



**PHYSICO CHEMICAL PROPERTIES OF WATER COLLECTED FROM BHATYE ESTUARY,
RATNAGIRI.**

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Abstract: The temporal and spatial distribution of temperature, pH, salinity, conductivity, turbidity, Total Dissolved Solids(TDS) and DO of surface water collected from different points of Bhatye estuary were measured during April 2010 to March, 2011. Though the temperature varied from 25.0 to 30.0°C (av. 27.5), the pH variation was in range of 7.49 - 8.26 (avg. 7.87). Relatively low values were obtained during monsoon due to influence of riverine flow. Marked variation in salinity was observed ranging from 2 ppt to 40 ppt, lowest was observed towards riverside during monsoon. Total dissolved solids were in the expected limits and were decreasing towards river side. TDS values were high in the riverine and TSS values were high during summer period.

Key Words: Estuary, DO, conductivity, turbidity and Salinity etc.

Introduction

Estuarine and coastal areas are complex and dynamic aquatic environment (Morris *et al.*, 1995). When river water mixes with seawater, a large number of physical and chemical processes take place, which may influence of water quality. The quality of surface water is a very sensitive issue. The natural processes, such as precipitation inputs, erosion, weathering of crustal materials, as well as the anthropogenic influences, viz, urban, industrial and agricultural activities, calling for increasing exploitation of

water resources, together determine the quality of surface water in a region. Rivers play a major role in assimilation or carrying off of municipal and industrial wastewater and runoff from agricultural land, the former constitutes the constant polluting source whereas the later is a seasonal phenomenon. To establish the spatial and temporal variations in water quality, regular monitoring programs are required.

The study area, Ratnagiri is situated at 17⁰North and 73⁰East and having an area of about 50,209 sq miles. The coastline of Ratnagiri district is 250 miles long and marked with several islands, which is a result of drowned topography. Ratnagiri coast has been blessed with luxuriant, thick mangrove vegetation with patches of other associated flora and fauna. The important estuaries along the Ratnagiri coast include Bhatye estuary, Kalbadevi Creek, Jaitapur

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Creek, Bankot Creek, Sakharthar, Shirgaon etc. Bhatye estuary is situated at 73°15' East and 16°51' North near Ratnagiri and known for the mangroves on the mud flats. At Bhatye, river Kajali meets the Arabian Sea and forms an estuarine zone. Various mangrove species along with their associated flora form characteristic vegetation in Bhatye estuarine region. Bhatye Estuary happens to be one of the most important estuarine region (*extends to almost 25 Km inside the coast up to Hattis*) along the Ratnagiri Coast and is breeding ground for most of the commercially important fishes. The fishery economics of Ratnagiri largely depends on Bhatye Estuary and the favorable area for carrying out fishing activities is 530 ha. Hence this particular area is important from the biodiversity and economics point of view. Further, literature review showed that no physicochemical analysis was carried out for this area and hence the present studies provide thorough insight of all these factors. Many studies have been carried out so far on physicochemical parameters of various estuaries of India (Ashok Prabu *et al.*, 2008, Mary Helan *et al.*, 2011, Anila Kumari *et al.*, 2007, Muduli Bipra Prasanna *et al.*, 2010, Jayachandran P.R *et al.*, 2011, Prabhakar.C *et al.*, 2011). The present study was carried out for monitoring of this estuary and future ecological assessment.

Material and Methods

Selection of Sampling Sites

The present study was carried out in the Bhatye estuary. Six stations were selected within a stretch of about 25 Km. Three zones were selected for sampling, considering the nature of study area. Zone-I include Station-1 and 2, which is a marine zone. Zone- II as middle zone occupies Mangroves Island (Station- 3 and 4), while Zone- III was riverine zone includes Station-5 and 6. Depth of the water column varied from 3-15 m. Sampling was done fortnightly covering intermediate phase of the tide to avoid tidal effect, if any. Diesel engine boat was used to reach different stations.

Collection of water samples (physico-chemical analysis)

Water samples for selected physicochemical parameters (temperature, pH, DO, salinity, conductivity, TDS and turbidity) were collected from the surface by using clean plastic bucket. Water samples were collected every month during April 2010 to March 2011. Preservation and transportation of the water samples to the laboratory were as per standard methods (APHA, 1998). Water temperature was measured on the site using mercury thermometer. Water pH was measured using a pH analyzer (WTW model Multi 340), while conductance and salinity were analyzed by MohrKundsen AgNO₃ titration method (APHA, 1998). Dissolved oxygen was fixed immediately after collection and then determined by Winkler's method. Turbidity was measured by Nephelometer using 0.02 NTU standards.

Results and Discussion

Variations in water quality parameters were within the expected levels for tropical estuary indicating that this area was free from any environmental perturbation. Seasonal variations and tides were main factors influencing the temporal and spatial variations of some of the parameters. Though the temperature varied from 25.0 to 30.0°C (av. 27.5), the pH variation was in range of 7.49- 8.26 (avg. 7.87). Relatively low values were obtained during monsoon due to influence of riverine flow. Marked variation in salinity was observed ranging from 2 ppt to 40 ppt, lowest was observed towards riverside during monsoon. The entire water column was homogenous during pre-monsoon period due to limited influence of fresh water and the estuary was completely tide dominated. With the season of monsoon the estuary became freshwater dominated and there was a dilution effect with most of the physico-chemical parameters. Salinity decreased towards freshwater side at riverside zone during monsoon. There was a fair seasonal variation in DO level, 1.68-9.45 mg/l (avg. 3-5). Conductivity and Total dissolved solids were in the expected limits and were

decreasing towards river side. Higher values were observed during summer months and at zone I and zone II. Turbidity was in range of 1.2- 2.0 and depends on tidal movements and primary production. In general, Zone III showed lower water temperature, pH, salinity,

conductivity and T.D.S. but higher range of DO and almost similar turbidity, it might be due to influence of freshwater flow from river side. Seaward zone showed higher values of most of the parameters except DO.

Table 1: Physico-chemical parameters of Bhatye estuary, Ratnagiri, Maharashtra.

Water parameters	Zone 1			Zone 2			Zone 3		
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg
Water temperature	26.3	29.0	27.6	25.5	30.0	27.7	25.0	27.0	26.0
p ^H	7.90	8.32	8.11	7.62	8.26	7.94	7.49	7.99	7.74
Salinity (ppt)	36.0	40.0	38.0	29.0	38.0	33.5	2.0	28.0	15.0
Dissolved oxygen (mg/l)	1.68	9.45	5.56	2.88	9.17	6.02	4.20	7.91	6.05
Conductivity	24.7	48.1	36.4	27.0	49.2	38.1	7.1	30.5	18.8
T.D.S.	15.9	27.2	21.5	15.4	24.2	19.8	4.6	19.9	12.2
Turbidity	1.2	1.9	1.5	1.2	2.0	1.6	1.3	1.8	1.5

Conclusion

The physicochemical of chemical characteristics of river water in the study area suggested that there was no harmful chemical contamination. If proper measures are taken for the treatment of sewage before discharge and restrictions are put on various anthropogenic activities upstream, the estuary would remain healthy in the long run.

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