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Estuarine Biogeochemical Dynamics of the East Coast of India

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Chapter 11
Nutrient Cycling and Seasonal Dynamics of Primary Production in Nearshore Waters of East Coast of India

Rajdeep Roy, Ravidas Krishna Naik, Priya M. D'Costa, P. V. Nagamani, and S. B. Choudhury

Abstract The five major rivers (Ganges, Mahanadi, Godavari, Krishna, and Cauvery) flowing in the north eastern Indian Ocean greatly influence the biogeochemical cycling nearshore waters of the east coast of India. For example, estuaries which are located at the interface between land and ocean are an area of intense recycling of organic matter with a large salinity gradient. The estuarine environment is generally complex, as local circulations and mixing affect the chemistry and deposition of organic matter, thereby controlling the estuarine–coastal nutrient budget. The fluvial inputs are major sources of nutrients to the Bay of Bengal (BoB) which also regulates the phytoplankton dynamics in both estuaries and coastal waters. The annual supply of nutrients by the Ganges and Brahmaputra rivers to the BoB is estimated to be 133×10^9 mol year^{-1} which is ~2% of the riverine input to the world ocean. Both river runoff and precipitation are more intense during the southwest monsoon (SWM), resulting in lowering of surface salinity to 3 to 7 units in the Bay of Bengal. This also creates a strong seasonality in phytoplankton primary production in both estuaries and coastal waters. In general, primary production in the nearshore waters of eastern India has been found to covary with reduced suspended material and stability of water column with three seasonal peaks at few locations. Although it was hypothesized that the biological productivity of BoB is low in comparison to its adjacent basin due to various reasons such as a narrow shelf, cloud cover during the summer monsoon, turbidity resulting from sediment influx, etc. However, recent studies suggest the presence of cyclonic eddies can enhance primary production in BoB due to the entrainment of nutrient-rich waters

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