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DISTRIBUTION OF TOTAL NITROGEN, TOTAL PHOSPHORUS AND ORGANIC CARBON IN THE SEDIMENTS OFF MANGALORE

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ABSTRACT

The distribution of total nitrogen, total phosphorus and organic carbon in sediments off Mangalore in relation to sediment texture was studied. The nitrogen values ranged between 38 μg/g and 466 μg/g phosphorus from traces to 23 μg/g and organic carbon varied from 0.06 to 1.22%. The sediment nutrients and organic carbon were found to be dependent on the texture of the sediments.

Key-words: Nutrients, Organic carbon, Nearshore waters.

It is well recognised that the primary productivity in shallow marine environment depends on nutrient economy which is known to be governed by the sediment nutrients. A knowledge of the role of sediment nutrients is thus useful in determining the sediment-water interactions which eventually affects the productivity of the overlying waters. Documented evidence on the distribution of total nitrogen, total phosphorus and organic carbon in the sediments from the coastal areas off Mangalore is almost lacking. Most of the studies along the Mangalore coast pertains only to the hydrochemical characteristics (Suresh and Reddy, 1978; Benakappa, Reddy and Hariharan 1979).

In the present study 3 stations were selected along the 10 metre depth contour (Fig. 1) and monthly sediment samples were collected using a Peterssen type grab, from January to December 1982 (except during June to August). A small quantity of the sediment was air dried and later subjected to particle size analysis adopting the combined sieving and pipette method (Buchanan and Kain, 1971). Total nitrogen and total phosphorus were determined following jackson (1967). Organic carbon was estimated by the method of ElWakeel and Riley (1956).

Generally, the sediments at most of the stations consisted of a relatively higher percentage of sanday fraction with only low percentage of silt and clay. April, May, November and December months accounted for higher percentage of silt and clay fraction. This might be due to the increased siltation and circulation pattern.

The seasonal variation of total nitrogen appeared to depend to a great extent on the grain size of the sediment. Relatively higher values at almost all the stations

Table I. Total nitrogen, total phosphorous and organic carbon in relation to sediment texture

	Jan.	Feb.	Mar.	Apr.	May	Sep.	Oct.	Nov.	Dec.
					Station 1				
Sand percentage	95.32	98.28	87.26	72.07	62.00	96.40	98.66	90.16	19.06
Silt-clay percentage	4.68	1.72	12.74	27.93	38.00	3.60	1.34	9.84	80.94
Total nitrogen ($\mu g.g^{-1}$)	129	258	65	105	230	38	65	193	465
Total phosphorus ($\mu g.g^{-1}$)	2.8	4.3	T	3.2	4.6	6.8	7.6	15.0	12.5
Organic carbon (%)	0.92	0.64	0.79	0.41	0.51	0.34	0.28	0.07	1.22
					Station 2				
Sand percentage	97.68	99.04	99.19	71.17	80.16	93.26	98.82	95.34	87.68
Silt-clay percentage	2.32	0.96	0.81	28.83	19.84	6.74	1.20	4.66	12.32
Total nitrogen ($\mu g.g^{-1}$)	258	129			430	63	72	105	258
Total phosphorus ($\mu g.g^{-1}$)	1.2	3.0	1.8	2.1	3.2	7.2	8.3	13.0	15.0
Organic carbon (%)	0.39	0.46	0.42	0.41	0.34	0.32	0.26	0.34	0.06
					Station 3				
Sand percentage	93.34	94.36	99.36	73.56	88.00	97.27	98.75	92.76	93.32
Silt-clay percentage	6.66	5.39	0.64	26.44	12.00	2.73	1.25	7.24	6.68
Total nitrogen ($\mu g.g^{-1}$)	65	258	65	193	238	48	65	129	103
Total phosphorus ($\mu g.g^{-1}$)	3.6	9.8	T	3.3	2.8	5.3	6.4	10	23
Organic carbon (%)	0.47	0.35	0.20	0.51	0.42	0.20	0.17	0.20	0.06

T. Traces

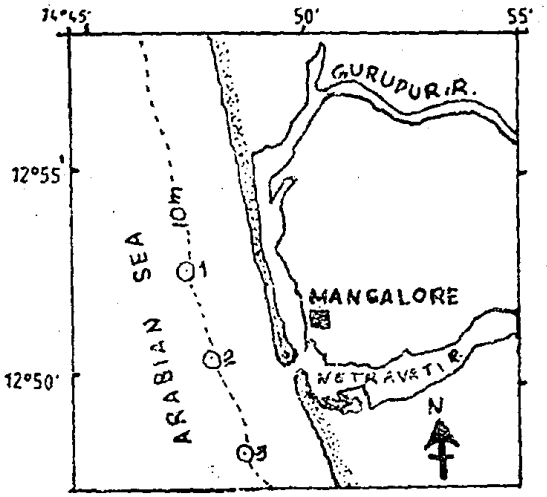

Fig. 1. Location of sampling stations.

during April and May is probably due to the abundance of phyto and zooplanktons in the overlying waters. In addition to this relatively increased quantum of silt and clay fraction in the sediment in comparision to previous months also contribute to the increased values. However, the increased values observed during November, December and January could be due to the organic detritus from the phytoplankton which shows blooms (Table I) in these months (Segar, 1982).

Although the temporal variation was observed in the total phosphorus values, there was no pronounced spatial variation. During the post-monsoon period, relatively higher values were recorded. This is in accordance with the observations of Reddy (1982) in the nearshore areas of Mangalore. The causative factors for this increased values are thought to be addition of terrigenous material brought in by the river during the south west monsoon period as also the organic productivity.

The organic carbon content of the sediment showed spatial variations, the values ranged from 0.06 to 1.22%. Rajamanickam and Setty (1975) have expressed the possibility of greater accumulation of organic carbon in the case of clayey sediments which offer larger surface area for the adsorption of organic matter. In the present study although no direct relation could be drawn between the organic carbon content and the texture of the sediment, the organic carbon content was more at stations where the fine fraction was predominant.

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