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Estuarine Biogeochemical Dynamics of the East Coast of India

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Nutrient Cycling and Seasonal Dynamics of Primary Production in Nearshore Waters of East Coast of India | SpringerLink

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Table of contents (15 chapters)

Front Matter

Pages i–xix

[Download chapter PD](#)

Introduction: An Overview of Biogeochemical Cycle of Estuarine System

Sourav Das, Tuhin Ghosh

Pages 1–11

<https://link.springer.com/book/10.1007/978-3-030-68980-3>

4/21/25, 12:37 AM

Estuarine Biogeochemical Dynamics of the East Coast of India | SpringerLink

Geological Setup of the East Coast of India

Bijan Kumar Saha

Pages 13–30

Aquatic Biogeochemistry of the Estuarine and Coastal Waters of the Bay of Bengal: Impact of Physical Forcing and Extreme Atmospheric Events

Suchismita Pattanaik, Abhra Chanda, Pradipta Kumar Mohapatra

Pages 31–43

Carbon Dynamics of the Estuaries Along the East Coast of India

Kunal Chakraborty, Jayashree Ghosh, Trishneeta Bhattacharya, Anirban Akhand, R. S. Mahendra, Vimal Valsala

Pages 45–56

A Systematic Review of Biogeochemistry of Mahanadi River Estuary: Insights and Future Research Direction

Tamoghna Acharyya, Bikram Prativa Sudatta, Susmita Raulo, Sambit Singh, Suchismita Srichandan, Sanjiba Kumar Baliarsingh et al.

Pages 57–80

Mercury-Resistant Marine Bacterial Population in Relation to Abiotic Variables at the Bay of Bengal, India

Hirak R. Dash, Surajit Das

Pages 81–102

Persistent Organic Pollutants in the Coastal and Estuarine Regions Adjoining the Indian Periphery of the Bay of Bengal

Sanghamitra Basu, Abhra Chanda, Sourav Das, Subarna Bhattacharyya

Pages 103–110

Geostatistical Analysis of Suspended Particulate Matter Along the North-Western Coastal Waters of Bay of Bengal

Atreya Basu, Sayan Mukhopadhyaya, Kaushik Gupta, Debasish Mitra, Shovan Lal Chattoraj, Anirban Mukhopadhyay
Pages 129–149

Multiple Facets of Aquatic Pollution in the Estuarine and Continental Shelf Waters Along the East Coast of India

Anirban Akhand, Abhra Chanda, Sourav Das
Pages 151–163

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, S. B. Choudhury
Pages 165–181

Microzooplankton in Estuaries, Mangroves, and Lagoons of East Coast of India

Biraja Kumar Sahu, Sourav Das
Pages 183–209

Influence of Physical Processes on Nutrient Dynamics and Phytoplankton in the Coastal Bay of Bengal

Madhusmita Dash, Chandanlal Parida, Biraja Kumar Sahu, Kali Charan Sahu, Sourav Das

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 $133 \times 10^9 \text{ mol year}^{-1}$ which is $\sim 2\%$ 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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165