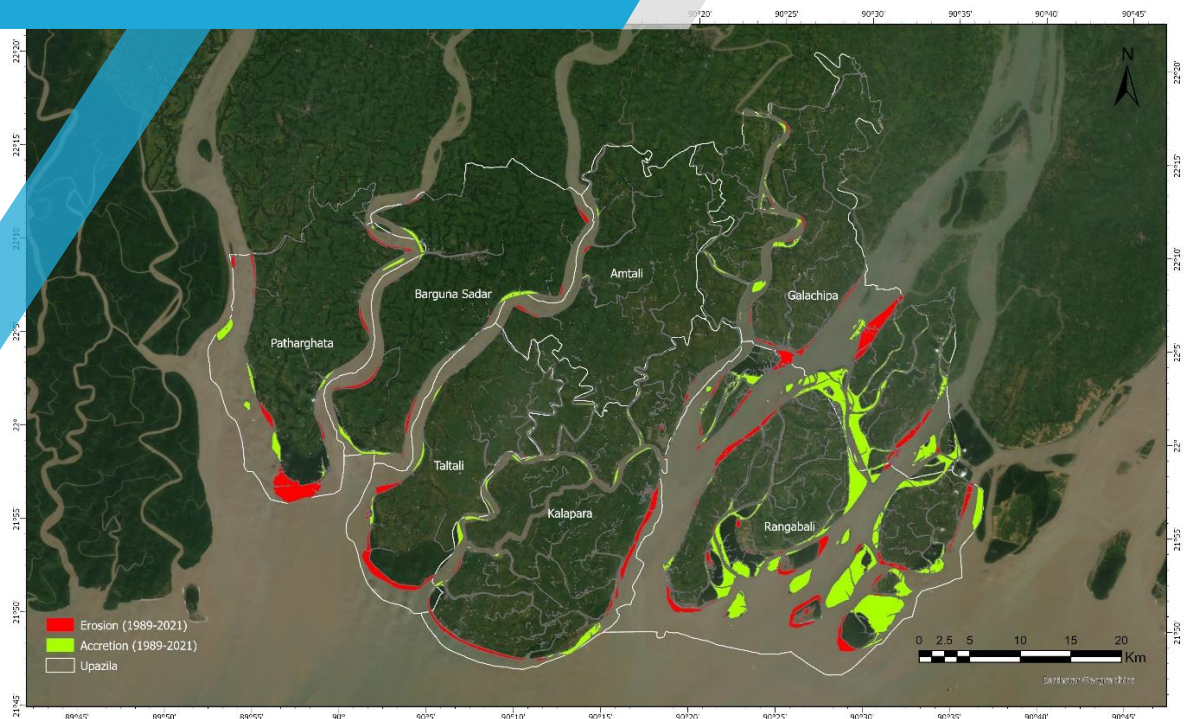


# URBAN DEVELOPMENT DIRECTORATE (UDD)

Ministry of Housing and Public Works

Government of the People's Republic of Bangladesh

## Report on erosion and accretion model



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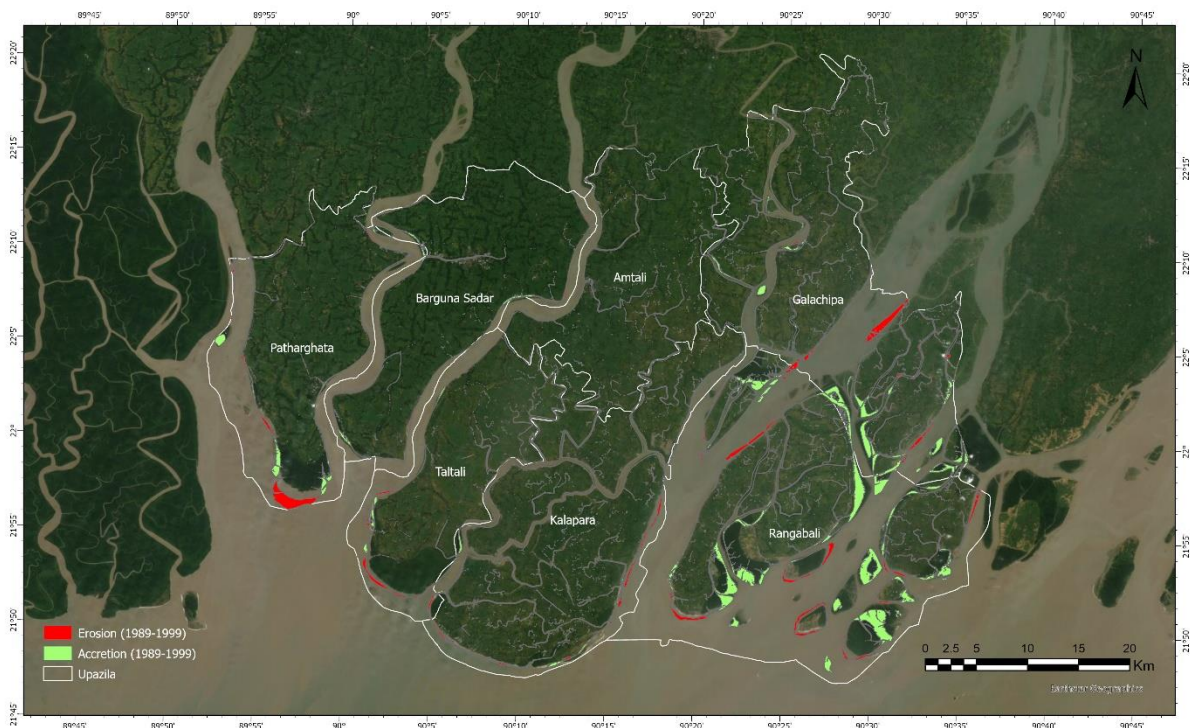


# Erosion and Accretion

## Land Erosion

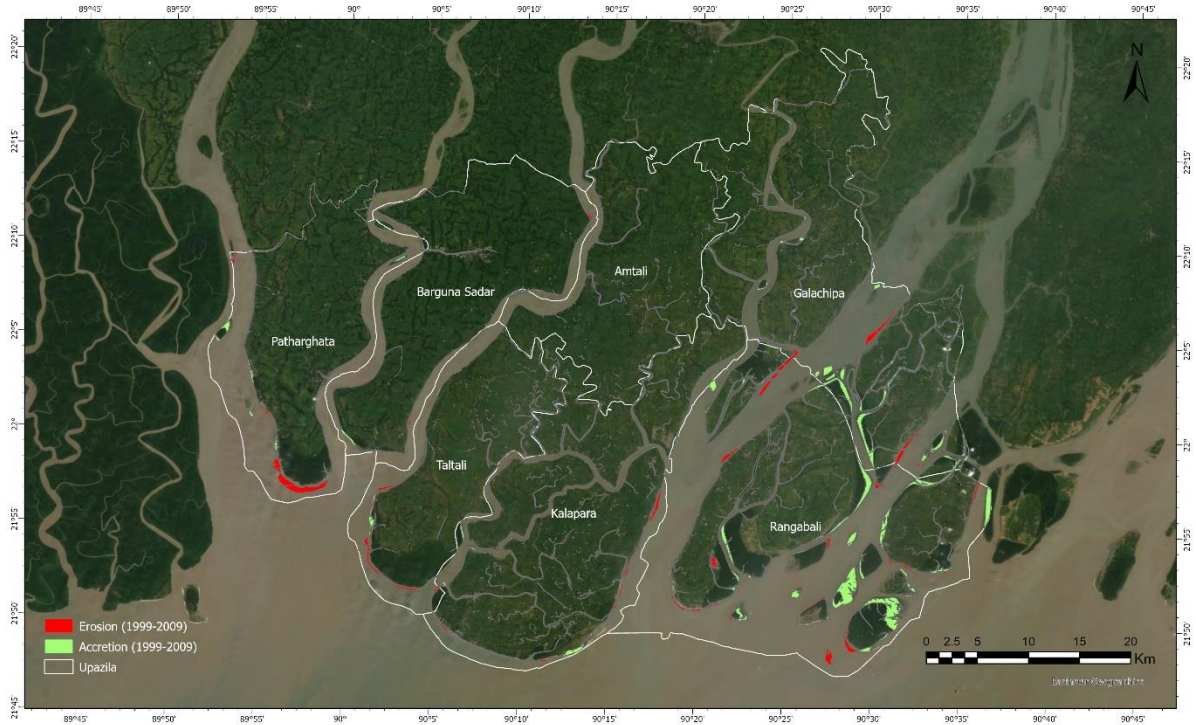
Land erosion is a common natural phenomenon in the coastal zone. Massive changes have occurred in the coastline over the last two centuries due to land erosion coupled with land accretion. The boundaries of islands undergo major changes due to land erosion and simultaneous accretion. Erosion victims are a disadvantaged group in coastal areas subject to both social and economic distress. Besides the erosion of the riverbanks, the foreshore and the embankment systems are posing a continuous problem in the coastal areas. This exposes interior lands to cyclone surges and salt-water intrusion threats. River erosion has taken a serious turn in Patuakhali and Barguna districts, and many families have become homeless. Some 30,000 houses, many commercial establishments, hundreds of educational institutions, and thousands of hectares of cropland have been devoured by different rivers in the southern districts during the last 10 years.

Historical satellite images of Landsat TM and Landsat 8 are analyzed over the study area to determine erosion and accretion. It has been found that major accretion is observed in the Rangabali upazila while erosion is observed in many locations of Patharghata, Taltali, Kalapara, Galachipa, Amtali and Barguna Sadar as shown in Figure 1, Figure 2, Figure 3 and Figure 4.

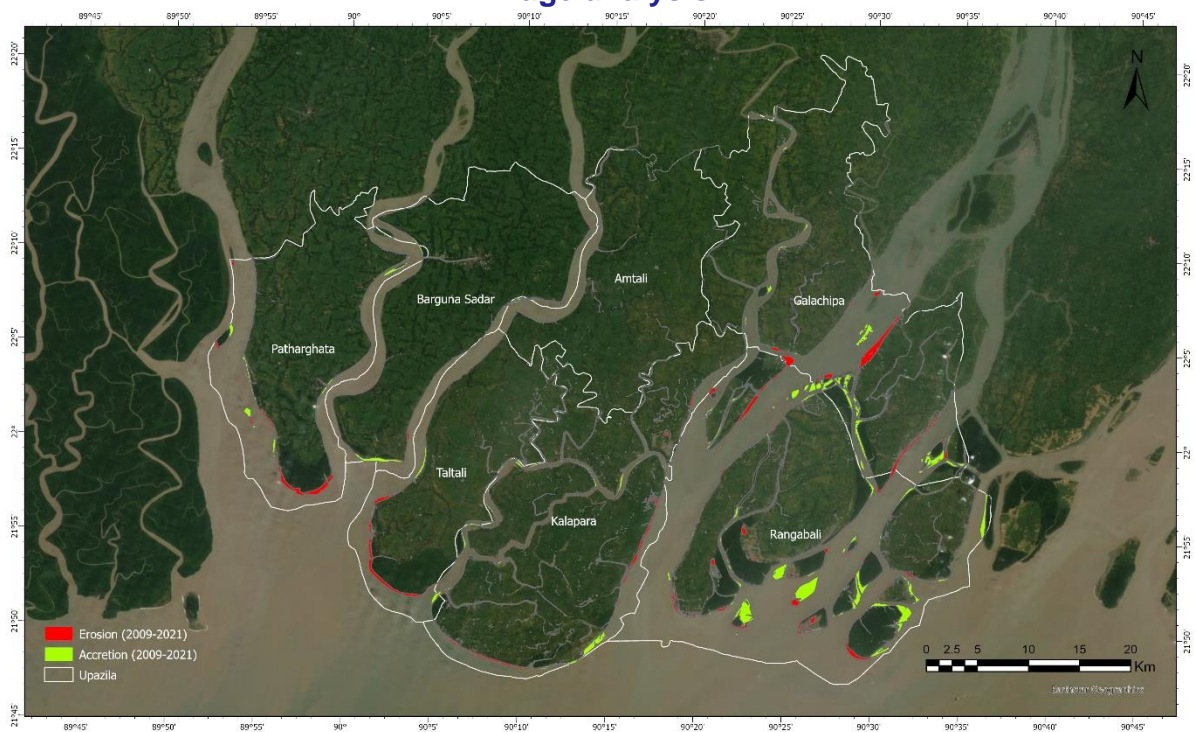


**Figure 1: Erosion and accretion in the study area between 1989-1999 based on satellite image analysis.**

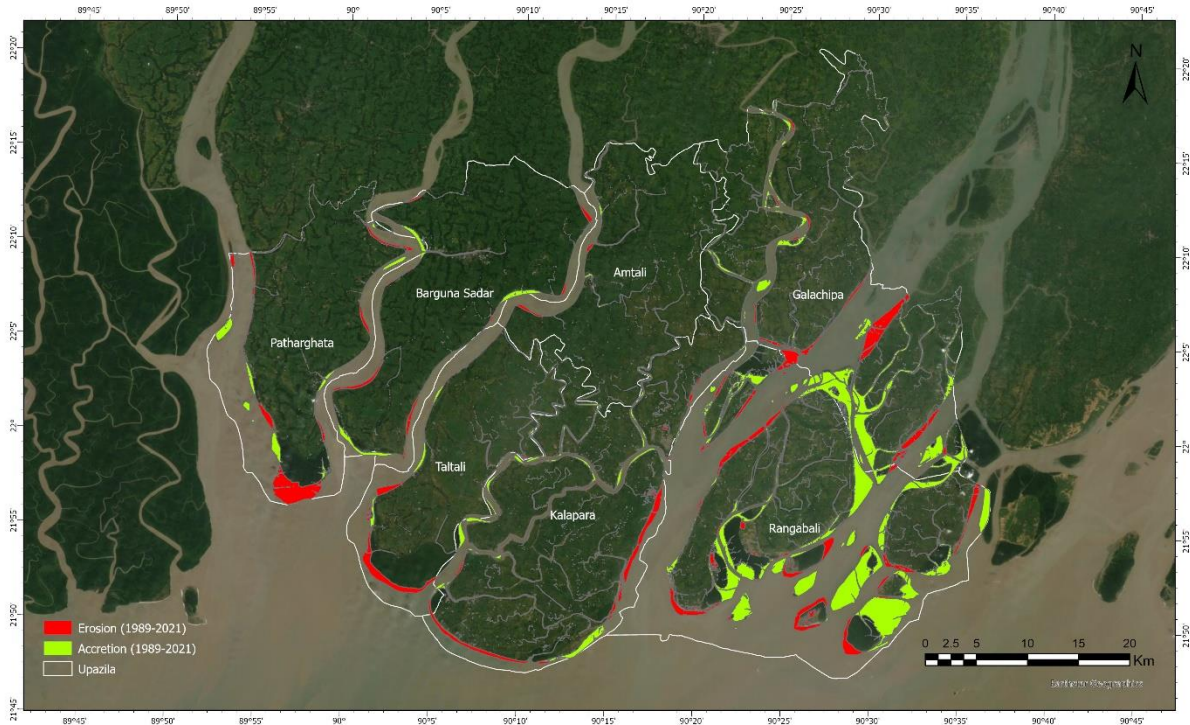




**Figure 2: Erosion and accretion in the study area between 1999-2009 based on satellite image analysis.**



**Figure 3: Erosion and accretion in the study area between 2009-2021 based on satellite image analysis.**



**Figure 4: Erosion and accretion in the study area between 1989-2021 based on satellite image analysis.**

A summary of upazila-wise accretion and erosion areas between 1989 and 2021 is presented in Table 1. Table 1: Upazila-wise accretion and erosion areas between 1989 and 2021

**Table 1: Upazila-wise accretion and erosion areas between 1989 and 2021.**

Upazila	1989-1999		1999-2009		2009-2021		1989-2021	
	Accretion	Erosion	Accretion	Erosion	Accretion	Erosion	Accretion	Erosion
Galachipa	45.48	15.59	34.29	12.17	11.87	9.60	42.98	16.98
Kalapara	11.89	11.01	15.15	11.01	6.86	7.96	16.08	14.28
Rangabali	52.29	22.92	49.15	20.05	22.95	12.23	78.86	25.69
Patharghata	7.09	8.52	4.39	8.52	3.29	4.89	7.76	14.43
Taltali	13.48	12.64	15.52	10.11	1.94	3.88	3.48	8.36
Barguna Sadar	2.47	2.11	1.99	2.01	1.68	1.85	4.70	5.17
Amtali	2.26	5.28	11.08	6.28	0.91	0.75	5.12	1.35

Historical analysis of Satellite Images using Landsat TM and Landsat 8 shows that accretion is more dominant than erosion in 7 upazilas under study. Erosion at Patharghata upazila is dominant, and threats are there. Taltali is an erosion-prone upazila after Patharghata. Barguna Sadar, Amtali, Kalapara, Galachipa area less erosion prone upazila. Accretion dominant upazila is Rangabali, with 3 times compared to erosion. As a whole, accretion is more dominant than erosion.



Protective measures for shoreline as well as rivers need to be taken up for Patharghata and Taltali upazila. River bank protection works are to be taken up for Barguna Sadar, which is applicable for all erosion-prone pockets of all upazilas.

Taking up integrated water, land, and sediment management approaches in erosion-prone coastal areas considering the locations of erosion areas like along the shoreline or the rivers. Erosion control measures like hard protection or nature-based green applications like afforestation, river stabilization and training work to provide erosion protection of rivers could be proposed.

## Kuakata beach erosion and protection measures

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Bangladesh Water Development Board (BWDB) conducted a detailed feasibility study for sea beach protection and development namely 'Feasibility Study for Protection and Development of Kuakata Sea Beach' by the Institute of Water Modelling (IWM) in 2020. The study assessed the erosion and accretion of the Kuakata beach area from 2010 to 2020. The report found that over the last 10 years, the maximum shoreline shifting from Gangamati Khal to Lebu Bagan is 147 meters. The Kuakata beach falls under Polder 48 which is one of the 17 polders considered for rehabilitation under the Coastal Embankment Improvement Project (CEIP) funded by the World Bank. The ongoing renovation works of Polder 48 are re-sectioning of the embankment, slope protection, bank protection and afforestation on the foreshore area.

Based on the analysis of wave and tide dynamics, the study derived a number of hydraulic design parameters for the protection works. The study also conducted a frequency analysis of the maximum significant wave height along the Kuakata beach. The study considered two options for coastal erosion protection. Option 1 is a series of groyne and multifunctional dyke while option 2 is sleeping defense such as coastal armoring, sand nourishment, and multifunctional dyke. Based on the multi-criteria analysis, the study opted for Option 1 as the most feasible option. As Option 1 entails groyne and multifunctional dyke, the study designed the different parameters of groyne structures. The layout of the groyne is designed in such a way that it would not discontinue the beach entirely, rather it is proposed to protrude 70 meters offshore which will provide ample space for tourists.