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HYDROGRAPHIC CHARACTERISTICS OF PALK STRAIT REGION OF THE MALLIPATTINAM, SOUTHEAST COAST OF INDIA

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ABSTRACT

The physic-chemical parameters such as temperature, pH, salinity, dissolved oxygen, phosphate, nitrates, rainfall, humidity and photoperiod were studied from Mallipattinam coast water (Lat. 10°12′ NS. and Long. 79°20′ EW) on south east coast of Bay of Bengal during April-2009 to March-2011. The result of the present study showed that there was a significant monthly variation. The atmospheric and water temperature was found to be high in summer and low in monsoon months. Salinity were found to be minimum during monsoon months and maximum during summer months. The pH of the water was found in alkaline range throughout the study period. DO (Dissolved Oxygen) showed marked variation. However phosphate and nitrate were found to the slight monthly variation. There was a direct relationship noticed between rainfall, humidity and photoperiod. The present study indicates that the fluctuation of physico chemical parameters in the coastal region of Mallinpattinam, in southeast coast of India.

Keywords: Physico-chemical Parameters, pH, DO, Salinity, Nutrients

INTRODUCTION

It is known that the hydrological factors have an impinging effect on the aquatic organisms. These parameters are either exogenous or endogenous or both. Considerable data of informations are available on exogenous factors such as rainfall, temperature, salinity and pH fluctuations and their effect on aquatic organisms **[1, 2, 3]**. The hydrobiological study is prerequisite in an aquatic system for the assessment of its potentialities and to understand the food webs. **[4, 5, 6]**. The natural distribution of the flora and fauna in

the aquatic system are mainly controlled by the fluctuation in the physical and chemical characteristics of the water body **[7, 8, 9]**. The physico-chemical parameters of the sea water of Bay of Bengal on east coast of India have been reported by many workers **[10, 11, 12, 13, 14, 15, 16]**. However very few literature is available on seasonal fluctuation of physico-chemical parameters of south east coast of Bay of Bengal. Hence the present study is aimed to observed the physicochemical parameters of Mallipattinam coast, on south east coast of Bay of Bengal, India.

MATERIALS AND METHODS

Seawater was collected every month in a clean polythene container between 8 A.M. to 9 A.M. during low tide for a period of two years from April 2009 to March 2011. Samples were transported to the laboratory and the different physico-chemical characteristics of seawater were recorded using standard methods. Temperature was recorded using thermometer. The hydrogen ion concentration and salinity were recorded with the help of Elico pH meter and Salinometer respectively. The dissolved oxygen content of surface water was estimated by the modified Winkler method [**17]** phosphate was estimated following the method given by **[18]**. Nitrate was estimated by the method of [**19]**. Rainfall humidity and photoperiod data for Mallipattinam coast were obtained from the meterological department of Chennai and Pune. The data were statistically analyzed and presented.

RESULTS AND DISCUSSION

The results of the present study are summarized in the **Table 1 and Figures 1-6.** From the data it clearly indicates that there was a significant variation in physico chemical parameters during the study period. It revealed that the nature of differences and the trend in variation in the physico chemical parameter of Mallipattinam coast depends on monsoon rains. The influence of monsoon is reflected on the changes in different physico chemical factors in the marine environment. The temperature is an important factor which considerably fluctuated during the study period. Maximum level of temperature (32˚C) was observed during May 2009 and minimum level (25˚C) was recorded during December 2009. The salinity was found to be high (36‰) in summer months and low (26%) in monsoon months. Highest level of pH (8.4) was recorded during summer months and lowest level (7.1) was noticed during December 2009. The pH showed alkaline range throughout the study period. Heavy rainfall (682.6mm) was recorded during November 2009 and low level (12.0mm) was noticed during September 2009.

Table1: Hydrological factors of Mallipattinam Coast from April 2009 to March 2011

Months	Atmospheric temperature (C')	Water temp (C')	Rainfall (mm)	Humidity (%)	Photoperiod (hrs)	pH	Salinity (‰)	Dissolved oxygen (mg/l^{-1})	Phosphate (mg/l^{-1})	Nitrates (mg/l^{-1})
Apr-09	32	30	0.0	74	11.27	8.4	34	2.32	3.2	3.1
May09	34	32	36.4	70	11.41	8.3	36	2.59	3.0	3.0
Jun-09	31	29	20.1	72	12.04	8.4	33	2.33	9.70	9.52
Jul-09	29	27	0.0	75	12.27	8.1	35	1.78	10.92	8.4
Aug-09	30	27	152.2	77	12.40	8.2	33	3.49	5.90	4.2
Sep-09	31	29	12.0	82	12.51	8.3	35	2.30	6.71	7.35
Oct-09	29	30	160.4	84	12.47	8.2	31	2.29	6.7	9.89
Nov-09	30	28	682.6	89	12.32	7.4	26	2.31	9.9	9.48
Dec-09	26	25	497.3	91	12.15	7.1	28	2.30	5.25	7.69
Jan-10	27	26	65.9	82	11.55	7.4	27	2.33	4.9	3.8
Feb-10	27	28	0.0	82	11.30	7.2	33	5.96	4.1	3.8
Mar-10	28	27	0.0	86	11.25	7.5	35	4.15	3.4	3.6
Apr-10	30	29	0.0	73	11.28	8.3	36	1.99	3.2	3.0
May10	33	31	126.5	67	11.41	8.4	34	1.27	3.5	2.8
Jun-10	32	30	96.2	69	12.02	8.2	32	1.28	6.9	9.57
Jul-10	31	29	52.1	70	12.22	7.5	30	1.54	9.45	9.55
Aug-10	30	28	232.7	74	12.45	8.3	32	5.59	3.75	4.5
Sep-10	29	29	139.1	77	12.51	8.1	33	2.61	5.58	2.86
Oct-10	28	28	99.1	79	12.48	7.2	34	1.17	10.89	5.11
Nov-10	27	25	610.8	86	12.34	7.5	26	2.59	3.15	7.29
Dec-10	25	25	504.7	90	12.12	7.2	29	2.59	4.20	5.93
Jan-11	27	28	33.5	82	11.51	7.4	31	2.58	4.6	4.0
Feb-11	27	26	0.0	88	11.32	7.3	34	6.57	3.9	3.5
Mar-11	28	27	0.0	85	11.22	7.6	32	4.32	3.7	3.0

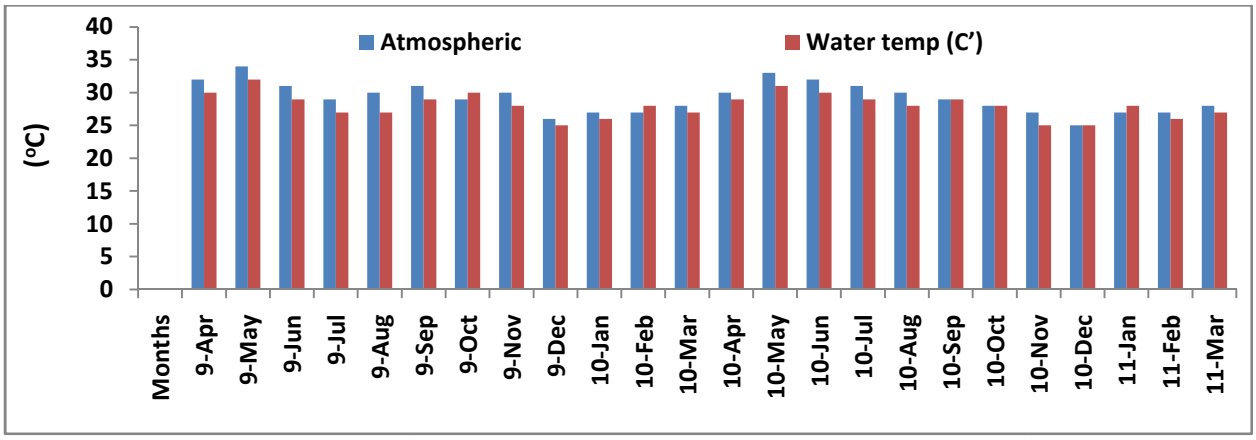

Figure 1: Monthly Variations in Atmospheric and Water Temperature at Mallipattinam Coast

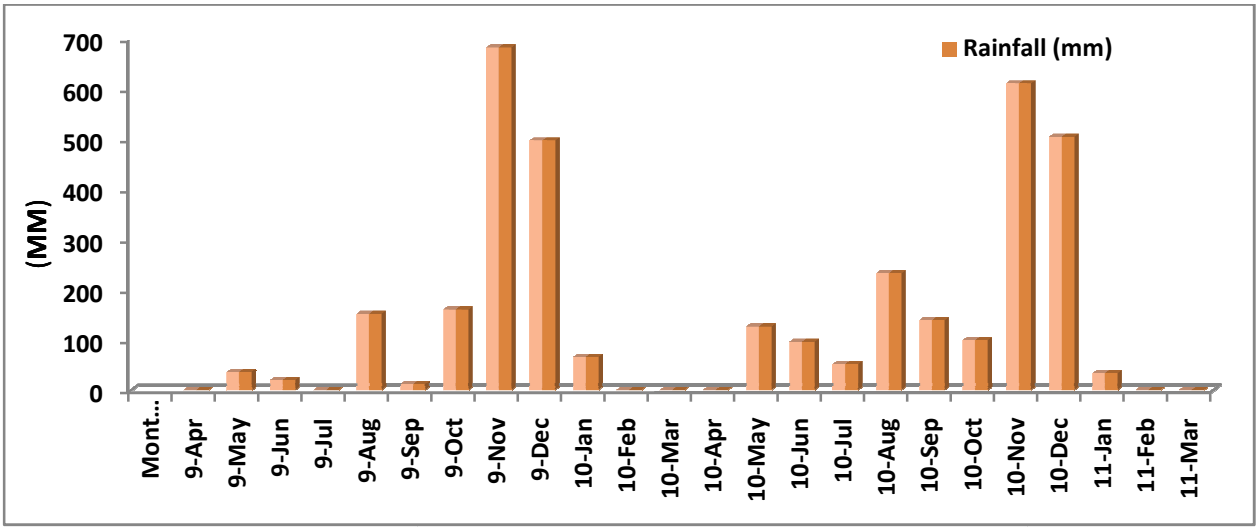

Figure 2: Rainfall Recorded During April 2009 to March 2011 in Mallipattinam Coast

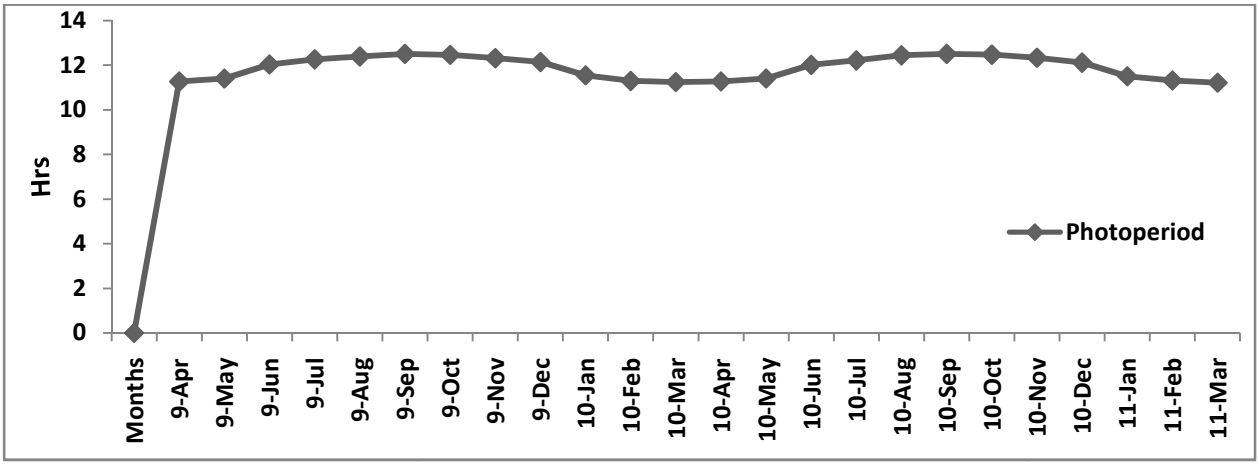

Figure 3: Seasonal Variations of Photoperiod During April -09 to March 2011 at Mallipattinam Coast

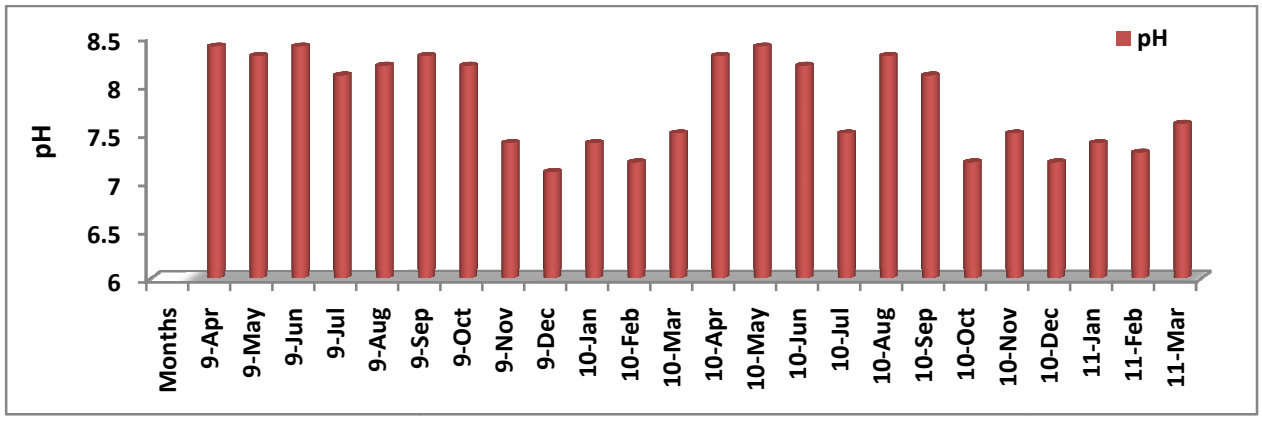

Figure 4: pH Recorded During April 2009 to March 2011 at Mallipattinam Coast

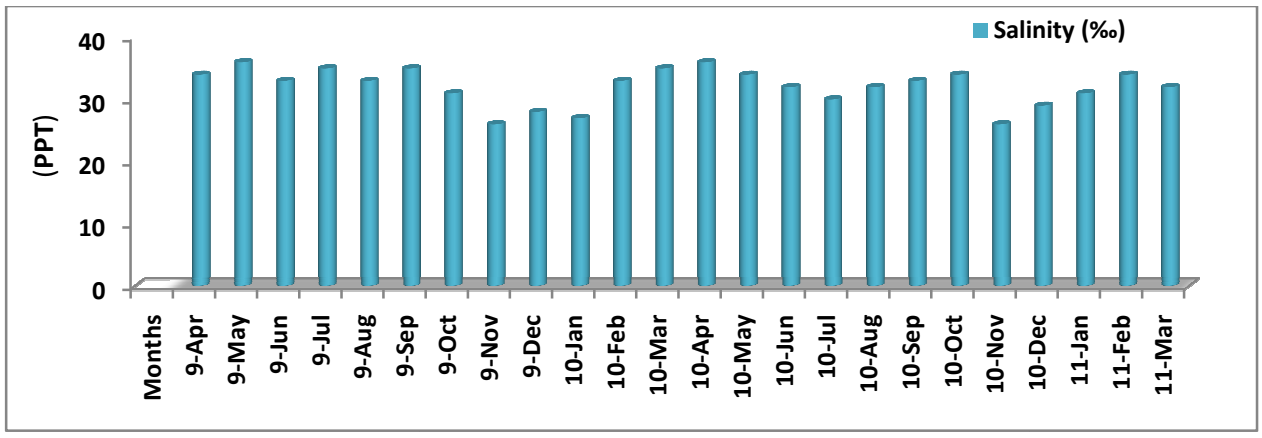

Figure 5: Salinity Recorded During April 2009 to March 2011 at Mallipattinam Coast

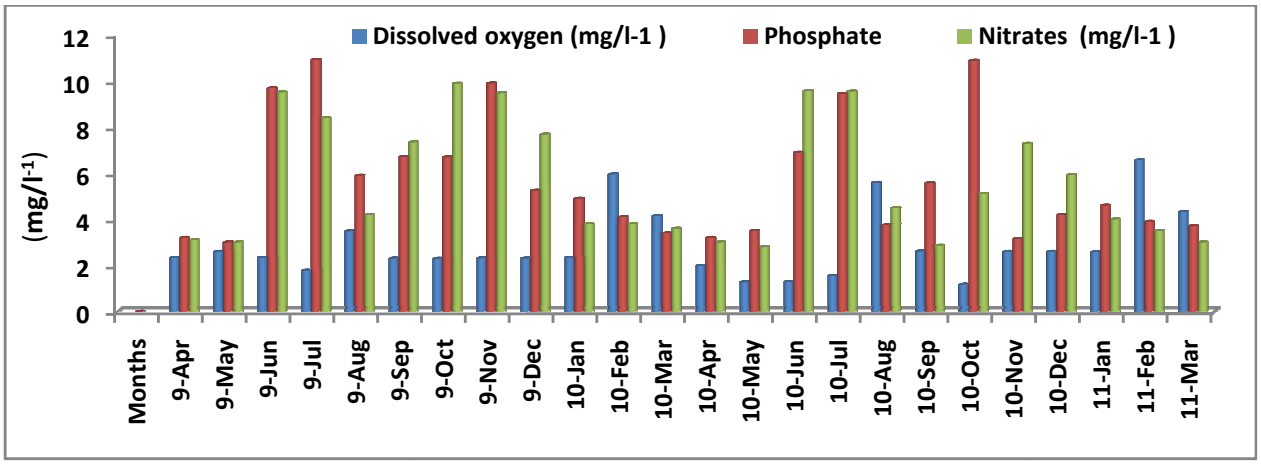

Figure 6: DO, PO4, NO3 Recorded During April 2009 to March 2011 at Mallipattinam Coast

Minimum photoperiod value was recorded during March 2011 and maximum in September 2009 and 2010. Maximum level of humidity (91%) was observed during December 2009 and minimum level (67%) was noticed during May 2010. Maximum level of DO (6.57 mg/l^{-1}) was observed during February 2010 and minimum level (1.17 mg/l^{-1}) was noticed during October 2010. Highest level (10.92 mg/l^{-1}) of phosphate was noticed during July 2009 and lowest (3.2 mg/l^{-1}) during April 2010. Highest level of nitrate (9.89 mg/l-1) was noticed during October 2009 and lowest level (2.8 mg/l^{-1}) in May 2010.

In the present study the seasonal variations in atmospheric and water temperature were found to be associated with intensity of rainfall and photoperiod existed in that time. The range of variation in atmospheric temperature was slightly more than the surface water temperature. Similar observation reported by earlier workers **[1, 8, 14, 16]**. The temperature of east coast varied from 27.40 to 29.10^{0}C which may be due to diurnal variation of the sea surface **[11]**. The central Bay of Bengal the surface sea temperature value decreased from the pre monsoon to post monsoon **[13]**. At Nagapattinam coast the surface water temperature varied from 25.3 to 32.3^{0}C **[3]**. The salinity of the sea water like the temperature is one of the abiotic factors which fluctuated significantly. The salinity was found to be high during summer and low during monsoon periods. The reduction in salinity during monsoon season is due to influx of fresh water from land after the monsoon rain and discharge of water from the river Agini. Similar observations reported by earlier workers **[1, 2, 15]**. The average salinity value of the sea waters were 30‰ to 33‰ and it showed wide fluctuation during summer and monsoon month **[5, 6, 10, 14]**. The minimum salinity during monsoon could be due to heavy rainfall and influx of freshwater from land at monsoon rain and discharge of water from the rivers **[3]**.

Hydrogen ion concentration is another important factors in the aquatic eco-system. The variation in pH of the water was less pronounced throughout the study period. The obivious seasonal changes of pH was mainly due to rainfall and fresh water inflow. The North Western Bay of Bengal in surface sea waters were more alkaline and mono mesohaline in nature**[12]**. The pH of Nagapattinam coastal water showed slight fluctuation. It was found to be minimum during monsoon and maximum during

summer months [**3]**. The dissolved oxygen is an another important biological factor which showed fluctuation during the study period. The DO level promoted by phytosynthetic activities of phytoplankton and direct diffusion of oxygen from atmosphere. Similar observation reported by earlier workers **[4, 13]**. The maximum DO level was recorded during monsoon season and the minimum during pre monsoon season **[3]**. The phosphate and nitrate are essential factors of aquatic ecosystem. In the present study, the phosphate was high during pre monsoon and low during summer. The maximum nitrate was recorded during monsoon and minimum was during summer months. Similarly observations were reported by earlier worker **[15]**. At Nagapattinam coast the minimum phosphate, nitrate was estimated during the summer season and maximum during monsoon season **[3]**.

CONCLUSIONS

In the present study all hydrological parameter were showed slight monthly variation. There was a direct relationship noticed between rainfall, humidity and photoperiod. The variation in physico-chemical parameters mainly deponds on monsoon rains. The fluctuation in physico-chemical parameter may be influence the biological activity and productivity of aquatic organism.

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