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**Geological Report on Cox's Bazar-Teknaf Coastal Area,  
Bangladesh**

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## ABSTRACT

Geological investigation of Cox's Bazar District has been carried out during 2007-2008 field season under the project 'Geological Exploration for the Identification of Mineral Resources and the Areas Vulnerable to Natural Hazards in the Coastal Parts of Bangladesh'. The study area exists in the cliff coast of Bangladesh. The mapped area of Ramu, Ukhia, Teknaf and Sadar upazilas under this district is about 1239 sq. km. Geological mapping has been conducted at 1:250,000 scale. An extensive study has been carried out through field investigations as well as examining samples collected from 47 shallow boreholes, 14 auger holes and 4 pits holes. Different type data have been collected for understanding the geomorphology, geology, hydrology, hazards, probable evolutionary history and to identify economic minerals deposits.

The geomorphic features of the Cox's Bazar-Teknaf coastal plain has formed due to sea level fluctuations during different periods of glacial and inter-glacial phases. The oceanic waves acted on Tertiary hills of this area which formed wave-cut platforms, benches and notches during the maximum high stand of sea level (6 ka BP). These wave-cut platforms are present about at 3.2 m above Mean Sea Level (MSL) in Noakhalipara and about 24.38 m and 30.48 m beneath the surface in North Nuniar Chara and Golapara respectively. Wave-cut benches and notches found at 4 m above MSL in Rupoboti. Hill wash sandstone-siltstone boulders and quartzite pebbles have been settled down on the wave-cut platform occurring at Rupoboti, Shaplapur, Hazampara and Inani. Afterward these deposits have been perforated by the rock-borers and marine organisms attached to the surface in the splash-zone of sea waves. Bioturbated boulders have observed about at 4.50 m above MSL in Mohammad Shafir Bil. Fossils of marine organisms attached to the boulders have been observed above present sea level at Inani and Shaplapur. Paleo beaches and dunes have also been formed along the foot hills.

From the analysis of Geological logs, it can be interpreted that alternation of three tidal mud and beach sand facies appeared on the wave-cut platform at North Nuniar Chara and Golapara. Analysis of 12 representative sediment samples from (0.5-2) m, (4-5) m and (22-27) m depth reveal CIA value of 73.19%, 67.57% and 81% respectively. The highest CIA value of the sequence at greatest depth denotes that it was exposed to the air for long time. Presence of microfossils *Ammonia beccarii*, *Ammonia dentate*, *Elphidium macellum*, *Nonionella sp.*, *Bolivina sp.* etc. in the vertical sequence indicates deposition occur shallow marine environment.

Spatial analysis of different maps and satellite images reveals that during 1972-1989 and 1989-2005 the area has been lost about 15.2 sq. km and 3.8 sq. km of land respectively. On the contrary, during 2005-2010 the area has been gained about 16 sq. km of land. The net land loss of the area is about 2.89 sq. km from 1972 to 2010 at a rate of about 0.08 sq. km/year.

The area has been classified into 12 distinct geological map units which are- Foreshore deposit, Backshore deposit, Spit deposit, Lagoon deposit, Intertidal deposit, Supratidal deposit, Paleo-spit-lagoon deposit, Paleo-beach deposit, Piedmont deposit, St. Martin's Limestone deposit, Dakhinpara Sandstone deposit and Tertiary hill deposit.

The major hazards are cyclones and tidal floods, coastal erosion, flash flood and sea level rise and its impact. Frequent low to moderate earthquake events created in and around the area in recent years. Landslide, rock fall, slope failure and slump are very common phenomenon here.

The main economic minerals of the investigated area are heavy mineral, construction and filling sand, boulder and pebble, natural salt, white clay, brick clay and limestone deposits. Beach sand contains valuable heavy minerals like Zircon, Monazite, Magnetite, Garnet, Kyanite, Ilmenite, Leucoxene, Rutile, Kyanite etc. The following Trace elements: Barium, Chromium, Zirconium, Rubidium, Strontium, Vanadium, Zinc, Niobium, Cesium, Copper, Nickel, Lead, Galena, Arsenic, Molybdenum, Tin and Cadmium have been identified by XRF analysis of 17 sediment samples collected from 0.15 m to 29.57 meter a depth at different locations. The rare earth elements Cerium, Lanthanum, Scandium and Yttrium are also present in all samples. Detail study is suggested to ascertain the amount of these elements in sediment.

The wave-cut platforms wave-cut benches and notches, paleo beaches and dunes, perforated boulders at higher elevation, microfossil assemblage, alternation of tidal mud and beach sand facies and, variation of CIA values in vertical sequences etc. suggest that this area experienced the effect of sea level fluctuation in several times. The study appears that it is one of the most active coasts of Bangladesh. Cyclone and storm surges, sediment supply, sea level fluctuations, neo-tectonic and anthropogenic activities etc. is continuously modifying the configuration of the coast which is very rapid and remarkable. Beside this it is an economic mineral rich area.