

Metal Bioavailability in Estuarine Mudflat - Mangrove Sedimentary Environments and Bioaccumulation in Sediment Associated Biota and Mangroves and their Possible Effect, West Coast of India

G. N. Nayak

Department of Marine Sciences, Goa University, India

The estuaries are complex and dynamic aquatic environments known for interaction and mixing of fresh and saline waters and high sediment deposition. The studies carried out, for over a decade, on the mudflat - mangrove sedimentary environments in the tropical estuaries along central west coast of India, revealed that the small rivers are the major pathways for sediment and nutrients from catchment area to the estuaries and the adjacent sea. Further, estuaries are the breeding and nursery grounds for marine organisms and a potential fishery habitat. Estuarine processes are affected by sea level variation as well as cyclones, floods and such other natural processes. The systematic sorting of sediment size takes place within estuaries from the mouth to the head due to the prevailing hydrodynamic conditions. Intertidal flats represent sand flats in lower, marine dominated estuarine regions and mudflats in the middle mixing zones. Distribution of sediment, organic matter and metals within an estuary is regulated by changing tides, waves, winds and in turn resulting salinity, pH, redox potential and other physico-chemical parameters with space and time. The hydrodynamic conditions and rate of sedimentation in the estuaries along central west coast of India showed considerable variations with time. The metal concentration showed an increase towards surface of most of the cores indicating their deposition in calmer environment with finer sediments and organic matter. Change in land use and land cover pattern in the catchment area has enhanced the material supply to the estuary in the recent years. Further, in addition to natural material, anthropogenic activities such as mining, industrial, agricultural, transportation and others also adding material to the estuary. Within in the estuary, due to changes in physico-chemical conditions, metals are transformed from one phase to the other and are found in solution, exchangeable, carbonate, Fe-Mn oxide, organic/sulfide and residual phases. The phases other than residual are sensitive to changes in pH and Eh. The metals in solution and bioavailable phase (exchangeable, carbonate, Fe-Mn oxide, organic/sulfide) enter sediment associated biota through bioaccumulation and are enriched in mangroves, bivalves and other sediment associated biota. Mangroves are known for biomagnification of metals and act as remedial measures to control the quality of coastal waters. The edible sediment associated biota with metal bioaccumulation is consumed by the fish eating coastal human population. Regular consumption of these biota can affect the health of coastal population. The awareness campaign to the coastal population on the effect of eating metal bioaccumulated biota is essential.

Biography:

Prof. G. N. Nayak, born on 10.06.1957, did his graduation (1979), post-graduation (1982) and doctorate (1986) degrees in Geology from Karnataka University, Dharwad, India with Ph.D. topic entitled "Studies on morphology, texture and mineralogy of the beaches along North Karnataka Coast around Karwar, India". Later, on 22.12.1986 he was appointed as a Lecturer at Department of Marine Sciences, Goa University, Reader on 19.05.1991 and Professor on 08.06.1996. As a faculty member at Goa University he held positions of Head, Department of Marine Sciences for over 12 years and 8 months and Dean of the Faculty of Life Science and Environment for 6 years. He was also member of Executive council, Academic council, Senate; Chairman of Board of studies of Marine Sciences and Environmental Sciences. Prof. Nayak was member of Board of studies of Gulbarga University, Berhampur University and Shivaji University. Prof. Nayak is a President of Indian Association of Sedimentologists since 2013, was UGC Expert member on UGC-SAP at Berhampur University and Manonmanian University, was a Member of Ocean Science & Technology Cell, Tamil University and Mangalore University, was a member of Goa Environmental Protection Council, is an expert member of Goa State Wetland Authority (GSWA), State Level Steering Committee (SLSC) for National Adaptation Fund for Climate Change (NAFCC), Goa. He received awards namely The Shrimati Saroma Sanyal Memorial Prize and The Rekha Nandi and Bhupesh Nandi Prize. He has published two books entitled "Beaches of Karwar" and "Impact of Mining on Environment in Goa" and over 89 publications in National and Internationals. He has conducted 19 research / consultancy projects, guided 16 Ph.D.'s and 1 M.Phil, participated in over 110 conferences and delivered over 20 invited talks and chaired many sessions.