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Benthic Fauna of Southwest and Southeast Coasts of India

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Abstract

Benthos, sediment characteristics and organic matter content were studied along southwest and southeast coasts of India. Number of groups/species varied with the stations and also with the depths. Population density was very low in southeast coast compared to southwest coast. Polychaetes formed the dominant group. 36 species of polychaetes were recorded along southwest coast, whereas 19 species were recorded from southeast coast. Molluscs were more common along southeast coast. Five types of substratum viz. clayey silt, clayey sand, silty clay, sandy silt and sandy were noticed from different stations along southwest coast. But sand percentage dominated along southeast coast. The pooled mean organic matter percentage varied from 0.08 to 4.08 in southwest coast and 0.25 to 2.18 in southeast coast. Organic matter was high in silty clay substratum (3.15%) whereas in sandy substratum this varied between 0.07 and 1.38 percent.

Introduction

Qualitative and quantitative study of bottom fauna is a pre-requisite in assessing the demersal fishery resources of a region, since they form an important source of food for demersal fishes and prawns. Benthos along southwest coast of India has been studied by several workers. See Saraladevi *et al.*, 1991; (and references therein) Ansari *et al.*, 1994. Harkantra and Parulekar, 1994; Sunilkumar and Antony, 1994. Reports on benthos from southeast coast is comparatively less (Ganapathi and Raman, 1970; Chandran, 1987; Prabhadevi and Ayyakannu, 1989; Murugan and Ayyakannu, 1991; Vijayakumar *et al.*, 1991) and mostly confined to estuarine region. The present paper covers the bottom fauna and sediment characteristics of coastal regions of the southwest and southeast coasts.

Materials and Methods

Benthic fauna and sediment samples were collected from three depths *i.e.* from 5, 10 and 15m in duplicate with a van Veen grab (0.048 m²) at 9 stations *viz.* Mangalore, Kasargod, Kannur, Calicut, Ponnani, Cochin, Alleppey, Quilon and Vizhinjam along the southwest coast and 5 stations *viz.* Cuddalore, Ennore, Karaikkal, Nagapattinam and Thondi along the southeast coast. Grab samples were sieved through 0.5mm mesh for benthos and major groups were identified upto species level wherever possible. The number of organisms were converted to no/m² and the biomass expressed as wet weight g/m² (Shell on). Sediment characteristics such as grain size and organic carbon were estimated by standard methods.

Results and Discussion

Faunal composition and distribution along southwest coast

The benthic fauna identified were classified into 4 major groups *viz.* polychaetes, crustaceans, molluscs and miscellaneous forms. Polychaetes formed the dominant and common group in most of the stations. Number of groups/species varied with stations and also with depths. Population density of different stations varied from 210 to 4771 no/m², the

highest being off Calicut at 15m depth and lowest off Kasargod at 10m depth. Number of faunal groups were more towards north of Cochin especially Calicut, Kannur and Ponnani compared to south of Cochin. The wet weight showed a wide range between 5.60 and 286.42 g/m², peak being at Alleppey and lowest at Kasargod.

Polychaetes were constituted by 36 species and the percentage composition of this group was >90 at Mangalore, Ponnani and Alleppey at 5m depth, Cochin 10m, Calicut 15m and in general it varied from 16.96 to 95.83 irrespective of depths and stations. Number of species were more towards north of Cochin. The highest diversity was noticed at Kannur (26). Towards south 17 species were recorded from Quilon, 10 species from Alleppey and 12 species from Vizhinjam. Of 36 species encountered only 4 species *viz.* *Ancistrosyllis constricta*, *Nephtys dibranchis*, *Maldane sarsi* and *Lumbriconereis simplex* were found at all the nine stations. *Cossura* sp. showed its presence at seven stations. *Scyphoproctus djiboutiensis*, *Paraheteromastus tenuis*, *Heteromastides bifidus*, *Polydora ligni*, *Pista indica* and *Sternaspis scutata* occurred at six stations. *Prionospio pinnata* was present at five stations. *P. polybranchiata*, *Glycera alba*, *G. longipinnis*, *Goniada incerta*, *Owenia* sp. and *Phyllodoce* sp. were recorded from four stations. *Lycastis indica*, *Sthenelais boa*, *Serpula vermicularis*, *Capitella capitata* and *Aphrodita aculeata* were present at three stations. *Magelona longicornis*, *Hesione* sp., *Pherusa inflata*, *Syllis* sp., *Lumbriconereis notocirrata*, *Cirratulus cirratus*, *Paraonella platybranchia*, *Dendronereis aestuarina*, *Heteromastus similis*, *Ophelina acuminata*, *Perinereis cavifrons*, *Notoproctus* sp., and *Lepidonotus* sp. were noticed at one or two stations. Olygochaetes also showed rare occurrence.

Percentage composition of amphipods was very low at most of the stations. Of the 6 species encountered *Eriopisa chilensis* was noticed at Mangalore, Kannur, Calicut, Cochin and Vizhinjam, *Corophium triaenonyx* at Mangalore, Kasargod, Calicut and Quilon, *Grandidierella bonneri* at Kannur and

Quilon, *Melita zeylanica* at Mangalore, *Grandidierella gilesi* and *Quadrivisio bengalensis* at Vizhinjam, Alleppey and Ponnani. Other crustaceans include crabs, mysids, sergestids, cumacea, tanaidaceans and anthuridae. Except cumacea others were recorded only from one or two stations along the coasts. *Molluscs include gastropods, Dentalium* sp., *Cavolinia* sp., *Cardium* sp., *Donax* sp. and *Arca* sp.. Only gastropods were noticed throughout the coast. *Dentalium* sp. were observed at six stations whereas others occurred at one or two stations at deeper depths

Miscellaneous groups include echinoderms, echiuroides, sipunculids, juvenile fish, nematodes and amphioxus. Of these only echinoderms were found at six stations and others showed rare occurrence.

Faunal composition and distribution along southeast coast

The benthic faunal density along southeast coast was very low compared to southwest coast and varied from 63 to 1209 no./m². The wet weight showed a wide range between 1.29 and 706.90 g/m² and higher values in wet weight is due to the occurrence of molluscan forms. Molluscs and polychaetes were observed at most of the stations. Crustaceans and miscellaneous groups were recorded only from few stations. 19 polychaete species, oligochaetes, 5 amphipod species, 3 other crustaceans, 3 molluscan forms and 2 miscellaneous groups were encountered from this coast. In general high numbers were noticed at Karaikkal and Thondi. Stations at Ennore (Madras) being in the estuarine mouth showed relatively high numbers. Eventhough the density of polychaete is low compared to southwest coast, the percentage composition ranged between 9.13 and 91.0. Though 19 species of polychaetes were recorded from this coast, they were represented in less numbers. *Prionospio polybranchiata* present at five stations *Pista indica* and *Cirratulus cirratus* at three stations. Others were noticed at one or two stations in smaller numbers. Number of species were more at Karaikkal and Nagapattinam.

Of the 5 species of amphipods recorded 4 were present at Ennore estuary. From Cuddalore and Thondi 2 species each and from Nagapattinam one species were encountered. Molluscs include gastropods, dentalium and bivalves. Gastropods were noticed in considerable numbers except at Karaikkal whereas sparse representation of bivalves and dentalium were noticed along the coast. Foraminifera occurred along this coast. Nematodes and cumacea were poorly recorded and present only at Thondi. In general southeast coast is very poor in benthic standing crop compared to southwest coast. Cuddalore recorded very poor benthic density compared to other areas studied.

Substratum characteristics

Five types of substratum were noticed along southwest coast viz. clayey silt, clayey sand, silty clay, sandy silt and sandy. Percentage of organic matter was more in the clayey silt (3.34 to 4.60) at Kasargod and low in the sandy substratum (0.07 to 1.38). Percentage of sand dominated throughout the southeast coast except at Ennore where silty clay was noticed at the mouth of the estuary. Organic matter in the sand portion ranged between 0.12 and 0.78% and in the silty clay of the estuarine region it

ranged between 1.25 and 1.81%.

Total benthic density along southwest coast varied from 210 to 4771 no./m² irrespective of depth the peak being at Calicut and lowest being at Kasargod. The pooled density for the three depths from Mangalore to Vizhinjam varied from 596 to 3516 no./m² and the average for the entire southwest coast is 1538 no./m². Polychaete dominated the benthic population ranging between 313 and 2279 no./m². The pooled percentage composition of polychaetes fall within the range of 39.83 to 78.46, the highest being at Kannur and lowest at Kasargod. The second dominant group is mollusc having a percentage composition ranging between 0.00 and 49.53 followed by crustacean (0.23 - 38.23) and miscellaneous group (0.00 - 27.57).

The present study shows a two fold increase in number of polychaete species compared to earlier records (Harkantra, Ayyappan Nair, Ansari and Parulekar 1980). They noticed a decrease in population density in the samples taken from 10-20m depths. In this study restricted to 15m depth no such trend could be noticed. Density and biomass are high when compared to the earlier reports.

The total benthic density along southeast coast varied from 63 to 1209 irrespective of depth. The pooled density for three depths ranged between 217 and 461 no./m², the highest being at Ennore. Though the density is low (13 - 251 no./m²) the pooled percentage composition of polychaetes ranged between 13.33 and 65.29 and miscellaneous groups were rare along this coast. The pooled value of organic matter was high in the Ennore estuary (1.49%) whereas it varied from 0.25 to 2.18% in the other areas. The high biomass was due to the presence of molluscan forms. The depth wise distribution in population density and different animal groups showed irregular pattern. More numbers of molluscan forms were observed at 10 and 15 m collection. Variation in biomass and density from station to station in this study may be attributed to the impact of localised biotic and abiotic factors.

The dominance of suspension and deposit feeders like polychaetes and crustaceans in the estuary and nearshore region and the presence of filter feeders like bivalves and gastropods etc. from deeper stations noticed in the present study was also similar to the observations of earlier workers. The macrofaunal density and biomass in the southeast coast were much higher than the earlier reports. The high benthic density was associated with sandy silt and high biomass was associated with sandy substratum where shelled forms dominated. It is well established that the sedimentary type is the main criterion in the distribution of benthos. Rich benthic fauna in the nearshore region having riverine influence is mainly due to the influx of nutrient rich river water (Parulekar and Dwivedi, 1974). In conclusion it should be stated that eventhough coastal and nearshore region receive pollutants from various sources, no marked deleterious effect was observed in benthic population.

Acknowledgements

The authors are grateful to The Director, National Institute of Oceanography, Goa for the facilities and

Table 1a. Faunal composition and occurrence at different stations along southwest coast.

Species	MNG	KGD	KNR	CAL	PON	CHN	ALP	QUL	VZH
<i>Ancistrosyllis constricta</i>	+	+	+	+	+	+	+	+	+
<i>Nephtys dibranchis</i>	+	+	+	+	+	+	+	+	+
<i>Maldance sarsi</i>	+	+	+	+	+	+	+	+	+
<i>Lumbriconereis simplex</i>	+	+	+	+	+	+	+	+	+
<i>Cossura</i> sp.	+	-	+	+	+	+	-	+	+
<i>Scyphoproctus djiboutiensis</i>	+	+	+	+	+	-	+	-	-
<i>Paraheteromastus tenuis</i>	-	+	+	+	-	-	+	+	+
<i>Heteromastides bifidus</i>	-	+	+	+	-	+	-	+	+
<i>Polydora ligni</i>	-	+	+	+	+	+	-	+	-
<i>Pista indica</i>	+	-	+	-	-	+	+	+	+
<i>Sternaspis scutata</i>	+	-	+	+	+	+	-	+	-
<i>Prionospio pinnata</i>	+	+	+	+	-	+	-	-	-
<i>Prionospio polybranchiata</i>	-	+	+	-	+	+	-	-	-
<i>Glycera alba</i>	+	-	+	-	-	+	-	-	+
<i>Glycera longipinnis</i>	-	+	+	+	+	-	-	-	-
<i>Goniada incerta</i>	-	-	-	+	-	+	-	+	-
<i>Owenia</i> sp.	-	+	+	+	+	+	-	+	-
<i>Phyllodoce</i> sp.	-	+	+	-	-	+	-	-	-
<i>Lycastis indica</i>	-	-	-	+	-	+	-	-	-
<i>Sthenelais boa</i>	-	-	+	+	-	+	-	+	-
<i>Serpula vermicularis</i>	-	-	+	-	-	+	-	-	+
<i>Capitella capitata</i>	+	-	+	+	-	-	-	-	-
<i>Aphrodita aculeata</i>	-	-	+	+	-	-	-	+	-
<i>Magelona longicornis</i>	-	+	+	-	-	-	-	-	-
<i>Hesione</i> sp.	+	-	-	+	-	-	-	-	-
<i>Pherusa inflata</i>	-	-	+	+	-	-	-	-	-
<i>Syllis</i> sp.	-	-	+	+	-	-	+	-	-
<i>Dendronereis aestuarina</i>	-	-	+	-	-	+	-	-	-
<i>Heteromastides similis</i>	+	-	-	+	-	-	-	-	-
<i>Ophelina acuminata</i>	-	-	+	-	-	-	-	+	-
<i>Perinereis cavifrons</i>	-	-	-	-	-	-	-	-	+
<i>Notoproctus</i> sp.	-	-	-	-	-	-	+	-	-
<i>Lepidonotus</i> sp.	-	-	-	-	-	-	+	-	-
<i>Cirratulus cirratus</i>	-	-	-	-	-	-	-	+	+
<i>Paraonella platybranchia</i>	+	-	-	-	-	+	-	-	-
<i>Lumbrio conereisnotocirrata</i>	-	-	-	-	-	+	-	-	-
<i>Olygochaeta</i>	-	-	-	-	-	+	-	+	-
<i>Quadrivisio bengalensis</i>	-	-	-	-	+	-	+	-	+
<i>Eriopisa chilensis</i>	+	-	+	+	-	+	-	-	+
<i>Corophium triaenonyx</i>	+	+	-	+	-	-	-	+	-
<i>Melita zeylanica</i>	+	-	-	-	-	-	-	-	-
<i>Grandidierella gilesi</i>	-	-	-	-	+	-	+	-	+
<i>Grandidierella bonneri</i>	-	-	+	-	-	-	-	+	-
Mysids	+	-	-	-	-	-	-	-	-
Sergestidae	-	+	-	-	-	-	-	-	-
Decapods	+	-	-	-	-	-	-	-	+
Cumacea	+	+	-	+	+	-	+	+	-
<i>Apseudes ch ilkensis</i>	-	-	-	-	-	-	+	+	-
Anthuridae	-	-	-	-	-	-	-	-	+
<i>Arca</i> sp.	+	+	+	+	-	+	+	-	-
<i>Cavolinia</i> sp.	+	+	-	-	-	-	-	-	-
<i>Donax</i> sp.	+	-	-	-	-	-	-	-	-
<i>Cardium</i> sp.	-	+	-	-	-	+	-	-	-
<i>Tellina</i> sp.	+	-	-	-	-	-	-	-	-
Gastopods	+	+	+	+	+	+	+	+	+
<i>Dentalium</i> sp.	+	+	+	-	+	-	+	+	-
Echinoderms	+	+	+	+	+	-	-	+	-
Echiuroids	+	-	-	-	-	-	-	-	-
Amphioxus	-	-	-	-	-	-	-	+	+
Nematodes	-	-	-	-	-	-	-	+	+
Sipunculiids	-	+	-	-	-	-	-	+	-
Fish larvae	-	+	-	-	-	-	-	-	-
Foraminifera	+	+	+	+	+	+	+	+	+

Table 1b. Faunal composition and occurrence at different stations along southeast coast.

Species	CUD	ENR	KRL	NGP	TND
<i>Prionospio polybranchiata</i>	+	+	+	+	
<i>Pista indica</i>	+	-	-	+	+
<i>Cirratulus cirratus</i>	-	+	+	+	-
<i>Goniada incerta</i>	+	-	-	-	-
<i>Aphrodita aculeata</i>	-	+	-	-	-
<i>Heteromastides bifidus</i>	-	+	+	-	-
<i>Ancistrosyllis constricta</i>	-	+	-	-	-
<i>Paraheteromastus ten uis</i>	-	+	-	+	-
<i>Nephtys dibrancheis</i>	-	-	+	-	-
<i>Owenis sp.</i>	-	-	+	-	-
<i>Polydora ligni</i>	-	-	+	-	-
<i>Pherusa inflata</i>	-	-	+	+	-
<i>Cossura sp.</i>	-	-	+	-	-
<i>Maldane sarsi</i>	-	-	+	+	-
<i>Serpula vermicularis</i>	-	-	+	-	-
<i>Capitella capitata</i>	-	-	+	-	-
<i>Sternaspis scutata</i>	-	-	-	+	+
<i>Euthalenessa djiboutiensis</i>	-	-	-	-	+
<i>Glycera longipinnis</i>	-	-	-	-	+
<i>Olygochaetes</i>	-	-	+	+	-
<i>Quadrivisia bengalensis</i>	+	+	-	+	+
<i>Eriopisa chilensis</i>	+	+	-	-	-
<i>Corophium triaenonyx</i>	-	-	-	-	+
<i>Granidirella gilesi</i>	-	+	-	-	-
<i>Granidirella bonneri</i>	-	+	-	-	-
Decapods	+	+	+	+	+
Cumacea	-	-	-	-	+
Anthuridae	-	-	-	+	-
<i>Dentalium sp.</i>	-	-	+	+	-
Gastropods	+	+	+	+	+
Bivalves	-	+	+	+	+
Nematodes	-	-	-	-	+
Foraminifera	+	+	+	+	+

encouragement. The second author is thankful to the Department of Ocean Development for the award of Senior Research Fellowship.

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Table 2. Ranges of benthic density, percentage composition and organic matter percentage along the southwest and southeast coasts irrespective of depths and stations.

	Southwest	Southeast
Density (no./m ²)	210-4771	63-1209
Biomass (g/m ²)	6.02-286.42	1.29-706.90
Polychaetes	63-4624	21-294
(Percentage)	16.76-95.83	9.13-91.00
Crustaceans	21-1916	21-314
(Percentage)	1.32-93.87	9.13-89.26
Miscellaneous groups	21-641	21
		(only at Thondi)
(Percentage)	1.59-46.49	5.01
Organic matter percentage	0.08-4.08	0.25-2.18
(Pooled for the three depths)		
Type of substratum	Organic matter %	
<u>Southwest</u>		
Clayey silt	3.34-4.60	
Clayey sand	1.48-2.26	
Silty clay	3.15	
Sandy silt	1.43	
Sandy (>90%)	0.07-1.38	
<u>Southeast</u>		
Clayey sand	0.12-0.78	
Silty clay	1.25-1.81	

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