

Physico-Chemical Parameters of Coastal Waters of Visakhapatnam, East Coast of India



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Abstract: The coastal zone of Visakhapatnam is receiving a sewage waste and industrial effluents owing to intensified industrial and population growth. The physicochemical parameters rainfall, atmospheric temperature, water temperature, pH, salinity and dissolved oxygen seasonal variations were discussed. pH ranges between 7.5 to 8.3. during the course of investigation. It was minimum in July and was highest in October. However, DO was maximum in May (6.7mg/L) while it was minimum in the month of September (4.0 mg/L)

Keywords: Salinity, pH, Dissolved oxygen, Rainfall.

Introduction

Oceans are the treasure houses of wealth for both sustenance of life and scientific researches. The researchers are being intensified in the recent years on the conservation of marine biota and the marine ecosystem. Oceans offer potentialities for marine fisheries as a sources of food. The rapid industrialization along the coastal area have brought considerable decline in the water quality particularly of brackish water and the estuaries producing increased pressures leading to environmental stress or even affect public health (Cave *et al.*, 2003; Belzunce *et al.*, 2004; Sundaramanickam, 20080; Kumar and Tembhe, 2010).

The total life of the world depends on water and hence the hydrological study is very much essential to understand the relationship between trophic levels and food webs. The environmental conditions such as temperature, topography, water movement, stratification, salinity, oxygen and nutrients characterizing at particular water mass also determine the composition of its biota. Usually in the near shore waters and estuaries, temperature exhibit considerable seasonal variations depending on the local conditions of rainfall, tidal incursions, various a biotic and biotic processes, quantum of fresh water inflow affecting the nutrient cycle of different coastal environments (Annon; 1989). There are often variations in water temperature mainly due to seasonal changes and rainfall (Choudary and Panigraphy, 1991). Both the atmospheric and water temperatures often get fluctuated with reference to the topography of the location and from season to season, (Gothandaraman; 1993).

The coastal zone of Visakhapatnam industrial belt is receiving a vast quantity of sewage waste and industrial effluents owing to intensified industrial and population

growth. Several workers have investigated different aspects of hydrography off Visakhapatnam harbor waters (Phani Prakash, 1989; Nanda, 1991)

NIO, (2006) extensively investigated on Visakhapatnam marine area at harbor and beach. Damotharan, *et al.*, (2010) reported on seasonal variations of physic chemical characteristics in point Calimere coastal waters. Poonam and Rahul (Bhadjr and Kundu), (2012) observed the status of sea water quality at few industrially important coasts of Gujarat, off Arabian Sea. Archana and rameshbabu, (2013) Seasonal variations of physicochemical parameters in coastal waters of Visakhapatnam, East Coast of India.

Materials and Methods

Water samples were collected in every fortnightly and water and atmosphere temperature and pH was recorded immediately at the collecting station by using standard digital maters. For estimation of Dissolved Oxygen, Winkler's modified method Strickland and Parson. (1972) has been followed. The samples for Dissolved Oxygen were fixed with Winkler's reagent A and B at the collection station. The remaining titration has carried out in the laboratory. Salinity estimation was done by standard titration method of Knudsen. Rainfall data was collected from the local meteorological department. The data was pooled together and the mean value expressed in the results.

Results

The results of the study on physico-chemical parameters of water during the period of study are presented in table-1 and Fig 1and 2.

Table 1: Physico-chemical characteristics of coastal waters of Visakhapatnam at Fishing Harbor

Month	Monthly rainfall (cm)	Temperature (°C)		pH	Salinity 0/ '00 (ppt)	Dissolved oxygen (mg/L)
		Air	Water			
June06	4.04	28.8	27.0	8.0	32.3	5.0
July06	6.65	29.6	27.5	7.5	32.8	5.7
Aug-06	10.50	28.0	27.8	7.8	32.6	5.1
Sep-06	11.6	28.0	28.0	8.0	32.9	4.0
Oct-06	4.2	30.0	29.0	8.3	28.0	6.0
Nov-06	3.3	29.2	29.5	8.2	19.8	6.5
Dec-06	0	25.4	29.0	8.0	25.0	6.3
Jan-07	2.1	31.0	29.0	8.0	27.2	5.0
Feb-07	2.14	28.0	27.0	8.0	31.1	6.5
Mar-07	6.9	29.8	28.3	8.01	32.9	5.9
Apr-07	0.2	29.9	29.8	8.1	33.7	5.3
May07	6.25	31.0	29.0	7.9	33.8	6.7

The annual rain fall exhibits great fluctuations in season wise. The maximum 11.6 cm rain fall is noticed in September and it is slowly decreased to 0 cm in December. It reveals that the rain fall is fluctuated in summer season and rapidly increased to monsoon season. Atmospheric temperature the maximum is 31°C in the month May and a minimum 25.4°C in the month of December. In case of water temperature the maximum 29.8°C is noticed in the month of April and the minimum 27.0°C in February and June months. The atmospheric temperature is higher than that of surface water temperature. It is observed that the both atmospheric and water temperature fluctuated almost parallel. The significant fluctuations were not noticeable in atmospheric temperature than water temperature.

pH value ranged between a minimum of 7.5 in the month of July and maximum of 8.3 in the month of October. pH values showed a decrease during the summer months compared to the other months. Salinity showed a typical pattern with maximum 33.8‰

in the month of May and the minimum 27.2‰ in the month of January. The values during the winter shows lower than all the months then onwards it increase in summer season. The maximum dissolved O₂ recorded in the month of May is 6.7 mg/L and the minimum 4.0 mg/L in month of September. In the monthly dissolved oxygen content very short fluctuations were observed from the results. And it reveals that there is no any pattern in dissolved oxygen content increase and decrease.

Discussion

The rain fall is fluctuated in summer season but rapidly increased to monsoon season and in winter it reached to zero. It is due to most stable in absence of rainfall (Maruthanayagam *et al.*, 1999). The up and down of atmospheric temperature impact on water temperature is clearly appeared. The seasonal variations in atmospheric heating and warming up of surface waters during summer are the main causes for relatively high temperatures. The increased pattern from winter to summer is pointed the earlier reports (Govindswamy, *et al.*, 2000 and Archana and Ramesh Babu, 2013).

pH values showed a decrease during the summer months compared to the other months which might be due to the acidic nature of the effluents discharged from industries. The observations of Uma Maheswara Rao and Mohan Chand, (1988) and Rao and Padmaja, (1999) are reveals the same. Salinity showed a typical pattern with maximum values during pre - monsoon period and minimum values during post monsoon period. A decrease of salinity during monsoon months is due to influence of fresh water from land runoff through the monsoon fed streams. The salinity at any point is dependent on the state of the tide (high or low; spring or neap), time of the year, rainfall and extent of fresh water inflow (Mc lusky, 1971, Desousa, 1977). In the monthly dissolved oxygen content very short fluctuations were observed from the results. According to Albaster and Lloyd, (1982) minimum level of dissolved oxygen required for life activities is 5 mg/l, but the present observations show the content less than the required level during a couple of months.

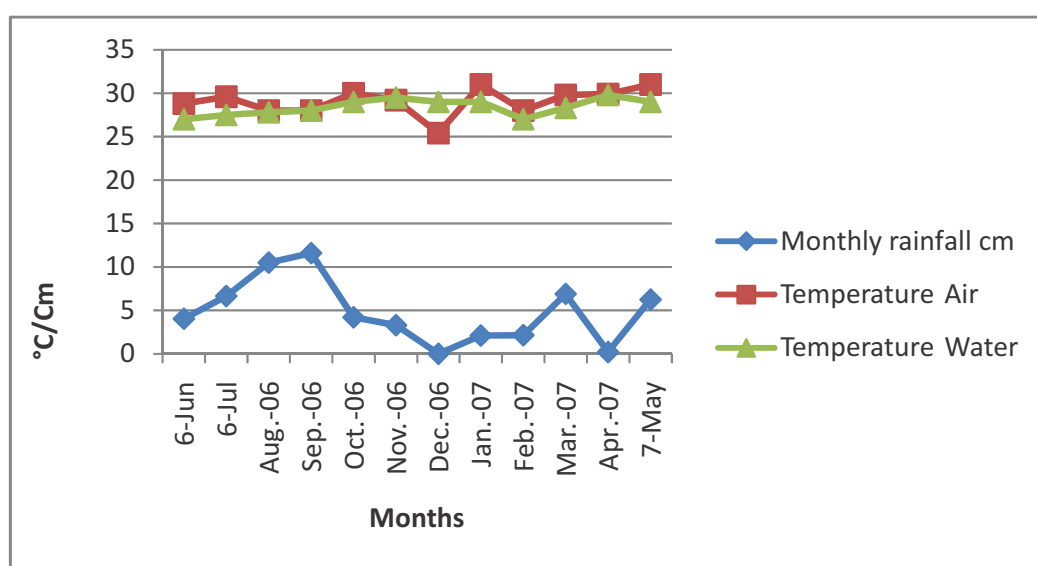


Fig.1. Physico-chemical parameters of visakhapatnam in different months in the years 2006-2007

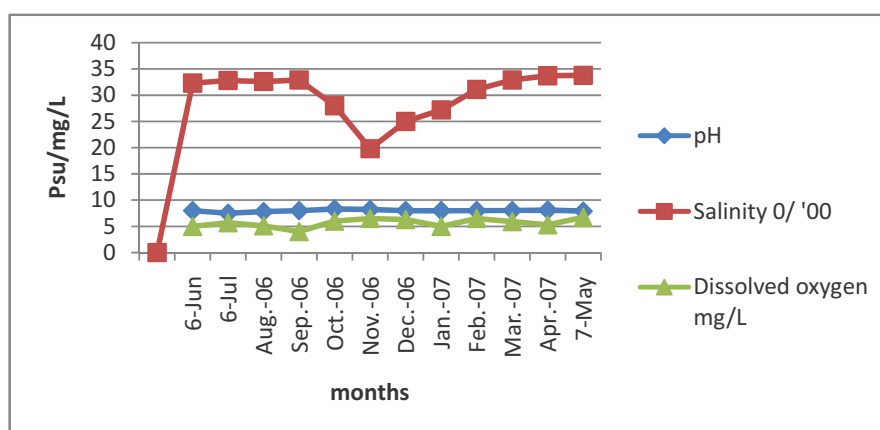


Fig. 2. Physico-chemical parameters of Visakhapatnam in different months in the years of 2006-2007

Acknowledgement

The authors express thanks to the Head, Department of zoology, Andhra University for providing necessary facilities to carry out this research work.

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