



Biodiversity and ecology of polychaetes in Indian mangroves: A review

Dr. Santosh Vasantrao Rankhamb

Associate Professor and Head, Department of Zoology, Late Ramesh Warpuddkar ACS College, Sonpeth, Maharashtra, India

Abstract

Polychaetous annelids represent the most abundant and diverse group of macrobenthic invertebrates in Indian mangrove ecosystems. This review synthesizes data from major mangrove forests along the East and West coasts of India. Analysis reveals that Indian mangroves harbor approximately 385 species belonging to 49 families, representing roughly 35.2% of the total polychaete diversity recorded in the Indian EEZ. The review highlights the dominance of the East Coast deltas, the impact of physicochemical parameters like salinity and Total Organic Carbon (TOC) on distribution, and the role of polychaetes as bio-indicators of environmental stress.

Keywords: Polychaetes, mangrove ecosystems, biodiversity, ecology

Introduction

Mangroves are highly productive intertidal ecosystems that serve as a bridge between terrestrial and marine environments. In India, these forests cover approximately 4,992 km^2 (FSI, 2021). Polychaetes (Annelida) are the dominant component of the soft-bottom benthos in these habitats, often accounting for over 60% of the macrofaunal density (Murugesan *et al.*, 2012) [5]. They play a critical role in the 'detritus food web,' converting mangrove leaf litter into biomass that supports higher trophic levels, including commercially important fish and crustaceans (Santhosh *et al.*, 2024) [8].

Taxonomic Diversity and Composition

The taxonomic landscape of Indian mangrove polychaetes is diverse, though unevenly studied.

- **Dominant Taxa:** The community is consistently dominated by the families.

- **Nereididae, Spionidae, Capitellidae, and Eunicidae** (Khan and Murugesan, 2005) [3].
- **Key Species:** Common species recorded across Indian mangroves include *Dendronereis arborifera*, *Neanthes glandicincta*, *Marphysa gravelyi*, and *Prionospio cirrifera*.
- **Status:** Recent checklists suggest that while the East Coast has been extensively documented, the West Coast and the Andaman and Nicobar Islands still possess significant 'taxonomic gaps' (Sivadas and Ingole, 2016) [9].

Regional Distribution Patterns

Biodiversity varies significantly across the Indian coastline due to differences in riverine discharge and tidal amplitude.

Mangrove Region	Species Richness (Estimated)	Dominant Families	References
Sundarbans (WB)	68–75	Nereididae, Nephtyidae	Misra (2018) [4]
Bhitarkanika (OR)	54–60	Spionidae, Capitellidae	Rama Devi (2021) [6]
Coringa (AP)	48–55	Glyceridae, Nereididae	Rao <i>et al.</i> (2023) [7]
Pichavaram (TN)	59–65	Eunicidae, Sabellidae	Murugesan (2012) [5]
Cochin (KL)	33–40	Capitellidae, Nereididae	Sunil Kumar (2019) [10]

Ecological Drivers of Community Structure

The distribution of polychaetes is not random but governed by specific environmental 'filters.'

- **Salinity:** According to studies in the Vellar estuary (Murugesan *et al.*, 2012) [5], salinity is the primary factor. Euryhaline species like *Nereis* spp. dominate the mid-estuary, while stenohaline marine species appear near the river mouths.
- **Sediment Texture:** Polychaete richness is typically higher in silty-clay substrates compared to sandy areas. Fine sediments trap more organic matter, providing a food source for deposit feeders (Santhosh *et al.*, 2024) [8].
- **Organic Carbon:** Mangroves are carbon-rich environments. High levels of Total Organic Carbon

(TOC) promote the dominance of opportunistic families like Capitellidae, which thrive in anaerobic conditions (Gopal *et al.*, 2025) [2].

Bio-indication and Anthropogenic Impact

Polychaetes are widely recognized as 'sentinel organisms.'

- **Pollution Monitoring:** The presence of the 'indicator complex' *Capitella capitata* has been used to map organic enrichment from shrimp farm effluents in the Andhra Pradesh and Tamil Nadu mangroves (Rao *et al.*, 2023) [7].
- **Heavy Metals:** Research in the Hooghly estuary mangroves has shown that *Nereis diversicolor* can bioaccumulate heavy metals like Cu and Zn, providing a snapshot of industrial contamination levels (Misra, 2018) [4].

Conclusion and Future Directions

The biodiversity of polychaetes in Indian mangroves is a vital indicator of coastal health. However, the reliance on morphological identification often masks 'cryptic species.' Future research must integrate molecular barcoding (COI genes) with traditional taxonomy to resolve these complexes (Sivadas and Ingole, 2016) ^[9]. Furthermore, as climate change induces sea-level rise, monitoring the shift in polychaete communities will be essential for predicting the resilience of Indian mangrove ecosystems.

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