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Coastal Environmental Change During Sea-Level Highstands: A Global Synthesis with implications for management of future coastal change

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## Holocene Sea-level Changes and Coastal Geomorphic Evolution in Bangladesh: Example from Matuail near Dhaka City.

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## Abstract

The coastal belt of Bangladesh occupies nearly one fourth of national territories and supports about one quarter of total population. This open coastal system is vulnerable to a number of natural disasters, such as cyclones, stormsurges, saline water intrusion and above all the future potential sea level scenarios (Islam, 2001). Since geological past, rapid siltation, sediment compaction, differential land uplift and subsidence, local tectonic activities and accelerated tidal force have led this coast as one of the most dynamic ecosystem in the world (Stanley and Hait, 2000; Goodbred Jr. and Kuehl, 2000). In this paper it has been attempted to reveal the geomorphological evolution of the coast, particularly in the context of Holocene relative sea level movements and coastal dynamics.



Figure 1. Location of the study area.24 boreholes were made in east-west and north-south transactions at the site Panigati.

Records have been collected from the site at Matuail, about 3 kms east of Dhaka city and located at the southern fringe of the Madhupur Pleistocene terrace. Here, evidences from a series of boreholes and exposed faces have been considered to register the litho-bio-chro-stratigraphic signatures of Holocene relative sea-level movements and coastal dynamics.

At least eight sedimentary sequences have been identified in coastal stratigraphy of Bangladesh, of which the top two have been deposited under fluvially controlled freshwater conditions and remaining under marine influences. Mangrove pollen and diatom evidences suggest three periods of post-glacial marine transgressions (6890-6225 yrs.BP, 5850-4580 yrs.BP and 4400-2325 yrs.BP), each followed by a regression.

Based on <sup>14</sup>C results, an average sea level rise of 0.87 mm/yr., with the maximum rise of 2.50 mm/yr. at about 5300 yrs. BP, has been estimated. Due to Holocene sea level fluctuations, the land/sea interface migrated accordingly and the coastline was very close the site at Matuail only about 2500 yrs. BP. Since then it has shifted more than 200kms southward suggesting rapid post-glacial delta progradation.

The present shoreline geometry of Bangladesh has been attained at about 1500 yrs BP and since then it has not been migrated noticeably towards the sea (Jabber, 1979; Umitsu, 1987).

The fluctuating relative sea level movements along the coastal belt have thus played the major role to Holocene sediment accumulation, coastal geomorphic evolution and shoreline migration in Bangladesh (Islam and Tooley, 1999).

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