Shoreline Dynamics and Land Use Shifts in Sandwip Island, Bangladesh: A Comprehensive Analysis Using Digital Shoreline Analysis System and Satellite Imagery.

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Sandwip is located in the north-east of the Bay of Bengal, off the port city of Chittagong. The total area of sandwip island is about 762.42 sq. km with a population of 334,420. The island features Meghna estuary floodplain alluvial soil and experiences a tropical climate. Using Sentinel and Landsat satellite data the study evaluated Land Use Land Cover (LULC) and shoreline change analysis in Sandwip Island.Net Shoreline Movement (NSM) and End Point Rate (EPR) are extracted and calculated using the Digital Shoreline study System (DSAS) and ArcGIS tools for shoreline change study. Landsat 8 and Sentinel-2 data are utilised to estimate land use and land cover using the ISO cluster, an unsupervised classifier that maps change from 2020 and 2023. LULC analysis reflects important changes, including changes in cropland and vegetative cover, as well as urbanisation patterns.The Kappa method of accuracy evaluations shows an overall accuracy of 95% for Sentinel 2, 2023, 93.15% for Sentinel 2, 2020, 87% for Landsat 8, 2023, and 85% for Landsat 8, 2020. Along with other indicators, the Rate of Linear Regression (LRR) provides quantitative information about shoreline dynamics.Shoreline retreat or extension is indicated by NSM, with both positive and negative values denoting recession or accretion. Intense accretion is shown close to a bridge construction site by EPR, which infers the rate of change. This method is helpful in locating regions that have seen accretion or are susceptible to erosion, and it may offer some quantitative insight into coastal dynamics. This study makes a significant addition to environmental monitoring, coastal management, and knowledge of the interplay between the artificial and natural forces that shape Sandwip Island.