SEASONAL SHIFTS OF MEIOFAUNA COMMUNITY STRUCTURES ON SANDY BEACHES ALONG THE CHENNAI COAST, INDIA

BY

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ABSTRACT

Meiofauna standing stocks and community structures were studied at five sandy beaches along the Chennai coast of the Bay of Bengal, at the SE coast of India from January 2000 to February 2001. Meiofauna densities ranged from 1341.14 ± 1205.76 ind. 10 cm$^{-2}$ to 3.73 × 10^6 ± 4.1 × 10^5 ind. 10 cm$^{-2}$. Mean abundance was highest during February 2000 (35 565.85 ± 12 463.03 ind. 10 cm$^{-2}$) and lowest during March 2000 (11 465.85 ± 4250.26 ind. 10 cm$^{-2}$). As for individual stations, the highest abundances were found at Neelangarai (67 058.31 ± 7153.43 ind. 10 cm$^{-2}$) and lowest at Marina (52 517.69 ± 5373.63 ind. m$^{-2}$), respectively. As for taxa, the mean of the highest and lowest meiofauna abundance was observed in Copepoda and Cladocera during different months (109 372.40 ± 10 906.42 ind. 10 cm$^{-2}$ and 1341.14 ± 241.15 ind. 10 cm$^{-2}$) and at different stations (30 6242.40 ± 3905.26 ind. 10 cm$^{-2}$ and 3755.20 ± 88.90 ind. 10 cm$^{-2}$), respectively. Cluster analysis and principal component analysis showed that the elements of the meiofauna were separated into three major groups according to their distribution and abundance. Correspondence analysis showed the importance of meiofauna abundance with different months and stations. Ecological indices varied with month, station, and with meiofauna group. Monthly changes in the nematode-copepod index showed that both Ernavoor and Thiruvotriyur were more subjected to pollution, with the highest diversity and evenness values for nematodes among all stations.

ZUSAMMENFASSUNG

Meiofaunapopulationen und Gemeinschaftsstrukturen wurden an 5 Stränden entlang der Küste von Chennai und der Bucht von Bengalen, an der Südostküste Indiens von Januar bis Februar 2001...
studiert. Individuendichten der Meiofauna lagen hier zwischen 1341,14 ± 1205,76 ind. 10 cm$^{-2}$ und 3,73 \times 10^6 ± 4,1 \times 10^5 ind. 10 cm$^{-2}$. Durchschnittliche Individuendichten waren im Februar 2000 am höchsten (35 565,85 ± 12 463,03 ind. 10 cm$^{-2}$) und im März 2000 am geringsten (11 465,85 ± 4250,26 ind. 10 cm$^{-2}$). Bei der Betrachtung einzelner Stationen wies Neelangarai die höchsten Meiofauna Abundanzen auf (67 058,31 ± 7153,43 ind. 10 cm$^{-2}$) und Marina die geringsten (52 517,69 ± 5373,63 ind. m$^{-2}$). Bei der Betrachtung der Taxa, wiesen Copepoda und Cladocera die höchsten und niedrigsten Meiofauna Abundanzen auf: monatlich (109 372,29 ± 10 906,42 ind. 10 cm$^{-2}$ und 1341,14 ± 241,15 ind. 10 cm$^{-2}$) und für die Stationen (306 242,40 ± 3905,26 ind. 10 cm$^{-2}$ and 3755,20 ± 88,90 ind. 10 cm$^{-2}$). Clusteranalyse und PCA (= principal component analysis) ergaben 3 Meiofaunagruppierungen bei der Berücksichtigung ihrer Verteilung und Abundanz. Eine Korrespondenzanalyse zeigte die Veränderungen der Meiofauna Abundanzen hinsichtlich der Probennahme (Monate und Stationen). Andere ökologische Indizes variierten mit Monat, Station und Meiofaunataxon, Monatliche Änderungen hinsichtlich des Nematoden / Copepoden Indexes zeigten, dass Ernavoor und Thiruvotriyur mehr von Verschmutzungen beeinflusst waren als die anderen Stationen. Hier wiesen die Nematoden auch die höchste Artenzahl und Evenness auf.

INTRODUCTION

Meiofauna represents the smaller-sized component of the benthos and provides the food for higher consumer levels (Coull et al., 1995; Dahms et al., 2006). Meiofauna production can be equal to or higher than that of macrofauna (Warwick et al., 1979). Meiofauna enhances nutrient mineralization (Montagna, 1995; Fenchel, 1996) and affects biogeochemical cycles (Aller & Aller, 1992; Murray et al., 2002). Meiofauna taxa exhibit high sensitivity to various kinds of disturbance of anthropogenic nature, that make them useful bioindicators for the state of environmental health (Coull & Chandler, 1992; Chandler & Green, 2001; Dahms & Hellio, 2009).

Sandy beaches are very much understudied with respect to meiofauna (McLachlan & Brown, 2006). Sandy beaches provide important environments in coastal ecosystems of both tropical and temperate regions, showing a remarkable biodiversity (McLachlan & Brown, 2006), and providing a dynamic environment with variations related to natural abiotic characteristics such as temperature, salinity, desiccation, mean grain size of sediment, sea bottom currents (Coull & Bell, 1979; McLachlan et al., 1996; Coull, 1999; Corgosinho et al., 2003), and community changes that might be mediated by biotic interactions like competition and predation (Snelgrove & Butman, 1994). Equilibrium states are shown by intermediate morphodynamics between organic input and aerobic interstitial conditions (Short & Wright, 1983) that favour meiofauna in such intertidal habitats (Giere, 2009). Rodriguez et al. (2003) found that exposure time, desiccation, availability of food, sediment granulometry, tidal zonation, and interstitial water quality are the physical parameters that regulate the abundance of intertidal meiofauna. Meiofauna plays a major role in pollution monitoring studies (Dahms et al., 2009; Yamanaka et al., 2010). The meiofaunal species are vulnerable to abiotic and hydrodynamic