ANNEXURE I

LIST OF CONFERENCE/SEMINAR/SYMPOSIUM ATTENDED

Oral Presentations

I. 'Vertical distribution and variability of meiobenthic assemblages from different mangrove vegetation of Sundarban Estuarine System, India': Moumita Ghosh, Sumit Mandal – at International Conference on Benthos, 2019, CUSAT, Kochi, India.

II. 'Structure of meiofaunal assemblages from sediments of different mangrove habitats at Sundarbans': Moumita Ghosh, Sumit Mandal – at International Conference of 5th India Biodiversity Meet, 2018, ISI, Kolkata, India.

III. 'Meiobenthic biodiversity from soft bottom estuarine habitat of Indian Sundarbans: A pilot study': Moumita Ghosh, Sumit Mandal - at National Conference on Applied Zoology in Sustainable Development: An Update, 2015, University of North Bengal, West Bengal, India.

Poster Presentations

I. 'Intra-monsoonal impact of soft-bottom meiobenthic community structure from Sundarban Estuarine System': Moumita Ghosh, Sumit Mandal – at UGC Sponsored National Seminar on Biodiversity, Exploration, Exploitation, Conservation & Managemment – Vision & Mission, 2016, Barasat Govt. College, Barasat, Kolkata.

II. 'Ecology of soft bottom meiobenthic community from estuarine habitat of Indian Sundarbans: A case study': Moumita Ghosh, Sumit Mandal, Meenakshi Chatterjee – at International Symposium on the Indian Ocean: Dynamics of the Indian Ocean: Perspective and Retrospective, 2015, CSIR-National Institute of Oceanography, Goa, India.

III. 'Structure and diversity of meiofaunal community from sediments of different Mangrove habitats at Sundarbans': Moumita Ghosh, Shubhrajyoti Chattoraj, Bibrita Bhar, Ritisri Mondal, Tanmoy Nandy, Tirthankar Nath, Sumit Mandal – at DBT-BUILDER sponsored National Symposium on Environmental Impact on Biodiversity and Plant Development, 2015, Presidency University, Kolkata.

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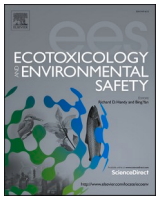

Research paper

Deciphering the synergistic impact of elevated temperature and oil pollution on meiobenthic community structure: A benthocosm study

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ARTICLE INFO

Edited by - Paul Sibley

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ABSTRACT

Meiobenthos has been considered as an excellent tool for biomonitoring assessment. Elevated temperature and oil pollution are considered as the most pervasive aspects of global environmental changes and matter of concern for contemporary society. Presently, very limited information is available about the synergistic effect of these stressors on meiobenthic community structure and tolerance potential from tropical intertidal environment. Here, we assessed their impacts on meiobenthic community by conducting a 60 days long benthocosm experiment selecting three sets of temperature (25°, 30° and 35 °C) and two sets of diesel oil (low and high) combinations. Gradual changes in their community composition were revealed discernibly with exposures to both the disturbances after 30 and 60 days of experimental period. Diversity profiles for the nematodes were less affected, but copepods showed a graded response of decreasing density with increasing dose of both the stressors. Other meiobenthic taxa such as halacarid mite, turbellaria and polycheate juveniles were adversely affected and eliminated from the treatments, howbeit abundance of ostracods, foraminiferans and bivalve settlers varied significantly. A 3-factor PERMANOVA indicated a significant effect of temperature, diesel, between their interaction and interaction among stressors and time on meiofaunal abundances. In case of free-living nematodes, temperature rise and diesel contamination synchronously led to an elimination of *k*-selected species like *Halalaimus gracilis*, *H. longicaudatus*, *Oxystomina aesetosa* and *Pomponema* sp. with a significant decrease in abundance of *H. capitulatus* and *Oncholaimus* sp. The *r*-selected species *Daptonema invagiferoum*, *Sabatieria praedatrix*, *Theristus acer*, *Monhystera* sp. and *Thalassomonhystera* sp. had endured even at high doses of diesel treatment in three different temperatures set up. The effects were evident in term of changes in life strategies with an increment of opportunistic species and increased trophic diversity of deposit feeders in treated sediments. Overall, elevated temperature together with diesel oil contamination were found to alter species dynamics within shallow intertidal meiobenthic communities, which might have significant Armageddon on benthic ecosystem functioning.

1. Introduction

Several anthropogenic disturbances wrecked havoc on marine ecosystems, thereby altering the essential services they provide (Harley et al., 2006; Rosenzweig et al., 2008). Climate change induced elevated temperature has already jeopardized marine ecosystem functioning (Richardson and Schoeman, 2004; Behrenfeld et al., 2006; Poloczanska et al., 2016). Since the post-industrial era, excessive combustion of fossil fuel unambiguously leads to a noticeable increase in ocean mean temperature and it is conjectured that by 2100 sea surface temperature (SST) would escalate up to 2–4 °C (Collins et al., 2013; IPCC, 2014). A warming trend in the SST along the coastal Bay of Bengal has been observed during last few decades (Samanta et al., 2018) and has potential reverberation on coastal marine biota. Sea surface warming substantially declines primary production in tropical region (Krumhardt et al., 2017), which may affect the availability of food (organic matter) for benthic organisms. As benthic compartments play vital roles in biogeochemical cycles (Nascimento et al., 2012) and energy transfer to commercially important benthivorous fishes, shrimps and crabs (Schückel et al., 2013; Schratzberger and Ingels, 2017), impact to benthic community structure may have cascading ecological effects in marine food chains. In addition, distributional shift of benthic invertebrates as well as impact on their reproductive success and offspring survivability have been reported in response to warming waters

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Does vertical distribution of meiobenthic community structure differ among various mangrove habitats of Sundarban Estuarine System?

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HIGHLIGHTS

- Vertical distribution of meiofauna was assessed from five mangrove vegetation of Indian Sundarbans.
- *Sonneratia caseolaris* harboured the highest density of meiofauna with the lowest in *Bruguiera gymnorrhiza*.
- Vertical profile of meiofaunal composition suggested upper 3–4 cm contained 90% of total fauna.
- The nematode fauna consisted of 52 species dominated by r-strategists.
- *Desmodora scaldensis* was the most dominated nematode species among all vegetation.

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ABSTRACT

Mangroves are the most productive environments that play significant ecological and socioeconomic roles. For the first time we investigated vertical stratification of meiofaunal community and nematode species composition from the sediments of five mangroves (*Aegiceras corniculatum*, *Bruguiera gymnorrhiza*, *Avicennia alba*, *Rhizophora mangle* and *Sonneratia caseolaris*) at Bali Island in the worlds' largest mangrove ecosystem of Sundarbans, India. Among different mangrove species, *S.caseolaris* had the highest density of meiofauna with the lowest in *B. gymnorrhiza*. A total of eight taxa were recorded from the sediment of different mangrove habitats. In terms of percentage composition, free-living nematodes dominated followed by harpacticoid copepods, kinorhynch, ostracods, foraminifera, polychaete, halacarid mite and bivalve juvenile. The vertical profile of meiofaunal composition suggested upper 3–4 cm harboured 90% of total meiofauna, although they were present up to 15 cm depth. Environmental variables explained meiofaunal community structure. Availability of food sources such as phaeopigments, Chlorophyll *a*, organic carbon and sediment texture controlled meiofaunal distribution. The nematode fauna consisted of 52 species belonging to 39 genera and 20 families. The trophic structure of nematode taxa revealed a community dominated by epistrate feeders (2A) followed by selective deposit feeders (1A). Moreover, marine nematode genera were used to test Maturity Index (MI), life strategy or biological traits (i.e. c–p classes) and Index of Trophic Diversity (ITD) for assessing ecological health. Higher MI among different mangrove vegetation indicated a stable environment; moreover, biological trait analysis showed that mangrove sediments were dominated by r-strategists. Lower values of ITD index revealed a proportionate occurrence of trophic diversity in nematode communities among different vegetation. In the current context of habitat destruction and anthropogenic perturbations, investigation of ecological interactions between mangroves and meiofauna would be imperative for ecosystem monitoring and sustainable development in future.

1. Introduction

Mangroves, the most implicit element of the world, are living at the confluence of land and ocean in the tropics and sub-tropical regions. They play an influential role in various ecosystem services like carbon sequestration, soil formation, hydrological cycle regulation, mitigation of coastal erosion and extreme weather events, such as storms, cyclones or tidal surges (Kathiresan and Bingham, 2001; Danielsen et al., 2005; Spalding and Collins, 2010). With a number of floristic species, the shallow water mangrove vegetation endowed with a plethora of commercially valuable living resources like fin and shell fishes and sustains the fisheries of entire eastern coast (Mandal et al., 2012). This ecosystem is biogeochemically important for sediment, carbon, nutrient, and contaminant accumulation also (Alongi, 2002).

The world's largest contiguous deltaic mangrove, popularly known as Sundarbans, is situated across India and Bangladesh

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Living with Nematode: an Epibiont *Trematosoma rotunda* Associated with Basibiont *Desmodora scaldensis* from Matla Estuary, Sundarbans, India

Moumita Ghosh[1] · **Sumit Mandal**[1]

Received: 16 October 2018 / Revised: 8 February 2019 /

Abstract
In the present study, we reported the symbiotic associations of suctorian epibionts *Trematosoma rotunda* (Allgén 1952) with marine nematode *Desmodora scaldensis* de Man 1889. The attachment of the epibionts on the cuticle of marine free-living nematodes was reported for the first time from subtidal zone of Matla estuary, Sundarbans, India. We compared the biometrics of epibiont *T. rotunda* with published literatures, discussed host-epibiont interactions and suggested future research opportunities.

Keywords *Desmodora scaldensis* · Epibionts · Free-living nematodes · Sundarbans · Symbiotic associations · *Trematosoma rotunda*

Introduction

Several benthic marine invertebrates like cnidarians, annelid worms, crustaceans, halacarid mites, molluscs are common hosts (basibionts) to some ciliates (epibionts) like peritrichids and suctorians (Arndt et al. 2005; Dias et al. 2010; Dovgal et al. 2008a; Fenchel 1987; Jankowski 1981). This extremely common phenomenon is known as epibiosis and has been reported across the world's ocean (Allgén 1955; Dovgal et al. 2009a; Fernandez-Leborans et al. 2012; Fisher 2003; Gelmboldt and Dovgal 2005). Epibionts are considered as the organisms growing attached to a living body often with facultative association in the sediment interstices (Wahl 1989). Epibiont ciliates are widespread in meiobenthic organisms (free-living nematodes, harpacticoid copepods, kinorhynchs, ostracods, oligocheates, tanaids) of marine environments (Chatterjee et al. 2014; Dovgal et al. 2008b; Padmakumar et al. 2014; Sergeeva and Dovgal 2014; Susetiono 2006). This kind of epibiotic settlement provides epibionts a hydrodynamically favourable position (Oswald and Seed 1986; Wahl 1989) and the flexible nature of the basibiont body surface reduces the danger of being dispersed with increased water turbulence (Riedl 1971). From Indian water, there are few publications about suctorian epibionts associated with meiofaunal basibionts (Ansari and Bhadury 2016; Bhattacharjee 2014; Chatterjee et al. 2013; Dovgal et al. 2008a, b; Ingole et al. 2010; Padmakumar et al. 2014; Panigrahi et al. 2015). In the present study, specimens of *Trematosoma rotunda* (Ciliophora, Suctorea) were reported as epibionts on the cuticle of free-living nematode *Desmodora scaldensis*, which belong to the family Desmodoridae from the Matla river of the Sundarban Estuarine System (SES). Though the suctorian ciliates *Trematosoma rotunda* (Allgén 1952) were reported on the cuticle of various nematode species, but the association with the nematode *Desmodora scaldensis* was recorded first time from subtidal zone of the Matla estuary, in the eastern Sundarbans, the world's largest mangrove ecosystem.

Materials and Methods

Study Site

As part of our ongoing biological study along the Matla estuary of the Sundarbans, meiofaunal organisms were collected and examined from eight stations across salinity gradient following standard protocols. Collection was made from northern part of the Matla estuary (latitude 21°59'11.30''N;

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Original Articles

Impact of unusual monsoonal rainfall in structuring meiobenthic assemblages at Sundarban estuarine system, India

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ABSTRACT

The present study investigates the impact of monsoon on meiofaunal and free-living nematode communities of the Sundarban estuarine system (SES) both from taxonomic and functional point of view. In 2013, SES experienced an unusual rainfall event followed by cloud burst event at upper Himalayan regime. Average meiobenthic abundance declined considerably in the study area from early phase of monsoon (EM) (699 ± 1569.4 ind. 10 cm^{-2}) to later one (LM) (437 ± 949.9 ind. 10 cm^{-2}) probably due to high annual rainfall which completely flushed the estuary. Free-living marine nematodes were the dominant group among all other meiobenthic taxa in both phases of monsoon. Nematode community was made up of 49 genera in 22 families. Comesomatidae, Chromadoridae, Linhomoeidae and Xylidae were the richest and most abundant families. During both phases of monsoon, stations, which were represented by fine sediments and high amount of organic carbon, harbored higher meiofaunal densities and nematode diversity with a strong dominance of 1B and 2B trophic guilds of nematodes. Different feeding guilds of nematode would be able to reveal anthropogenic-induced stress, which could be useful in assessing ecological quality of estuarine ecosystems. The present study indicates that climate change mediated unusual monsoonal precipitation may notoriously affect the meiobenthic assemblages in tropical estuaries like SES. Thus, this study could be an important first stepping stone for monitoring the future environmental impact on meiobenthic community in the largest mangrove region of the world.

1. Introduction

Estuaries are considered as one of the most productive ecotone on earth (Prandle, 2009). It support invaluable ecological function and services in the context of its role in biogeochemical cycle, transport of nutrients, water purification, flux regulation of water, particles and pollutants, shoreline protection (Kennish, 2002; Alves et al., 2015). Due to its high biological productivity, estuaries forms the most important spawning zones and nursery ground for a wide variety of commercial fish and shell fish communities. Being a specialized dynamic environment, estuaries are usually well-marked by rapid variations in temperature, salinity, turbidity, dissolved oxygen and nutrient concentrations (Frontalini et al., 2014; Semprucci et al., 2014). These physico-chemical variables are characterized by riverine run-off during monsoon.

Benthic communities have been conventionally used as indicators of natural and man-made environmental perturbations (Borja et al., 2000; Vanaverbeke et al., 2011; Semprucci et al., 2015a). They are considered as sensitive to any kind of natural disturbances (tide, wave, currents etc.) because they could reflect an integrated response over time. In benthic realm, meiofauna contributes a considerable amount (10^5–10^6 individuals m^{-2}) in terms of total benthic biomass (Giere, 2009). They have been used as suitable yardstick of environmental health owing to their small size, high abundance and diversity, ubiquitous distribution, rapid generation times, fast metabolic rates, direct benthic development and sessile habitat (Kennedy and Jacoby, 1999; Schratzberger et al., 2000; Balsamo et al., 2012). They are important food source for large benthic organisms (McIntyre, 1977; Gerlach, 1978; Zeppilli et al., 2015) and help in recirculation of nutrients. It has been suggested that the production of meiofauna in estuaries and shallow water bodies is much higher than those of macrofauna (Balsamo et al., 2010). Among meiofauna, free-living nematodes and harpacticoid copepods are the richest animal groups (Boucher and Lambshead, 1995; Lambshead, 2004). On account of their dominance, ubiquitousness and robust bodies make these groups of organisms promising components to study natural and anthropogenic disturbances in marine ecosystem (Sanduli and De Nicola, 1991; Bongers and Ferris, 1999; Semprucci et al., 2015b). Thorough analyses of community structure can therefore provide a

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SENCKENBERG

ORIGINAL PAPER

Free-living marine nematode diversity from the Indian coasts

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Abstract We present an updated taxonomic list of free-living nematode community from Indian coasts and Andaman & Nicobar Islands based on available published literatures. The Indian coast was divided into six basic habitats. The faunal list presents 288 nematode species, 227 genus, 44 families and 9 orders. The continental shelf had the highest species richness (225), followed by intertidal areas (81). The coastal diversity of nematofaunal community is higher in East than west sector. *Halalaimus*, *Viscosia*, *Sabatieria*, *Bathylaimus*, and *Theristus* are present in all regions. The fluctuation in species number throughout the Indian coast is probably due to differences in geomorphology, habitat heterogeneity among coastal regions, and unbalanced research efforts. Present paper may help to give more information on marine nematodes.

Keywords Free-living nematodes · Indian coasts · Andaman & Nicobar Islands · Faunal list

Introduction

Nematodes are better known as parasites, but the phylum consists of a diverse free-living fauna with ubiquitous distribution in sediment (Balsamo et al. 2010). The major free-living nematodes community colonize marine habitat where the specific distribution is so far in the range between 4,000–7,000 (Lorenzen 1994; Venekey et al. 2010; Appeltans et al. 2012). Free-living nematodes are small (30–500 μ) (SCOR Working Group 76 1994), inconspicuous numerically dominant metazoan meiobenthos (Lambshead and Schalk 2001). They occur under all climatic conditions from Antarctic pristine lakes (Ingole and Parulekar 1993) to the deepest parts of the Ocean (Lambshead et al. 2003). In coastal ecosystem, nematodes are important in the food web, as they have an intermediate trophic position (between bacteria/detritus/microalgae and macrofauna/megafauna) and as small crustaceans feed upon them (Gerlach and Schrage 1969), thus playing a crucial role in demersal fishery (Coull 1973; Schückel et al. 2013). Experimental evidence has shown that this group of organisms stimulates mineralization of organic matter (Findlay and Tenore 1982) and nutrient regeneration (Tietjen 1980) by grazing on bacteria. Due to their reduced mobility, short life cycle and higher reproductive ability, marine nematodes also play a significant role in biomonitoring studies (Platt and Warwick 1980; Semprucci et al. 2015b, 2016). Presently, the benthic environment has been affected by various pollutants due to different human activities. The abundance of nematode assemblages were significantly altered by sewage outfall and organic enrichment (Fraschetti et al. 2006), biodeposition of faeces during aquaculture (Mirto et al. 2002), hydrocarbon pollution (Mahmoudi et al. 2005), and trace element contamination (Boufahja et al. 2011). Nematodes can survive even in extreme conditions, while other benthic groups disappear (Heip 1980). Many researchers have highlighted that nematodes could adapt to extreme environments due to their behavioural or physiological modifications (Schratzberger et al. 2008; Armenteros et al. 2010; Balsamo et al. 2012; Semprucci et al. 2015a).

Though they are extremely abundant and their numbers exceed millions per square meter (Platt and Warwick 1980), their diversity and ecology remain poorly understood. A copious number of research papers have dealt with various

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ORIGINAL ARTICLE

Short-term variations in surface water properties in the Sundarban Estuarine System, India

Tanmoy Nandy[1] · Sumit Mandal[1] · Soumya Deb[1] · Moumita Ghosh[1] · Tirthankar Nath[2] · Meenakshi Chatterjee[2]

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Abstract High resolution measurements were carried out to understand the short-term (<1 h) variability of surface water quality parameters in mangrove-dominated Sundarban Estuarine System of West Bengal, India during flood phases of spring-neap tidal cycle in a peak monsoon season August 2014. We observed that tidal propagation of both phases strongly influenced the water quality properties. During spring tide salinity, DO, pH, nitrate, phosphate, silicate, chlorophyll *a* and phaeopigments concentration exhibited increasing trends; whereas at neap tide nitrate, ammonia and chlorophyll *a* showed decreasing trends. Average nutrient concentrations were much higher during neap tide than spring tide. All the measured water quality parameters varied in every 15-min interval influenced by the tidal current, mangrove litter fall, re-suspension of bottom sediment and river runoff. The effect of tidal amplitude was observed to be the important factor in determining the variability in most of the water quality parameters.

Keywords Sundarban Estuarine System · Water quality · Monsoon · Spring–Neap Tide

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Introduction

Estuaries play an important role in biogeochemical cycle because of their capability to regulate a huge amount of river-borne major and minor elements entering the coastal environment. Estuarine ecosystems are complex, dynamic and experience strong gradients in water quality properties and complex hydrodynamic processes (Mitra et al. 2011). The distribution of nutrients and other environmental parameters in estuarine waters plays pivotal role in controlling biogeochemistry of estuaries. The Sundarban Estuarine System (SES) is a unique ecosystem, covered by mangrove vegetation which is very much tidally induced and all parts of the SES are propagated by the dominated semi-diurnal tide with an overall northward amplification (Chatterjee et al. 2013). Different physico-chemical parameters such as salinity, pH, dissolved oxygen (DO), chlorophyll and some essential micro-nutrients (N, P, S) are very much significant in controlling the productivity of estuarine system (Manasrah et al. 2006; Nixon et al. 1986). This mangrove-dominated estuarine region also provides major pathways for nutrient recycling and acts as a natural filter for pollutants coming from the human settlements and industrial area in its northern part. Measurements at hourly intervals or time series study are more common practice to study the changes in properties with diurnal and/or tidal variability, but sub-hourly changes of such environmental parameters have not been done earlier from this region, though Anand et al. (2014) had been reported variations in sub-hourly biogeochemical properties from Zuari estuary, central western part of India. The sub-hourly sampling strategy in an estuarine system is very essential to understand the intra-tidal variability of nutrients and the effect of tidal straining and suspended sediment on water column stratification (Uncles 2002). Cassidy and Jordan (2011)

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DOI 10.1007/s12526-015-0383-z

SENCKENBERG CrossMark

ORIGINAL PAPER

Modern benthic foraminiferal assemblages from the world's largest deltaic mangrove ecosystem, the Sundarbans

Areen Sen[1] · Moumita Ghosh[1,2] · Pradnya Khanderao[1] · Sunit Kumar Das[3] · Debmalya Roy Chowdhury[3] · Pankaj Kumar Sarkar[3] · Ratul Saha[3] · Punyasloke Bhadury[1]

Received: 29 September 2014 / Revised: 16 July 2015 / Accepted: 11 August 2015 / Published online: 4 September 2015

Abstract The Sundarbans is the world's largest contiguous mangrove ecosystem. Recent changes in the region have been reported due to a rise in relative sea level along with increased salinity intrusion. Intertidal benthic foraminifera are widely used as indicators of relative sea level change. The taxonomic diversity of foraminifera in the Sundarbans remains relatively understudied due to the remoteness of this ecoregion. The present study documented modern intertidal benthic foraminiferal assemblages across eight sites from previously unexplored eastern parts of the Indian Sundarbans. We also analyzed sediment texture from the study sites, which is essential for sea level reconstructions. Our study recorded an assemblage dominated by agglutinated genera that are characteristic of mangroves globally. However, we also recorded calcareous genera characteristic of higher-salinity zones, indicating saline intrusion further upstream in the region. In total, we recorded 15 species, representing ten different foraminiferal families. Total organic carbon (TOC) content and sediment composition showed variation across the studied sites. Canonical correspondence analysis (CCA) of the biological and environmental data confirmed its usefulness for understanding shifts in hydrological conditions across this region.

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Keywords Benthic foraminifera · Indian Sundarbans · Mangrove · Sediment texture · Total organic carbon (TOC) · Sea level · Canonical correspondence analysis (CCA)

Introduction

Mangrove ecosystems represent marginal marine habitats dominated by salt-tolerant halophytic angiosperms (Murray 2006). Globally, mangroves are restricted to the tropical zones between 32°N and 38°S. The Sundarbans deltaic mangrove is the world's largest contiguous area of mangrove habitat (Kumar and Mukherjee 2012). Since 1987, it has been designated a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site, and is the world's only mangrove tiger habitat (Manna et al. 2010). The Sundarbans is located in the southernmost part of the Ganges-Brahmaputra-Meghna (GBM) riverine delta. The delta, which was formed by late Holocene deposits of the GBM river system, is spread across coastal parts of India and Bangladesh (Stanley and Hait 2000). The Indian Sundarbans has an area of 9630 km^2, of which 4267 km^2 is forested (Dey et al. 2012). Seven rivers flow through the Indian Sundarbans. Two of these (Hooghly and Mooriganga), located in the western part, receive freshwater input, while five (Saptamukhi, Thakuran, Matla, Gosaba and Haribhanga), located in eastern part, are tide-fed from the Bay of Bengal (Mitra et al. 2009). The Sundarbans ecoregion is faced with the constant threat of cyclones, storm surges, sea level rise, and reduced flow of freshwater into the mangrove system. In addition, in recent times, tilting of the delta towards the east and the rising seawater along with increased anthropogenic activities have altered the balance between freshwater and saline water in this ecosystem (Allison 1998; Stanley and Hait 2000). Given the precarious

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Marine Harpacticoid Copepod from Indian Coasts: a Review

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Abstract

We present an updated taxonomic list of marine harpacticoid copepod community from Indian water of 13 habitats including Andaman-Nicobar Island and Lakshadweep based on available published literature. The faunal list comprises 287 species, 132 genus and 32 families. Andaman & Nicobar Island has highest species abundance (129), followed by Eastern Intertidal (80). The diversity of harpacticoida is richer in eastern sector than western sector of India. The fluctuation in species number throughout the Indian coast is probably due to differences in geomorphology, habitat heterogeneity among coastal regions, difference of food source and unbalanced research efforts. Present paper may help to give more information on marine harpacticoid copepod from Indian coasts.

Key words: Harpacticoid copepods, Indian coasts, Andaman & Nicobar Island, Lakshadweep Island, habitat heterogeneity.

Introduction

Harpacticoid copepod belongs to the suborder Copepoda, class Maxillopoda, subclass Crustacea and phylum Arthropoda. They are permanent member of meiofauna which always remain within the meiofaunal size range 63-500 μm (Gray and Elliott, 2009). They are highly mobile crustaceans (Hicks and Coull, 1983) which exhibits second most abundant meiofaunal group in marine sediment, while the free-living marine nematodes are most dominant. Harpacticoid copepods are completely flexible and well suited for shifts in their food preferences during different developmental stages and also between different seasonal and tidal changes, which makes it easier for them to be mass cultured and used as different experimental models for pollution monitoring and aquaculture (Sun and Fleeger, 1995; McLachlan and Brown, 2006). Moreover, harpacticoids are more sensitive, responsive and compulsive to pollutants than nematodes, which in turn make them excellent indicators of pollution (Coull and Chandler, 1992; McLachlan and Brown, 2006).However, there are many controversies around the Nematode-Copepod ratio and also subject to criticism. Reducing very complex and labyrinth meiofaunal community into a single and simple ratio is