Distribution and abundance of macrobenthos in mangroves ecosystem of Kali Estuary, Karwar, Karnataka

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ABSTRACT

The present work was mainly focused on this typical biotope for the period of thirteen months from January 2008 to January 2009. An attempt has been made to describe the faunal composition, distribution and abundance at different study sites of mangrove ecosystem of kali estuary during the study period. In the present study, fourteen taxa have been identified and are grouped as follows. Foraminifera, Coelenterata, Polychaeta, Gastropoda, Bivalvia, Harpacticoida, Cumacea, Tanaidacea, Isopoda, Amphipoda, Mysidacea, Shrimps, Decapoda and Pisces. In macrobenthos, the polychaete (13 – 99/m^2) and bivlavia (25 – 60 /m^2) group contributed much to the total density of macrobenthic community at all study stations. Seasonally, this faunal community has shown greater density during the post and premonsoon seasons (953.9 & 1137.1/m2) but it was very less during the southwest monsoon season (850.9/m^2).

KEYWORDS

Kali estuary, Macro-benthos, Seasonal Abundance, Faunal distribution, Diversity

INTRODUCTION

The Uttara Kannada maritime district has a 143km long coastline. The Uttara Kannada coast has blessed with five major riverine systems of which the River Kali originated in the Kusavali village in Supa taluka and after meandering about 185 km in the Sahyadri plateau and lastly joins the Arabian Sea at Karwar (14°50'21" N and 74°10'05"E). River Kali exhibits different type of biotopes such as estuary, backwater, fresh water and mangrove, grassland etc.

Benthos is the organism that inhabit in bottom of lakes, ponds and river stream. Macro benthos play as an important role in aquatic community consist of involved in mineralization, promoted and mixing of sediments and flux of oxygen into sediments, cycling of organic matter (Lie, 1969) and in effort to assess the quality of inland water (Mills, 1975). The amount of nutrients release by the sediments will depend on the mineralizing capacity of the benthic community (Newell, 1964). Abundance and distribution of macro benthos has affected by various physical and chemical condition of the water body such as depth, current of the water organic contents of the sediments, contaminations of bed sediments environment, toxicity of sediments and rapid sedimentation have appear to causes shifts towards lower abundances of macro benthic species (Pearson, 1970). The aquatic ecosystem mainly comprises two communities namely the pelagic and benthic. The former being referred to above water mass whereas latter one is confined to the bottom (benthic) habitat. The benthic environment is a unique ecological system being designed and governed by wide a range of ecological (physico-chemical) and biological factors drawn from planktonic, pelagic, mid-water interface and sediment realms. In general, the benthic environment involves almost all the physical and chemical parameters, processes and feeding types, recorded in the ocean while presenting a characteristic faunal association of its own.

MATERIALS AND METHODS

Totally three study stations were selected and fixed in the mangrove ecosystem of Kali estuary, Karwar on West coast of India. The location of study stations are shown in the Figure No.1.

The undisturbed sediment collected with the help of Petersen grab was sampled for benthos. A plastic cover was used for further sampling. The 10cm deep core samples were treated with 1:500 Rose-bengal formaldehyde solutions and were transported to the laboratory in polythene bags. The sediment was sieved between 500 and 62 microns. The residue obtained on the sieve of 500 microns was preserved in rose Bengal solution for qualitative & quantitative of macro benthos.

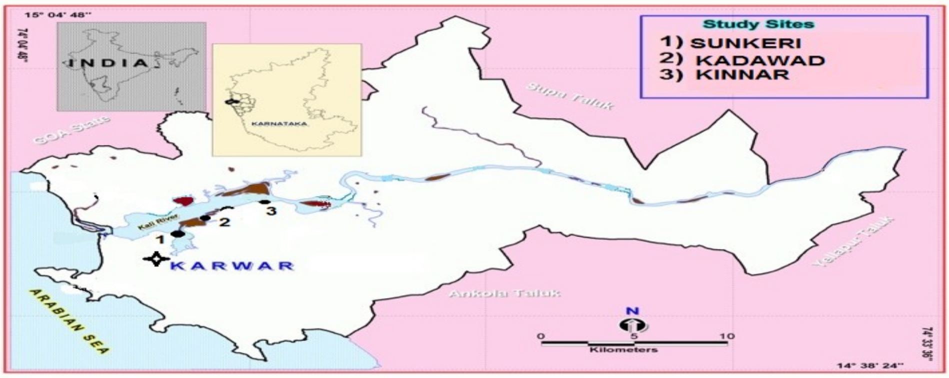

Fig 1: Map of Kali River Showing the position of Study Sites

Later, the samples were studied under microscope to identify the benthic taxa (Holme & McIntyre, 1971; Parsons *et al*., 1977). A total of 65 samples for macro benthos were taken for analysis with equal number of samples from each of the five study sites.

Totally fourteen groups were identified and grouped under one umbrella of Macrobenthos. The density of fauna is represented as number per square metre (No/m^2). A simple, comprehensive, graphical pattern has been drawn to show their monthly variation giving their salient features of the benthic assemblage in different stations during the study period.

RESULTS & DISCUSSION

At station 1, minimum density (51/m^2) was noticed during August with monthly mean of (3.79/m^2) whereas maximum density was recorded during April (542/m^2) with monthly mean of (38.71/m^2) respectively (Table 1). Minimum density of Mysidacea was noticed throughout the study period and was totally absent during south west monsoon and following months. Polychaete and bivalves were found most abundant groups throughout the study tenure with annual mean of 99.85 & 60.77/m^2.

In Kanasageri, the 2nd study station, overall macrobenthic density varied between 6.43/m^2 in August and 319/m^2 in December with monthly mean of 22.79/m^2. Bivalvia (9-81/m^2) and polychaeta (9-72/m^2) remained dominant groups attaining first and second ranking position in the total macrobenthic density during the study period (Table 2).

In 3rd study site at Sunkeri, the density ranged from 54/m^2 to 266/m^2 during August 08 and January, 09. Here, the polychaete (9-115/m^2)stood first in dominance and was followed by the bivalvia (9-48/m^2)group. Tanaiedacea and mysidacea groups were found in minimum numbers (1-5/m^2) in the study site throughout the study tenure (Table 3).

Table 1: Monthly variations in the macrobenthos density (No/m^2) at study station 1 – Mavinahole creek

Taxa	Jan.08	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.09
Foraminifera	29	21	25	31	39	8	6	5	5	17	33	41	21
Coelenterata	15	23	21	31	29	11	9	3	7	2	11	21	11
Polychaeta	131	93	101	151	141	58	32	18	31	115	141	181	105
Gastropoda	23	18	22	36	31	9	3	0	8	12	17	29	15
Bivalvia	95	91	101	118	111	25	11	15	11	21	43	81	67
Harpacticoida	20	12	9	21	19	9	2	1	3	13	15	21	21
Cumacea	28	19	14	17	21	3	0	0	3	9	21	19	18
Tanaidacea	31	15	12	29	31	3	2	0	2	3	15	21	23
Isopoda	14	16	8	14	18	5	0	0	5	2	6	15	11
Amphipoda	9	11	8	10	11	1	0	0	3	1	1	2	11
Mysidacea	1	2	3	8	10	0	0	0	0	0	0	0	3
Shrimps	10	8	11	10	19	2	0	0	14	8	5	12	18
Decapoda	18	23	34	38	21	0	0	0	15	21	25	23	14
Pisces	71	36	37	28	18	11	15	11	23	34	41	58	62
Total	495	388	406	542	519	145	80	53	130	258	374	524	400
Mean	35.36	27.71	29.00	38.71	37.07	10.36	5.71	3.79	9.29	18.43	26.71	37.43	28.57
±SD	37.38	28.38	32.08	42.26	38.95	15.20	8.97	6.23	8.85	29.45	35.62	46.56	28.80

Table 2 : Monthly variations in the macrobenthos density (No/m^2) at study station 2 – Kanasgiri.

Taxa	Jan.08	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.09
Foraminifera	26	17	11	16	15	7	5	6	5	9	18	24	15
Coelenterata	3	5	7	11	14	0	0	0	1	3	2	3	5
Polychaeta	65	66	51	55	59	32	17	12	9	35	63	72	51
Gastropoda	21	11	14	21	29	15	5	5	8	11	18	31	15
Bivalvia	73	81	71	79	81	21	9	10	15	26	61	69	61
Harpacticoida	15	11	11	10	12	5	0	0	3	5	4	21	17
Cumacea	3	2	4	8	1	0	0	1	0	0	0	2	5
Tanaidacea	18	9	9	11	13	5	2	0	3	5	11	15	23
Isopoda	8	3	1	2	1	0	0	0	0	0	1	3	11
Amphipoda	11	12	9	8	5	1	0	0	3	4	7	8	8
Mysidacea	11	5	11	14	8	4	0	0	5	7	10	15	15
Shrimps	18	15	12	17	23	9	6	3	31	27	24	29	23
Decapoda	16	28	26	24	29	12	8	2	11	12	14	18	17
Pisces	10	15	19	21	34	39	44	51	11	15	8	9	15

Table 3: Monthly variations in the macrobenthos density (No/m^2) at study station 3 - Sunkeri

Taxa	Jan.08	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.09
Foraminifera	23	26	36	31	22	9	10	0	11	9	18	25	21
Coelenterata	8	6	8	5	2	1	3	6	5	6	7	12	11
Polychaeta	88	83	63	54	56	37	15	9	31	54	83	115	91
Gastropoda	15	14	16	11	14	16	9	5	8	9	14	16	17
Bivalvia	43	45	36	38	21	15	9	12	12	19	22	33	48
Harpacticoida	7	5	9	5	7	3	0	0	5	3	9	8	11
Cumacea	9	5	6	2	4	0	0	0	1	2	3	5	14
Tanaidacea	1	3	0	3	3	0	0	0	0	0	2	3	5
Isopoda	8	11	14	9	7	8	1	0	3	5	1	7	9
Amphipoda	0	0	3	5	3	3	2	5	2	3	0	0	2
Mysidacea	1	1	3	4	0	0	0	0	5	3	0	0	3
Shrimps	9	6	2	4	11	14	8	0	5	11	8	5	11
Decapoda	15	16	21	17	19	12	11	6	23	12	25	29	17
Pisces	6	9	14	18	10	8	9	11	11	5	7	5	6
Total	233	230	231	206	179	126	77	54	122	141	199	263	266
Mean	16.64	16.43	16.50	14.71	12.79	9.00	5.50	3.86	8.71	10.07	14.21	18.79	19.00
±SD	23.32	22.53	17.63	15.75	14.38	9.94	5.14	4.47	8.73	13.59	21.39	29.66	23.64
Total	298	280	256	297	324	150	96	90	105	159	241	319	281
Mean	21.29	20.00	18.29	21.21	23.14	10.71	6.86	6.43	7.50	11.36	17.21	22.79	20.07
±SD	21.27	23.81	19.47	20.83	22.76	12.23	11.77	13.42	8.15	10.81	20.22	22.25	16.30

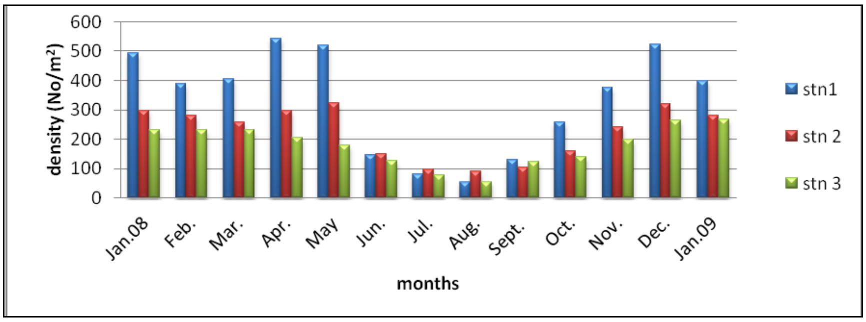

Fig. 2: showing Monthly variations in the macrobenthos density (No/m^2) at study stations.

Table 6: Seasonal variation in the Macrobenthos density (No/m^2) at stations 1-3.

Seasons	Stn.1	Stn.2	Stn.3
Pre Monsoon	371	231	169
SW Monsoon	263	183	139
Post Monsoon	296	201	160

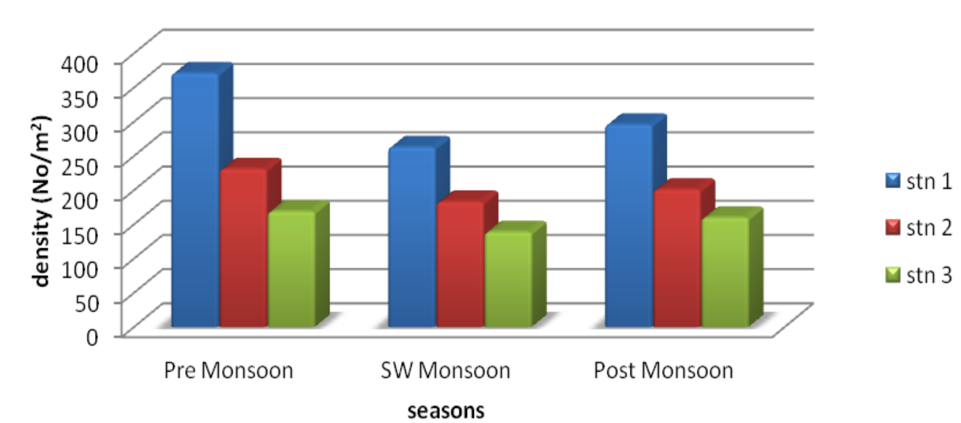

Fig 3: Seasonal variation in the Macrobenthos density No/m^2) at study stations 1-3.

CONCLUSION

In river Kali five different biotopes with different characteristics features, showed similarity in benthic populations. The dispersion here could be due to such factors as stated before or due to the currents, which flow to and from the distant station (stn.3) of the estuary during the tidal transformation. The dispersion of macrobenthos, similarities in species abundance of macrobenthos between different stations are described. In macrobenthos, the polychaete (13 – 99/m^2) and bivlavia (25 – 60 /m^2) group contributed much to the total density of macrobenthic community at all study stations. Seasonally, this faunal community has shown greater density during the post and pre-monsoon seasons (953.9 & 1137.1/m2) but it was very less during the southwest monsoon season (850.9/m^2).

The characters of benthic faunal association can be recognized in three distinct aspects of estuarine ecology. Firstly, the different taxa and species that comprise the population help in explaining basic components of the system. Secondly, the ecological factors, which formulate the environment, are to be explained in order to categorize the living conditions. Lastly, the information on faunal elements and physico-chemical factors can be integrated to know which factors do not contribute significantly in the synecology (Bhat, 1984).

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