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ESTUARINE COPEPOD DIVERSITY IN MALATTAR, PUDUCHERRY

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Species composition and monthly abundance of copepods were studied in Malattar estuary from September 2006 to August 2007. A total of 13 taxa of copepods belonging to three groups were recorded. Among copepods, Cyclopoida constituted maximum abundance followed, by Calanoida and Harpacticoida. The maximum abundance was noticed in summer and minimum during monsoon seasons.

Key words : Estuarine copepods, abundance, species diversity

INTRODUCTION

Estuaries are dynamic environments characterized by strong vertical and lateral gradients in salinity, pH, suspended particulate matter, oxygen consumption and current velocities (Nolting *et al.,* 1999). The highly productive estuarine regions play important role as nursery grounds for many commercially important fishes, especially shrimps. The environmental characteristics of tropical estuaries undergo short as well as long-term variations in terms of nutrients caused by tidal rhythm and monsoonal cycles (Hubertz & Cahoon, 1999). Tidal vertical migration by zooplankton is a common phenomenon in estuaries, usually associated with landward movement of meroplankton or positional maintenance of haloplankton (Pillai *et al.,* 1973). The estuarine circulation not only supplies nutrients to the euphotic layer but also transports plankton between the straits, causing an asymmetrical distribution of plankton biomass in the estuary (Li *et al.,* 2000).

Copepods occupy a strategic position in the pelagic food web because of their sheer abundance and diversity. Moreover, they play a major role in the energy transfer of any aquatic ecosystems. Much work has been done relating to the systematics and ecology of the copepods in estuaries of India (Wooldridge & Callahan, 2000).

Malattar estuary is a small rural tropical estuary situated at central zone of Puducherry, southeast coast of India, with a complexity of environmental conditions. It is a shallow tidal estuary flooded during monsoonal season, like other estuaries in tropical region. Because of the shallow condition (average depth 1.5 *m)* the water temperature and salinity are influenced by the degree of maximum tidal inflow due to ebb and flow *(Godhantaraman,* 2001). Studies on copepod diversity from these estuaries are meager; there is no previous account on the species composition and abundance of copepods. Hence, the present investigation is an attempt to understand the copepod diversity in estuarine water of Puducherry region.

MATERIALS AND METHODS

The study area Malattar estuary (Fig.1) is located between latitude 11° 49' 60 N and longitude 79° 49' 0 E southern region of Puducherry and 185 km south from Chennai. The estuary flows eastwards and empties into Bay of Bengal at Panithittu village southeast coast of India. This estuary carries the waste from the adjacent agricultural

lands, in addition to domestic and industrial effluents.

Zooplankton samples were collected by filtering 100 liters of surface water in conical plankton net with 64 µm mesh size. Approximately 100 ml concentrate was preserved in 5% formalin. Enumeration and counting of plankton were done by using inverted microscope (NIKON) with 100x magnifications. For each sample, plankton counting was made five times and the mean value was taken and expressed as number of individuals per m^3. Sedgewick Rafter counting cell was used for counting and standard keys (Kasturirangan, 1963; Rangareddy & Radhakrishan, 1984) were used for identification of copepods. Taxonomic diversity, evenness and richness of copepod community were calculated (Shannon-Weaver, 1949).

RESULTS AND DISCUSSION

A total of 13 taxa were recorded during the present study (Table 1). Calanoids were the most diverse group accounting for 6 species namely *Acartia major, Acrocalanus gracilis, Calanus finmarchius, Eucalanus elongates, Paracalanus parvus and Pseudodiaptomus acrivilli* . Cyclopoids were next dominant groups representing the copepods with 4 rich species such as *Cyclopina longicornis, Cyclops scutifer, Paacyclops logifera, P. vagus.* A third group of copepod Harpacticoida was recorded with less richness and evenness (Fig.1, 2 & 3). It consists of *Microstella norvegica, M. rosea and Stenocatis minor.* The maximum number of species recorded was in May, among them calanoida were dominant followed by cyclopoids. Most cyclopoida and harpacticoida species occurred occasionally during the study period.

Most copepod taxa showed a distinct seasonal pattern. In general, the species composition and abundance decreased from summer to monsoon. The diversity of copepod community was well supported by the Shannon-Weaver Index species richness and evenness.

PLATE - 1 MAP SHOWING THE STUDY AREA MALATTAR ESTUARY IN PANITHITTU

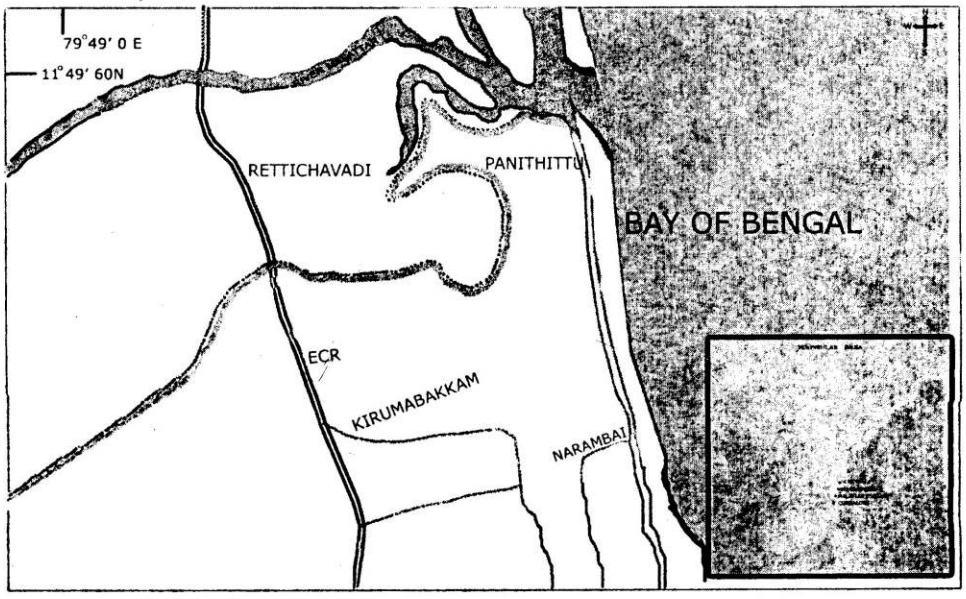

Plate I : Map showing the study area Malattar estuary in Panithittu

Table I : List of copepod species and maximum abundance (no.ind./m^3) recorded at Malattar estuary, Puducherry

Seasons	Monsoon			Post monsoon			Summer			Pre monsoon		
Species	**Sep 2006**	**Oct**	**Nov**	**Dec**	**Jan 2007**	**Feb**	**Mar**	**April**	**May**	**June**	**July**	**Aug 2007**
Calanoida												
Acartia major	162	68	140	242	392	480	895	808	902	585	295	-
Acrocalanus gracilis	148	-	71	266	315	291	594	682	801	600	300	281
Calanus finmarchius	128	40	132	174	292	302	343	403	480	281	202	160
Eucalanus elongates	9	-	20	22	67	80	100	40	122	83	41	20
Paracalanus parvus	61	-	-	-	29	21	-	140	181	262	242	109
Pseudodiaptomus aurivilli	94	-	-	154	174	122	347	341	460	240	212	128
Cyclopoida												
Cyclopina longicornis	25	-	-	-	53	40	112	82	142	101	63	25
Cylcops scutifer	-	-	-	22	-	-	50	61	43	20	42	-
Paracyclops longifera	-	-	-	28	97	163	231	440	400	282	281	-
Paracyclops vagus	58	-	69	81	169	241	463	481	562	503	300	121
Harpacticoida												
Microstella norvegica	177	95	34	107	165	209	419	423	501	458	360	257
Microstella rosea	-	-	-	-	-	-	-	-	142	-	-	-
Stenocaris minor	42	15	-	-	61	108	348	400	400	202	-	87

Plankton being the link at the base of food chain has been observed to influence the distribution of fishery resources. The changing nature of the environmental variables would affect the occurrence, composition and distribution of plankton and the variations are well pronounced in the sheltered systems like estuaries (Goswami, 1982). The total abundance of copepods were highest in summer and southwest monsoon (premonsoon) than the other seasons, as commonly observed in many marine coastal and estuarine waters (Padmavati & Goswami, 1996). High proliferation of copepods in summer months might be attributed to high temperature and phytoplankton abundance, which often is considered as the most important factor favourable for copepods (Ramaiah & Vijayalakshmi, 1997).

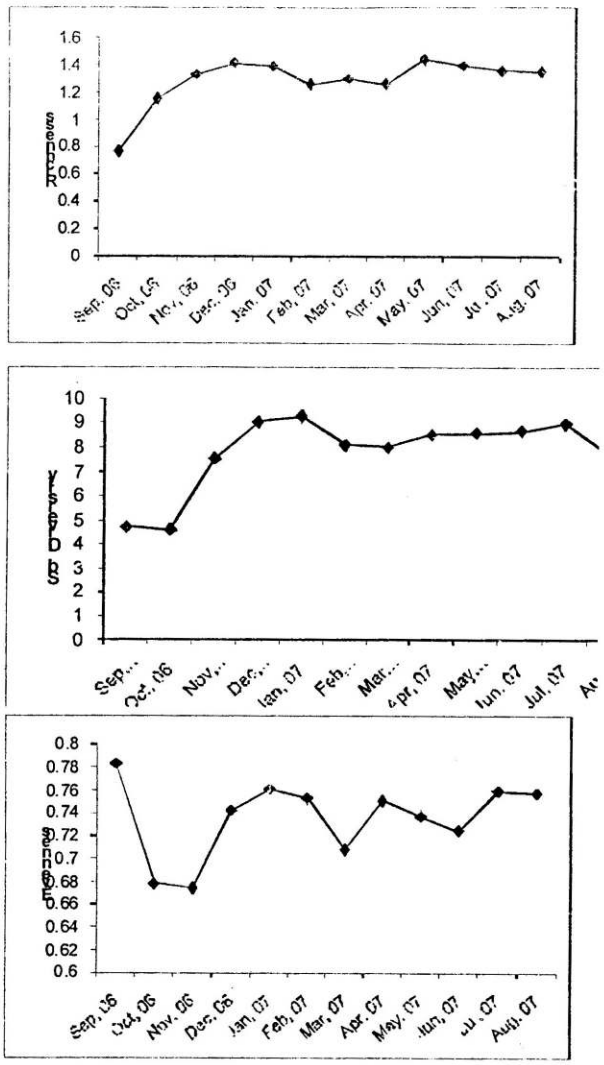

Fig. 1 : Monthly variation of the Shannon-Weaver Index of the copepod abundance at Malattar estuary, Puducherry

The abundance of copepods was lowest during monsoon months, when the water column was markedly stratified to a large extent because of high rainfall. As a result of these, water temperature, salinity and phytoplankton abundance decreased largely with increased turbidity. This has been observed in many Indian estuaries (Dutta *et al.*, 1990). Moreover, many copepod species disappear during monsoon and species composition also changed, since they are mostly stenohaline. When the conditions are favourable, normal plankton composition reappeared.

Marked seasonal fluctuations have also been noticed with respect to the number of species present in the plankton population. A maximum of 13 species of copepods were encountered. The dominant copepods were *Paracalanus. parvus, Stenocaris minor* and *Cyclops scutifer*. The abundance of these species might be due to their continuous breeding nature and the sustainable environmental conditions of the ecosystem. Similar dominance of these species reported in the Mandovi-Zuari estuaries (Dwivedi *et al.*, 1974)

Copepods varied distribution with respect to seasons in the studied habitat. In view of the fact that changes in population structure are defined not only by the dynamics of processes internal to environments, but also by the addition and superposition of changes in the surrounding environments of the estuaries.

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