Study of Abundance and Distribution of Sub Tidal Marcrobenthic Diversity in Near Shore Waters off Gulf of Kutch, Gujarat, India

Shivanagouda .N. Sanagoudra*, and U. G. Bhat

***Abstract*---**The present study was undertaken to know the distribution of Subtidal macrobenthos of Gulf of Kutch during preemansoon-(Jan-June 2012).The macrobenthos Gulf of Kutch were collected by using van veen grab having a mouth opening of 0.04 m^2 from four different stations. In total 34 taxa were recorded in this seasonal study in the benthic (subtidal) faunal assemblage. Faunal community was mainly represented by five groups namely, polychaetes, crustaceans, gastropods, bivalves and nematodes. Benthic faunal assemblages showed almost similar pattern of distribution with Gastropods, Crustacean and Polychaetes whereas Bivalves and Nematodes showed very rare occurrence. In overall observation in four stations, Polychaetes dominated in abundance with 32.29% followed by Gastropods (27.75%) and Polychaetes (32.29%). Numerical abundance of Bivalves and Nematodes was less with 7.89% and 1.60% in the study area. The study which is included here can be used to measure the impact of marine environment.

***Keywords*---** Abundance, Gulf of Kutch, India, Macro benthos, Subtidal.

I. Introduction

BENTHIC organisms living in the subtidal habitats are sensitive to environmental changes and thus serve as indicators of changes occurring in their habitats [3]**.** Community structure of benthic organisms is largely determined by the energy equilibrium and nutrient input [6]**.** There is a strong physical, chemical and biological relationship between benthic communities and the prevailing environment [1].In an industrial environment dredging, continuous movement of vessels and human presence in large numbers produces major impact at the marine/coastal environment in its vicinity. Assessment of the effects of this activity has usually targeted bottom substrata and the associated benthic fauna.

Shivanagouda . N. Sanagoudra* and U. G. Bhat are with Department of Studies and Research in Marine Biology, Karnataka University, P.G. Centre, Karwar, Kodibag, Karwar 581 303, Karnataka, India.(Corresponding author* e-mail: sanagoudra23@gmail.com, Phone: + (91) 8141150995, Fax :+(91)-02838-666299)

Hence benthic communities living in intertidal and subtidal habitats are logical subject of study in any environmental monitoring programs [2].

In this Preemansoon 2012 study, benthic (sub tidal) samples were collected from four sites. The sites are Station 1, station 2, station 3, and Station 4. This Paper outlines the results on composition, abundance and distribution and richness of fauna in subtidal habitats for January, 2012 in the Gulf of Kutch

II. Martial And Methods

Benthic (subtidal) fauna were collected by using the Vanveen Grab covering an area of 0.04 m^2 at each station the grab was placed randomly at a minimum of 3 and maximum of 4 locations. The sediment samples were sieved through 0.5 mm mesh and the organisms retained were preserved in 5 % formalin and stained with Rose Bengal in order to facilitate further sorting and identification in the laboratory [4]. Shannon index for species diversity, evenness and richness were computed using standard formulae for all the stations **[13]**.

III. Results And Discussion

***Faunal composition*:** In total 34 taxa were recorded in this seasonal study in the benthic (subtidal) faunal assemblage [11] Faunal community was mainly represented by five groups namely, polychaetes, crustaceans, gastropods, bivalves and nematodes. List of species collected in the grab samples is given Table 1.1[9]. During the present study Polychaetes were dominant with 10 species followed by Gastropods (8 species), Crustaceans and Bivalves (4 species) and Nematodes (one species). The faunal population of Polychaetes consists of *Sabellids, Amphitrite* sp., *Glycera* and *Nereis* sp. Among gastropods *Cerithidea cingulate*, *Nassarius pullus*, *N. dorsatus*, *Umbonium* sp, *Cirratulidae* and *Dentalium* sp were comparatively more abundant. Bivalves were represented by *Solen lamarcki*, *Epitonium scalare*, *Cucullea cucullata* and *Donax cuneatus*. Crustaceans were represented by Amphipods, Isopods, Tanaids, Shrimp larvae and Nematodes (*Monia brachiata*). ***Percentage composition of macrofauna*:** Benthic faunal assemblages showed almost Similar pattern of distribution with Gastropods, Crustacean and Polychaetes whereas Bivalves and Echinoderm showed very rare occurrence [10]. In overall observation in four Stations, Gastropods dominated in abundance with 32.29% followed by Crustaceans (30.67%) and Polychaetes (27.75%). Numerical

abundance of Bivalves and Nematodes was less with 7.89% and 1.40% in the study area. In Station 1, Gastropods were found to be the dominant representing 62% of the total benthic organisms recorded. Crustaceans formed the second dominant group with a Percentage occurrence of 23.63%. Polychaetes and Bivalves contribute to the lowest of 7.63% and 8.45% followed by the group "Nematodes" with a meagre percentage of 4.27% respectively. With respect to station 2, crustaceans dominated with a percentage of 50.70%. The polychaetes were found to be the next best with a percentage contribution of 22.61%. Gastropods and bivalves constituted 28.67% and 8.66% to the total benthic organisms collected. The contribution of group Nematodes was 1.64%. As in station Station 1, station 2 was dominated by Gastropods with a percentage incidence of 28.75% of the total benthic organisms enumerated. Polychaetes ranked highest with a percentage of 32.29%. Crustaceans and bivalves contributed 17.22% and 6.66% to the total benthic organisms collected. The contribution of group Nematodes was nil. In station station 4, Gastropods and Crustaceans dominated with a percentage contribution of 32.25% followed by Polychaetes, Bivalves and Nematodes with a percentage occurrence of 22.58%, 10.97%, and 1.93% respectively. Density of groups ranged from station 3/m2 of Nematodes at station 2 to a maximum of 99/m^2 by Gastropods at 'Station 1, station 3. Sub tidal faunal abundance was found to be more in inshore stations than offshore stations. A total of 936 specimens were recorded representing 34 species in 5 major groups (Table 1)

A. Sub Tidal Faunal Diversity

The Shannon index was used to describe the faunal diversity and evenness. Diversity, richness and evenness valves are presented in Table 1.2. Subtidal diversity (H) values ranged between 2.80 and 2.65 at all the four stations. From overall Pree monsoon seasonal [7]-[12]. Observation diversity as higher at Station 1 (2.86) followed by station 2(2.65), station 3 (2.42) and station 4 (2.65). The evenness ('E') values ranged between 0.8967and 0.8697 at the stations Station 1 to station 4. The evenness was higher at Station 1 (0.867) than other stations. The richness (d) values ranged between 8.95 and 0.869 at all the four stations. From overall Preemansoon season observation richness was higher at Station 1 (0.8956) followed by station 2(0.7836), station 3 (0.7798) and station 4 (0.8697).

IV. CONCLUSION

Among the four stations studied, macrofaunal composition and abundance varied among stations. In subtidal habitat, out of 34 species collected gastropods recorded highest percentage of density whereas polychaete showed more diversity. Crustacean also showed second highest density but diversity was poor. Both bivalves and nematodes were more or less equal in their ecological density in the study area.

REFERENCES

[1] Ansari, Z.A., Ingole,B.S., Benerjee,G., Parulekar, A.H., (1986). Spatial and temporal change in benthic macro fauna from Mondovi-Zuari estuaries of Goa, West coast of India, Ind. J. Of Mar. sci. 15, 223-229.

[2] Bhat, U.G., Neelakantan.,(1988). Environmental impact of macrobenthos distribution of Kali estuary, Central west coast of India. Ind.J. of Mar. sci.17,134-142.

[3] Debasish Mahapatro., R.C.Panigrahy., Sudarshan Panda., Rajani, K., Mishra., (2009). Enfluence of monsoon on macrobenthic assemblage in outer channel area of Chilika lagoon of East coast of India.J. of Wetlands Ecology Vol.(3),56- 67.

[4] Harkantra, S. N. and Parulekar, A. H. 1987. Benthos off Cochin, South – West coast of India. Indian J. Mar. Sci. 16: 57- 59.

[5] Manjappa, H. Gowda, G., Rajesh, K. M. and Mridula R. M. 2003. Macrobenthos in the brackishwater impoundment along Nethravathi estuary, Karnataka (South-West coast of India). Ecol. Environ. Cons. 9(1): 45-49.

[6] Longhurst, A.R., 1957. An Ecological Survey of the West African Marine Benthos. Fishery Publication, London, Pages: 102.

[7] Muniz, P., Pires,A.M.,(2000).Polycheate association in subtropical environment (Sao Sebastio Chanel Brezil) : A structural analysis. Marine Ecology. 21(2), 145-160.

[8] Parulekar, V. H., Dhargalkar, V.K.,Singbal, S.V.,(980). Benthos studies in Goa estuaries part III annual cycle of macro faunal distribution, distribution and tropic relation. Ind.J. of Mar. sci. 9,189-200.

[9] Remani, K.N., Sarla devi., Venugopal,K.P. Unnithan,R.V.,(1983). Indicator organism of pollution in Cochin backwaters , Mahasgar 16(2),199-207.

[10] Sandens,J., Forbes,T., Hansen,R., Sandens,B., (2000). Influence of particle type and faunal activity on mixing of di C2-ethlenexyl phthalate (DEHP) in natural sediment. MarineEcology progress Series. 36,139-149.

[11] Schafer,D.J.,Ellinger,W.H.,TuckerW.J. Kerster,H.W., (1985). Evaluation of a community basedindex using benthic indicator organisms for classifying stream quality J.W.P.C.F. Shrinivas Roa,D., Rama sarma,D.V., (1983). Abundanceand distribution of intertidal polycheate in Vashistha-Godavari estuary. Mahasgar 16(3): 337-340.

[12] Water quality in urban streams, what we expect J. Water Poll. Controll Fed. 1139-1147. Mishra, Vidya.,(2002). Study of macro fauna of mangrove mudflats of Ullas estuary, P.hD Thesis, University of Mumbai, p223.

[13] Arnold, P.W. and R.A. Birtles, 1989. Soft Sediment Marine Invertebrates of Southeast Asia and Australia: A Guide to Identification. Australian Institute of Marine Sciences, Townville, Pages: 272.

TABLE I
SUBTIDAL MACROBENTHIC DIVERSITY AT GULF OF KUTCH

S.No	Group/Species	Stn1	Stn2	Stn3	Stn4	Total	%
I	**Polychaetes**						
1.	*Flabelligeridae*	10	5	4	2	21	
2.	*Magelonidae*	5	5	0	0	10	
3.	*Paraonidae*	1	4	1	1	7	
4.	*Phyllodocidae*	4	2	1	0	7	
5.	*Sabellidae*	2	2	1	0	7	
6.	*Syllidae*	2	0	1	0	3	
7.	*Ampharetidae*	12	14	2	22	50	
8.	*Capitellidae*	8	3	0	8	19	
9.	*Cirratulidae*	45	19	54	15	133	
10.	*Nephtyis dibranchis*	12	21	14	2	49	
	Total	**99**	**73**	**77**	**50**	**299**	**32.29**
II	**Gastropoda**						
11.	*Naussarius pullus*	3	4	1	0	8	
12.	*Bursa granularis*	12	8	11	6	37	
13.	*Olive gibbosa*	1	0	8	3	12	
14.	*Bulla* sp.	12	4	4	5	25	
15.	*Umbonium sp*	0	2	0	1	3	
16.	*Tellina* sp.	5	2	2	1	10	
17.	*Mactra* sp.	5	0	5	1	11	
18.	*Dentalium sp*	5	45	12	2	64	
19.	*Cerithidea cingulata*	3	2	1	0	6	
	Total	**41**	**121**	**60**	**35**	**257**	**27.75**
III	**Nematodes**						
20.	*Monia brachiata*	5	5	0	3	13	
	Total	***5***	**5**	**0**	**3**	**13**	**1.6**
	Crustacean						
21.	*Ampipoda*	10	11	5	15	46	
22.	*Acetes*	05	10	3	10	28	
23.	*Melita Zeyanica*	5	3	8	3	19	
24.	*Anthuridae*	11	20	0	4	35	
25.	*Caridian Prawns*	10	5	0	2	17	
26.	*Grandidierella gilesi*	5	90	10	11	99	
27.	*Eriopisa chi/kensis*	6	12	5	5	45	**30.67**
	Total	**25**	**141**	**31**	**47**	**289**	
IV	**Bivalves**						
28.	*Prunum* sp.	3	4	5	4	16	
29.	*Donax cruneataus*	2	2	4	8		
30.	*Cucullea cucullata*	4	2	2	1	9	
31.	*Solen Lamarcki*	5	6	0	3	14	
32.	*Epitonium Scalare*	3	5	0	1		
33.	*Arlacama proboscidea*	5	2	1	0	8	
34.	*Sunetla scripta*	1	0	0	0	1	
	Total	**23**	**21**	**12**	**17**	**73**	**7.89**

TABLE II
ECOLOGICAL INDICES OF SUB TIDAL MACRO BENTHOS AT GULF OF KUTCH

Stations	Station 1	Station 2	Station3	Station 4
Evenness	0.8956	0.7836	0.7798	0.8697
Richness	0.8967	0.7893	0.7729	0.8697
Diversity	2.8689	2.6589	2.423	2.6591