological parameters and characteristics of the deposited sediments along with identification of social vulnerabilities. The investigated hydrological and sedimentological characteristics refer to the existing sediment management as well as provide a framework for the future development works in the pre-identified TRM sites. Based on the findings, the suitability of Inclusive and Adaptive Tidal River Management (TRM++) technique was assessed.

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## Nomenclature

FGD	Focus Group Discussion
KII	Key Informant Interview
SSC	Suspended Sediment Concentration
TRM	Tidal River Management
TRM++	Inclusive and Adaptive Tidal River Management
UNDP	United Nation Development Programme

## 1. Introduction

The Ganges, Brahmaputra and Meghna River coalesce together to develop one of the largest river systems in the world forming world's largest delta [1,2,3]. The river system carries a huge amount of water and sediment discharge of more than one billion tons per year [4,5,6]. The rivers and their hundreds of tributaries and distributaries crisscross Bangladesh and ultimately drain out in Bay of Bengal [7]. These characteristics make the region very dynamic and sensitive to changes [8]. Bangladesh is one of the most densely populated countries in the world [9] and, often, human development activities to accommodate the large population have caused major disruptions to the dynamics of the natural system. The study focuses on such a case where anthropogenic activities have disrupted the natural land building process and have caused persistent waterlogging in the southwest region of Bangladesh. The rivers of southwestern region in Bangladesh have a tendency for active deposition of sediment in riverbed causing significant reduction in their drainage capacity. Before the construction of the polders, some of the silt-rich tidal sediments were deposited in Beel areas and the rest were flushed out by upstream fresh water flow. The constructions of coastal polders that de-linked the flood plains from the rivers, and diminished upstream flow during the dry season have deteriorated the sedimentation problem in the region [15]. Consequently, the area has been experiencing severe drainage congestion and water logging since the early eighties. Considerable portion of the region undergo waterlogging each year and water often take six months to recede. In 2011, excessive monsoon rainfall triggered massive waterlogging damaging more than 200,000 households in three districts of southwest Bangladesh [10]. Among the affected area, Tala Upazila of Satkhira district were hit the hardest with 52902 affected families; 19328 fully and 12500 partially damaged houses; 11571 acres of damaged crops and 18364 acres of damaged shrimp farms (Source: Office of District Relief & Rehabilitation Officer (DRRO), GoB; obtained from UNDP Report, 2012 [10]). The area was also the most affected in the year of 2013 with 7500 severely affected households, 7300 moderately affected households and 6400 medium affected households [11].

Affected people and experts recognize an indigenous water-silt management process called Tidal River Management (TRM) as the immediate and intermediate solution to this complex problem [12,13]. However, the model is heavily conceived as less transparent in land compensation mechanism; involvement of landless people, LGIs, CBOs, and cooperatives in the process is low, limited or no options for alternative livelihoods of the small landholding and landless households. A participatory, robust, inclusive, innovative “TRM ++” is been explored through a consultative process. The preset study aims in understanding the pre-TRM hydrological and sedimentological scenario as well as the social condition of the two pre-identified sites for TRM construction in Khesra and Jalalpur Union of Tala Upazila under Satkhira district (Figure-3.1). The investigation sheds light on the current risk of waterlogging in relation to sediment management and suitability of present hydro-sedimentological conditions during the TRM phase.

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