

DISTRIBUTION AND SEASONAL VARIATION OF THE BENTHIC FAUNA OF VIZHINJAM INSHORE WATER, SOUTH-WEST COAST OF INDIA

O. DIVAKARAN, T. MURUGAN AND N. BALAKRISHNAN NAIR

*Department of Aquatic Biology and Fisheries, The Aquarium,
University of Kerala, Trivandrum-695007.*

ABSTRACT

Distribution, abundance and ecology of the benthic fauna have been reported from Vizhinjam harbour—an area of intensive fishing activity and aquaculture. Salinity and temperature were found to be most fluctuating parameters. Highest values of the population density and biomass were recorded during November and lowest during February. Polychaetes and crustaceans were dominant groups among the invertebrates.

INTRODUCTION

Vizhinjam harbour area, the site of the present study is situated 12.8 km south of Trivandrum at latitude 8°20'N and longitude 76°55'E (Fig. 1). It is an inlet of the Arabian Sea and an important centre of fishery and intensive aquaculture. At present a series of culture programmes like rope culture of mussels and cage culture of pearl oysters and lobsters are going on and there is wide potential for further development into diverse fields for production on a commercial level. Hence as a contribution towards an understanding of the general biotope and the benthos in particular the present work was undertaken. The study site was subtidal in nature and its depth ranged between 8-9 m.

MATERIAL AND METHODS

Bottom fauna was studied by fortnightly collections. Samples were collected by using a cylindrical corer of 12 cm diameter and 15 cm height. In order to get a true picture of the fauna during every collection, 5 similar samples were taken from a radius of 3 metres and the results represent the average of these samples. The samples were preserved in 10% buffered formalin and sorted out using a sieve with mesh size of 210 μ (No. 72). Biomass was taken of preserved animals within 5 days, after blotting the moisture, as wet weight of organisms. Sediment composition was studied by using international pipette method (Piper, 1950).

RESULTS

Seasonal fluctuations in the environmental parameters such as salinity, temperature and oxygen content are shown in Fig. 2. The data indicate that salinity and to some

extent temperature were the fluctuating factors. Salinity ranged between 27.9–36.2‰ in the surface water and 28.1–35.7‰ in the bottom water. Highest salinity was recorded during the late pre-monsoon period and the lowest during the monsoon. A similar fluctuation of temperature was also noticed. It ranged between 24.8–30.5°C in the surface water and 24.8–30.2°C in bottom water. The trend in the fluctuations of salinity and temperature was more or less the same in both surface and bottom waters.

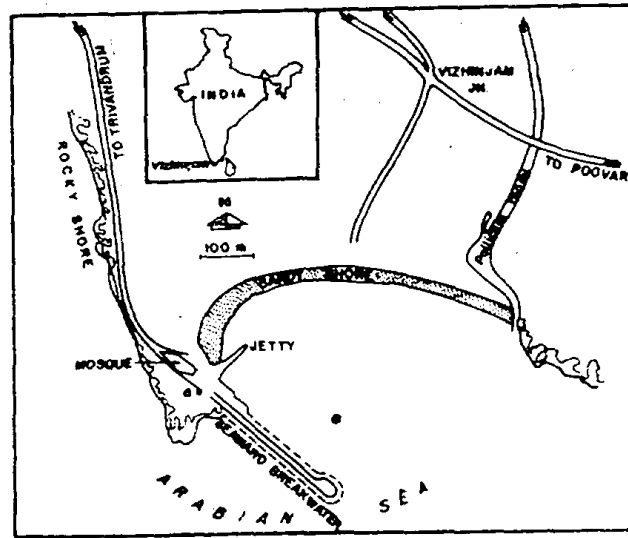


Fig. 1. Map of Vizhinjam harbour area showing the study site.

While dissolved oxygen of surface water ranged between 3.8–5.1 ml/l that of bottom water was between 3.2–4.6 ml/l. The fluctuations in dissolved oxygen were within narrow range, the highest value was recorded during the early monsoon and the lowest during the late pre-monsoon (Fig. 2). Very small differences were observed between bottom and surface water oxygen concentrations during the pre-monsoon period but the range was higher during the monsoon and post-monsoon periods.

The bottom was sandy in nature composed of coarse sand, fine sand, silt and clay. Their percentage composition and monthly fluctuations are indicated in Table I.

Biomass

Seasonal fluctuations in the population density and biomass of the benthic fauna are presented in Table II. It ranged between 0.44 and 4.31 g/m². Highest value was recorded during November and lowest during February. Despite dense populations of Foraminifera, Nematoda and Copepoda throughout the year, being small

Table I. Percentage composition of sediments of Vizhinjam Bay during February 1977 to January 1978.

Grain type	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.
Coarse sand	30.70	20.20	20.30	21.20	33.50	30.30	77.20
Fine sand	62.30	70.60	73.20	70.00	61.50	67.50	16.30
Silt	5.00	6.00	6.00	6.00	3.50	6.00	6.00
Clay	2.00	3.20	0.50	2.80	1.50	6.20	0.50

	Sep.	Oct.	Nov.	Dec.	Jan.
	30.30	42.20	21.20	42.20	77.80
	63.60	49.50	73.00	53.80	14.00
	4.00	4.80	3.80	0.50	3.00
	2.10	3.50	2.00	3.50	5.20

in size, their biomass values were low. Polychaetes and crustaceans were important groups among the invertebrates as far as biomass was concerned.

Faunal characteristics

Benthic fauna was [represented by protozoans, nematodes, annelids, arthropods, echinoderms, cephalochordates and pisces. Regarding population density foraminifers, nematodes, polychaetes and crustaceans were the most dominating groups.

Foraminifers were present almost throughout the year in fairly good numbers. Of the 9 genera identified viz. *Triloculina* sp., *Elphidium* sp., *Globigerina* sp., *Anomalinella* sp., *Globigerinoides* sp., *Spiroloculina* sp., *Artulina* sp., *Anomalinella* sp., and *Textularia* sp. the former 6 were noticed in fairly large numbers throughout the year.

Nematodes were seen throughout the year in varying densities, with peak of abundance during April (Table II). Of the 9 species identified the density of *Thoracostoma trichodes* (Leuckart), *T. amphidota* Allgen, *Anticoma quadriseta* Cobb, *Oncholaimus flexus* Wieser, *O. brachycercus* de Man and *Dolicholaimus benepapillosus* (Schulz) was much higher during the pre-monsoon and that of *Enoploides labiatus* (Buetschli) and *Epacanthion microdentatus* was higher during the post-monsoon periods. However, *Cyatholaimus ocellatus* (Bastian) obtained almost throughout the year in fairly good numbers along with this and *O. flexus* and *D. benepapillosus* constituted the bulk of the nematode population.

Regarding species composition, population density and biomass values, polychaetes had a very significant place in the benthic community. Of the 10 genera identified *Polydora* sp. and *Cirratulus* sp. had a high density and were obtained through-

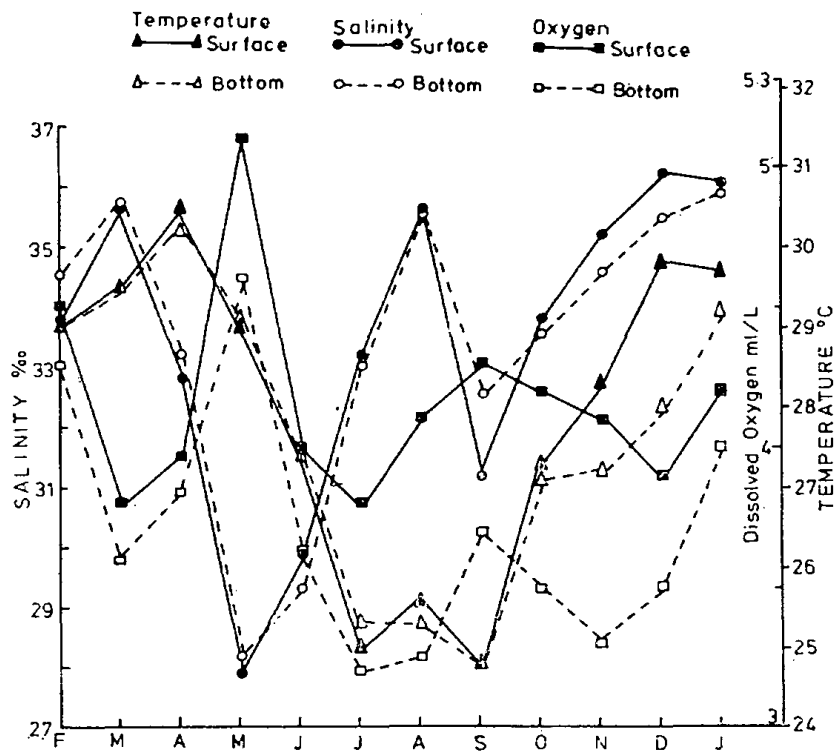


Fig. 2. Seasonal variation in surface and bottom water temperatures, salinities and dissolved oxygen of Vizhinjam inshore water.

Table II. Seasonal distribution of the benthic fauna of Vizhinjam Bay during February 1977 - January 1978

Groups of organisms	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
PROTOZOA:												
Foramini- nifers:												
<i>Triloculina</i>	—	1110	750	—	—	150	—	—	—	210	2340	—
sp.	—	—	—	240	—	—	—	60	30	300	—	—
<i>Elphidium</i>	—	—	—	—	—	—	—	—	—	—	—	—
sp.	—	360	540	—	—	—	—	—	30	180	2790	—
<i>Globigerina</i>	—	—	—	60	—	—	—	—	—	60	—	—
sp.	—	—	—	—	—	—	—	—	—	—	—	—
<i>Anomalina</i>	—	—	—	—	—	—	—	—	—	—	—	—
sp.	—	1800	1310	90	—	60	—	30	—	—	3360	—
<i>Globigerinoides</i>	—	—	—	—	—	—	—	—	—	—	—	—
sp.	—	240	—	420	—	—	—	—	90	—	870	—
<i>Spiroloculina</i>	—	—	—	—	—	—	—	—	—	—	—	—
sp.	—	60	240	—	—	—	—	—	—	30	—	—
<i>Artulina</i> sp.	—	—	—	180	—	—	—	—	60	—	—	—
<i>Anomalinella</i>	—	—	—	—	—	—	—	—	—	—	—	—
sp.	—	90	60	—	—	—	—	—	—	30	360	—
<i>Textularia</i> sp.	—	210	900	540	360	—	270	—	360	1050	810	360
<i>Thoracostoma</i>	120	—	—	—	—	—	—	—	—	—	—	—
<i>trichodes</i>	—	—	—	—	—	—	—	—	—	—	—	—
(Leuakart)	60	330	810	60	—	—	—	240	—	—	—	240
<i>T. amphidota</i>	—	—	—	—	—	—	—	—	—	—	—	—
Allgen	—	—	1230	960	650	210	330	150	120	420	270	—
<i>Anticoma qu-</i>	—	—	—	—	—	—	—	—	—	—	—	—
<i>adriseta</i> Cobb	300	600	1680	1260	—	390	—	—	—	2400	1050	1920
<i>Oncholaimus</i>	—	—	—	—	—	—	—	—	—	—	—	—
<i>flexus</i> Wieser	180	—	210	420	510	90	150	—	390	510	330	—
<i>O. brachycereus</i>	—	—	—	—	—	—	—	—	—	—	—	—
de Man	450	1110	1620	720	330	—	—	840	—	3210	1830	3360
<i>Dolicholaimus</i>	—	—	—	—	—	—	—	—	—	—	—	—
<i>benepapillosus</i>	—	—	—	—	—	—	—	—	—	—	—	—
(Schulz)	—	—	540	210	—	—	210	—	1530	—	—	1350
<i>Enoploides lab-</i>	—	—	—	—	—	—	—	—	—	—	—	—
<i>iatus</i> (Buetschli)	—	—	—	—	—	—	—	—	—	—	—	—

NEMATODA :

out the year. Among Crustacea, copepods were the most dominant group. They had a continuous occurrence and their density was high throughout the year with a peak during October (Table II). Other crustaceans like amphipods, isopods, ostracods, cumaceans, cladocerans and decapods were occasionally obtained in small numbers. Cephalochordata was represented by a species of *Branchiostoma* which was frequently obtained in small numbers. Occasionally juveniles of eels and other fishes were also obtained.

DISCUSSION

Among the hydrographical parameters such as salinity, temperature and oxygen content, the former two showed a steady decline during the monsoon, identical in both surface and bottom waters. A careful scrutiny of the nature of the substratum indicated certain general correlations with the incidence of the fauna. Thus nematodes showed high values in April when the substratum was composed of 73.2% fine sand. Low values for nematodes and copepods during May to September may be attributed to the rough sea consequent on the monsoon. Polychaetes abound in July when the substratum was composed of fairly high proportion of clay.

Biomass values obtained during the present study are low when compared with those reported from other marine localities. Even though they come within the range of those of off Bombay (Parulekar, Nair, Harkantra and Ansari, 1976) much higher values were also reported from the inner shelf of the central west coast of India (Parulekar, 1973), north-eastern Arabian Sea shelf (Parulekar and Wagh, 1975), Bay of Bengal (Ansari, Harkantra, Nair and Parulekar, 1977) and shallow waters of central west coast of India (Ansari, Parulekar, Harkantra and Nair, 1977a). But in most of the above mentioned cases the high biomass values were due to the dominance of either molluscs or polychaetes or sometimes both combined. In the present study while molluscs were absent, the population of polychaetes was high throughout the year mainly composed of meiofaunal types with a low biomass value.

ACKNOWLEDGEMENT

This work was carried out under the scheme "Composition and Energy flow..." financed by the C.S.I.R., New Delhi (No. 38(232)/76 Gau. II, dated 2-6-1976). We acknowledge with gratitude this assistance.

REFERENCES

- Ansari, Z. A., S. N. Harkantra, S. A. Nair and A. H. Parulekar, 1977. Benthos of the Bay of Bengal: A preliminary Account. *Mahasagar—Bulletin of the National Institute of Oceanography*, **10**: 55-60.
- Ansari, Z. A., A. H. Parulekar, S. N. Harkantra and Ayyappan Nair, 1977a. Shallow water macrobenthos along the central west coast of India. *Mahasagar—Bulletin of the National Institute of Oceanography*, **10**: 123-127.
- Parulekar, A. H., 1973. Quantitative distribution of benthic fauna on the inner shelf of central west coast of India. *Indian Journal of Marine Sciences*, **2**: 113-115.
- Parulekar, A. H. and A. B. Wagh, 1975. Quantitative studies on the benthic macrofauna of north-eastern Arabian Sea shelf. *Indian Journal of Marine Sciences*, **4**: 174-176.
- Parulekar, A. H., S. A. Nair, S. N. Harkantra and Z. A. Ansari, 1976. Some quantitative studies on the benthos off Bombay. *Mahasagar—Bulletin of the National Institute of Oceanography*, **9**: 51-56.
- Piper, C. S., 1950. *Soil and Plant Analysis*. Interscience Publishers, New York, p. 67.