

Monsoon runoff strongly affects benthic foraminiferal abundance and diversity in the tropical mudflats

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Mudflats are one of the most biologically productive systems with abundant invertebrates which also provide robust defence against the destructive tides and waves. Combined with high sedimentation rates and water-logged anoxic soil, mud flats are a large sink for carbon and play an important role in the mitigation of global warming. Mudflats filter the water as it runs off the land and absorb sediment, nutrients, and pollutants. Mudflats generally have a high abundance of benthic organisms and play a critical role in transferring energy between trophic levels. In this study, we assessed the monthly changes in the benthic foraminiferal distribution in a tropical mudflat from Goa, India. The region is strongly influenced by the summer monsoon. The monthly (pre-monsoon, monsoon, and post-monsoon), mini-core samples were collected from the Cortalim mudflat situated on the banks of the Zuari river. The top 10 cm of the sediments were collected in duplicate for a period of 13 months (November 2022 to December 2023). The foraminiferal distribution was compared with environmental parameters (pH, salinity, sediment texture, organic matter, inorganic carbon) to understand the dominant factors affecting foraminiferal abundance and diversity. A minimum of 300 living and dead intact benthic foraminiferal specimens along with broken specimens, were picked from the rose Bengal-stained sediments. A large seasonal shift in grain size and organic carbon was observed in the mudflat sediments. There was an increase in the benthic foraminiferal abundance during the premonsoon season and a sudden decline in the abundance is observed during the monsoon season. The absolute abundance of intact dead foraminiferal specimens was more when compared to living and broken specimens. The distribution of benthic foraminifera was mainly driven by the changes in the salinity and sediment texture. This work provides a robust understanding of the influence of different physico-chemical parameters on benthic foraminiferal distribution in the tropical mudflats.