Geological Processes in Bakkhali-Frasergunj Coast and Adjoining Offshore - Coastal Hazard Preparedness

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The coastal belt of West Bengal is a low lying area. It is vulnerable to natural hazards like cyclone, storm surge, erosion, inundation due to embankment failure etc. There is evidence of subsidence in some sector close to the coast. Theme based geological appraisal is essential towards coastal hazard preparedness. Compared to other areas of east coast, the shelf is wide (~100 km) here. The magnitude of effects of storm surges, tsunami etc depends on bathymetry, coastal configuration and topography. This coastal belt and adjoining offshore off Bakkhali- Frasergunj coast had been investigated to understand the geological processes. The offshore area up to a distance of 10 km has been surveyed by a mechanized boat to study the seabed. The entire coastal belt exhibits dynamic erosional-depositional activity. Presence of rootlets, paleomud and eroded irrigation bungalow on the beach indicates erosional phase in Frasergunj and near Bakkhali river mouth. Field measurements also indicate shoreline retreat compared to SOI toposheet. Matured sand dunes are also present along some part of the beach. Beach profiling perpendicular to coastline shows presence of submerged sandbars near and parallel to coast in Bakkhali which is exposed during peak low tide. The average height of the adjacent coastal domain is about 2.5 m from the level of high water line. The gently sloping, 200m wide beach is veneered by fine to very fine sand with occasional silt and clay.

The continuous bathymetric measurements indicate very shallow water depth, maximum to ~10m. Bathymetric contours broadly follow the coastline in a NW-SE direction. The gently sloping seabed is having occasional high relief with presence of shoals and some narrow underwater channels due to scouring of the sea floor by the effect of strong tidal current. Area just off the Frasergunj coast shows a depositional situation. There are several sandbars in north, north east, central and at southern domain of the area which are otherwise not indicated in the toposheet or NHO chart. These offshore sandbars are formed in recent times. General pattern of wave height near the coast is very low. Seawater is slightly alkaline. Surface salinity ranges from 26 mg/l to 28 mg/l in the

eastern sector whereas it is between 22 mg/l to 23 mg/l near Frasergunj coast possibly due to fresh water influx from Hooghly and Baratala River. The sediment character of the seabed varies from fine sand, silty sand and sandy silt..

The wider continental shelf, gentle gradient of seabed and shallow bathymetric zone starting far away from coast reduces the enormity of the marine hazards. Proper embankment, refrained developmental activity in low elevated coastal belt and stable shelter on higher topographical domain will ensure proper coastal preparedness.

Keywords: Bakkhali-Frasergunj coast, continental shelf, coastal hazard preparedness, bathymetry

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