

Title : Seasonal variation Physicochemical parameters Hydrochemistry Water quality assessment

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Abstract: Saltwater intrusion in the coastal areas of Bangladesh is a prevalent phenomenon. However, it is not conducive to activities such as irrigation, navigation, fish spawning and shelter, and industrial usage. The present study analyzed 45 water samples collected from 15 locations in coastal areas during three seasons: monsoon, pre-monsoon, and post-monsoon. The aim was to comprehend the seasonal variation in physicochemical parameters, including water temperature, pH, electrical conductivity (EC), salinity, total dissolved solids (TDS), hardness, and concentrations of Na^+ , K^+ , Mg^{2+} , Ca^{2+} , Fe^{2+} , HCO_3^- , PO_4^{3-} , SO_4^{2-} , and Cl^- . Additionally, parameters essential for agriculture, such as soluble sodium percentage (SSP), sodium absorption ratio (SAR), magnesium absorption ratio (MAR), residual sodium carbonate (RSC), Kelly's ratio (KR), and permeability index (PI), were examined. Their respective values were found to be 63%, 16.83 mg/L, 34.92 mg/L, 145.44 mg/L, 1.28 mg/L, and 89.29%. The integrated water quality index was determined using entropy theory and principal component analysis (PCA). The resulting entropy water quality index (EWQI) and SAR of 49.56% and 63%, respectively, indicated that the samples are suitable for drinking but unsuitable for irrigation. These findings can assist policymakers in implementing the Bangladesh Deltaplan-2100, focusing on sustainable land management, fish cultivation, agricultural production, environmental preservation, water resource management, and environmental protection in the deltaic areas of Bangladesh. This research contributes to a deeper understanding of seasonal variations in the hydrochemistry and water quality of coastal rivers, aiding in the comprehension of salinity intrusion origins, mechanisms, and causes.

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