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Abstract

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RESEARCH ARTICLE

THE PHYSICO-CHEMICAL PARAMETERS OF WATER FROM NIZAMPATNAM **BAY, EAST COAST OF INDIA.**

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Nizampatnam Bay is an embayment adjoins of the Krishna delta in its southern side covering an area of 1,825 km². Physico-chemical changes may have tendency to accumulate in the various organs of estuarine fauna especially fish which may in turn enter into the human metabolism through consumption causing serious hazards. Hence the present study was carried out of determine the physico-chemical parameters of water collected from three different points on were during January 2013 to December, 2013 to determine its water quality using standard method. Selection of sampling points on the basis of three important of with respect of distance of Nizampatnam port. The physico-chemical parameters like Temperature, Turbidity, Dissolved Oxygen, pH, Salinity, Nitrates and Phosphates are observed in the Nizampatnam area. The results of present investigation showed that there was a significant seasonal variation. The temperature was found to be maximum in summer months and minimum during the winter months. The pH of the water found in an alkaline range in the summer months and the turbidity showed marked variation. DO, nitrates and phosphates were found the slight monthly variations. The present study indicates that the fluctuations of physico-chemical parameters in the coastal region influence the feeding, breeding, migration and other activities of aquatic organism.

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INTRODUCTION

The total life of the world depends on water and hence the physico-chemical parameters of water are very much essential to understand the relationship between its different tropic levels and food webs. The environmental conditions such as topography, water movement and stratification, salinity, dissolved oxygen, temperature and nutrients characterizing particular water mass also determining the composition of its biota (Karande, 1991), usually in the shore waters and estuaries, they exhibits considerable seasonal variation depending on the local conditions of rainfall, tidal incursion, various abiotic and biotic processes, quantum of fresh water inflow affecting the nutrient cycle of different coastal environment (Choudhury and Panigraphy, 1991). The natural processes, such as precipitation inputs, erosion, weathering of crustal materials, as well as the anthropogenic influences like urban, industrial and agricultural activities, calling for increasing exploitation of fresh water resources, together determined the quality of surface in a region. Rivers play a major role in assimilation or carrying off municipal and industrial wastewater and runoff from agriculture land, aquaculture activities constitutes the constant polluting source whereas the later its seasonal phenomenon. Further, the changes are brought about due to global change impacts like sea

level rise, change of climate and oceanographic conditions. The process and events controlling the environmental characteristics in tropical and temperate estuaries are very different.

The natural distribution of the flora and fauna in the aquatic system are mainly controlled by the fluctuation of the physical and chemical characteristics of the water body (Ayyappan Nair, 1978; Dehadraj, 1970; Pati, 1980). The physico- chemical parameters of the water of Bay of Bengal on the East Coast of India have been reported by many workers (Rao *et al.*, 1982; Sasamal *et al.*, 1985; Somayajulu *et al.*, 1987, Ramaraju *et al.*, 1987, Vasanth Rao, 2006, Reddy et al., 2012, Selvem et al., 2013, Raju et al., 2014, Baliasingh et al., 2015). The abundance of larvae, juveniles, adults fish can, however be influenced by physical condition of salinity, temperature, pH and turbidity that vary in time, largely due to seasonal variation in freshwater input (Cyrus and Blaber, 1987, Barletta *et al.*, 2000; Barletta-Bergan *et al.*, 2002a, 2002b, Barletta *et al.*, 2003; 2005). Higher salinity would cause a profound impact on animal such as plankton, fungi, benthic forms, fish, shrimp and crab. The following authors who contributed the knowledge of physico-chemical parameters of water: Karande (1991); Choudhury and Panigrahy (1991); Kannan and Kannan (1996); Blaber (2000); Knox (2001); Brinda *et al.*, (2010); Damotharan *et al.*, (2010).

Materials and Methods:

For the study of the physico-chemical parameters of the Nizampatnam Bay of the surface and bottom water samples were collected in morning 8.00 AM and stored in clean polythene container of 500 ml content. Temperature, Turbidity, pH, salinity, Dissolved oxygen, Phosphates and Nitrates are recorded at the coast of Nizampatnam and samples for dissolved oxygen were fixed immediately in the collection point water analysis was performed as the methods described in standard methods.

Stastical analysis: The data of physico-chemical parameters during the January 2013 to December 2013 were subjected to Stastical analysis for which SPSS 16.0 version was used. For the conventions of computing data average value of physico-chemical parameters were taken and presented. Among the parameters correlation and cluster analysis also analyzed.

Results:

The average physico-chemical parameters water of the Nizampatnam Bay recorded from January 2013 to December 2013 and presented Table No: 1.

Temperature: In the present study atmospheric temperature ranges from 26.4 to 40.2°C. Minimum recorded in the month of December and Maximum in the month of May, 2013. The temperature is important factor which considerably fluctuated during study period.

Turbidity: Turbidity is measured of clarify of the water if is caused by the suspended particles and high turbidity is due to the more concentration of the suspended particle. In the present study turbidity range 8 to 20 cm. High turbidity recorded in month of August whereas lowest recorded in the month of March, 2013.

pH: pH is the most important chemical factor of water and it is controlled the solvent property. In the present study highest pH 8.5 recorded in the month of March whereas lowest 5.9 pH recorded in the month of December 2013.

Salinity: Salinity has been act as the one of the prime environmental factors which profoundly influences the utilization of the organisms in the coastal regions. In this study highest 34.5 ppt salinity recorded in the month of July where as lowest 10.5 ppt recorded in the month of January, 2013.

Dissolved oxygen: Dissolved oxygen is a sole of the hydrological parameters of the water that needed to keep the organism alive and health of the water body in terms of tropic status and biotic status. Further, that the oxygen content is needed of many organisms as its affects the solubility and availability of many nutrients of the productivity of aquatic ecosystem. In the present study Dissolved oxygen ranges in between 4.9 to 7.4 mg/l. The highest (7.4 mg/g) D.O recorded in the month of April and lowest (4.9 mg/l). D.O recorded in the month of January, 2013.

Nitrates ($\mu g/l$): Nitrates are important factor for controlling the occurrence and abundance plankton. Higher concentration of nitrates is an indicator of organic pollution and eutrophication. In this study it ranges between 0.0070 and 0.186 $\mu g/l$.

Phosphates: Phosphorus is the major limiting nutrient of a water body. It is an important constituent of biological systems may also be present in the organic forms. Phosphorus is utilized by organisms, followed by its subsequent release from the organic debris. The higher concentration phosphorus therefore indicator of pollution in the present study it ranges from 1.4 to $3.25 \mu g/l$.

DISCUSSION:

Physico- chemical parameters play an important role in the structuring the fish species in mangrove swamp, estuaries and coastal areas. Salinity and temperature are important hydrological parameters influencing the occurrence, density and growth of larvae of fish and shell fish in coastal areas (Ramos *et al.*, 2006; Faria *et al.*, 2006). Water depth and turbidity can also influence fish distribution. Large piscivorous fish prefer to stay in deeper area where they can feed more efficiently (Ruiz *et al.*, 1993, Laegdsgard and Johnson, 2001) are more likely to stay in deeper areas (Ruiz *et al.*, 1993). The Bay of Bengal is a semi enclosed eastern arm of tropical Indian Ocean. The basis is predominantly influenced by the seasonal reversal of the monsoon resulting in the input of large quantity of fresh water from major rivers. Further, winds and stratification influence phytoplankton productivity in the bay.

In India the temperature is quite high during the dry pre-monsoon season but with the advance of the south west monsoon (June-September) water temperature reaches is lowest value (24°C). Dissolved oxygen (DO) is one of the most important abiotic parameters influencing the life in the coastal environment. Normally high dissolved oxygen is encountered in polluted. Further, depletion of DO to the level of anaerobia is the most critical manifestation of pollution (Lester. 1975). Dissolved oxygen concentrations were above 5mg/l which was adequate enough to support aquatic life (Mishra et al., 2008). The D.O. concentrations may be depending on the condition water and respiration by plants and animals in that sample area. It has been observed from the present study that the amount of dissolved oxygen content during different months (Jan-Dec, 2013) have shown minimum in the month of January (4.9 mg/l). This is because of the oxygen is consumed more by the aquatic animals due to effluent stress. The temperature variation is also one of the factors in the coastal and estuarine system, which may influence the physico- chemical characteristics and also influence the distribution and abundance of flora and fauna. In the present study, it has observed the highest temperature recorded in the month of April, May and June, 2013 and lower temperature recorded in the months of December, January and February. Lower temperature in the above months due to cloudy sky and rainfall brought down the temperature to the minimum. Similar observations have been made by Thangaraj (1985); Mani (1989); Vasantha (1989); Kaliyaprumal (1992); (Kannan and Kannan, 1996); Karuppasamy (1997); Sreenivas (1998).

Salinity is one of the important factors which profoundly influence the abundance and distribution of the animals in the coast estuarine environment. In the present study the lower salinity was recorded during months November and January due to large quantity of fresh water inflow from creeks and other sources of water. Similar trends in the salinity was observed by Mani, (1989), Seenivasan, (1998); In the present study the salinity was higher in the months of April to July due to low rainfall, decreased freshwater inflow, and rise in temperature. Phosphates content was also found to high in the months of August to November and lower recorded in the months of April and May. The phosphate content during winter month was higher and lower in summer months (Meena Sudari, 2012). Highest and lowest levels of Nitrates were noticed during January (0.0078 μ g/l) and March (0.186 μ g/l) respectively. The higher concentration of nitrate could be attributed due to the variation in phytoplankton, excretion and oxidation of ammonia and reduction of nitrate (Kannan and Kannan, 1996). The lowest content of nitrate during the month of January was due to less freshwater input, higher salinity also uptake by phytoplankton. The same was recorded by Kannan and Kannan, (1996).

Hydrogen ion concentration is another important factor in the aquatic ecosystem. The variation of pH of the water was less pronounced throughout the study period. The oblivious seasonal change of pH was mainly due to the rainfall and fresh water inflow. Sasamal *et al.*, (1985) reported that from North Western Bay of Bengal surface waters are more alkaline and mesohaline in nature. In the present study highest pH recorded in the months of March, 2013. Davis (1954) emphasized that pH is the most important chemical factor of water and it controls the solvent

property. Thus pH is used in the measurement of alkalinity, CO_2 and many other acid - base equilibrium (Ahmad and Alireza, 1992). The variation of physico-chemical parameters mainly depends on monsoon rains and also other sources of freshwater. The fluctuations in physico-chemical parameters influence the biological activity and productivity of aquatic organisms. The aim of the present study was to understand distribution of physico-chemical parameters from January, 2013 to December, 2013 and to determine their influence on planktonic organism. **Table: 1.** Physico-chemical parameters of Nizampatnam Bay from January 2013–December2013

Month	Temperature (°C)	Turbidity (cm)	Do (mg/l)	рН	Salinity (ppt)	Nitrate (µg/l)	Phosphate (µg/l)
January	28.5	10	4.9	8.1	10.5	0.0070	2.072
February	29.5	13	6.5	8.2	23.2	0.158	1.9
March	31.2	08	7.0	8.5	27.2	0.186	2.33
April	39.5	11	7.4	7.8	29.5	0.121	1.91
May	40.2	12	6.9	7.5	32.5	0.017	1.42
June	40.2	14	6.4	8.0	33.2	0.021	1.87
July	38.1	15	6.2	7.8	34.5	0.041	2.76
August	36.1	20	5.2	6.9	32.3	0.035	2.85
September	34.1	18	4.9	6.2	28.2	0.021	3.25
October	30.5	16	5.2	7.1	25.5	0.031	2.82
November	29.5	15	6.1	6.8	24.5	0.029	2.45
December	26.4	14	5.8	5.9	26.4	0.020	2.56
Min-Max	26.4-40.2	08-20	4.9-7.4	5.9-8.5	10.5-34.5	0.0070- 0.186	1.42-3.25
Mean	33.6	13.8	6.04	7.4	27.2	0.07	2.34

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