

Reconstruction of Holocene paleoenvironment and evidence of sea-level changes in the central part of the Bengal Basin

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The study area is located in the south-eastern fringe of the Pleistocene terrace called the Madhupur tract which is slightly elevated (one to ten meters) from the adjacent floodplains. In most places the changes from the floodplains to the upland tract is quite sharp, but in some places the Holocene deposit (floodplain soils) overlies the gently inclining edges. Such an edge is observed in an exposed outcrop at Sony, a village near Dhaka city, which has been selected to interpret the facies to reconstruct the paleoenvironment of Holocene deposit. It is an erosional dissected valley filled up with Holocene sediments, represents a flood plain and annually inundates with flood water during the monsoon time.

Once data were collected at the site sedimentary facies including palynological research, diatom, radiocarbon dating were examined. To measure the altitude mean sea level at that point has been calculated with a standard reference BM of JICA which is authenticated by the Ministry of Home, Bangladesh. The selected outcrop was found to be about 1.9 meters above the sea level and 4.1 meters below the mean sea level. On the basis of lithostratigraphy, lithofacies and sedimentary structure examination the deposits have been assigned into 7 (seven) facies units in relation to sea-level changes since mid Holocene. The lowermost bioturbated sand flat unit with mangrove pollens represents as an intertidal flat subenvironment of coastal plain and the estuarine channel was dominated by tidal current. The obtained ^{14}C age of this unit, at 3.8 meters below the present mean sea level, has been found to be 6600±40 years BP. The facies supports a transgressive mode of the Bay during mid Holocene epoch. A thickly bedded mud flat unit 2 is composed of low angle cross lamination, plenty of wood fragments, and burrows those filled up with fine cream sands. It contains less organic matter and has a sharp contact with upper salt marsh layer. Unit 3 is characterised by a salt marsh into the shallow marine water and consists of mangrove pollen and brackish water diatoms. It has a sharp contact with the lower mud flat unit, shaped by the upper bed cut down by tidal currents, indicate a small regression of the Bay before 5819±60 yrs BP. Unit 4 represents a mud flat, having a gradational contact with the salt marsh, contains some thin parallel silt to mud lamination in upper part deposited by low energy current and burrows have been found in the lower part. The environment seemed to be stable and quite. Unit 5 comprised of dark coloured medium bedded fresh water peat layer which was developed at about 3560±60 years BP and this unit is dominated by grass pollen. With plenty of rootlets the unit 6 represents a light brown colour fresh water floodplain deposits. The uppermost unit (7) is characterised by a fresh water peat layer and large type grass pollen that probably originated from cultivated plants by human activity just before 1750±60 yrs BP.

All evidence supports that the central part of the Bengal basin (covers almost whole of Bangladesh) represented as a coastal plain estuarine environment and was experienced with Mid-Holocene sea level changes from 6680±40 to 3560±60 years BP. A small rebound of sea level can be inferred after the transgression in the Bay that tended to the estuarine system gradually prograding to the coast.