



Assessment of Water Quality of Freshwater Resources Along the Coast of Andhra Pradesh

Ch. Satyanarayana, S. Ramakrishna Rao* and Kaizar Hossain**

Deptt. of Marine Engg., College of Engineering, Andhra University, Visakhapatnam-530 003, A.P.

*Deptt. of Civil Engg., College of Engineering, Andhra University, Visakhapatnam-530 003, A.P.

**Dept. of Environmental Studies, GITAM Institution of Science, GITAM University, Visakhapatnam-530 045, A.P.

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ABSTRACT

Assessment of water quality is important as water is used for domestic, agricultural and also industrial purposes. The coastal stretch of Andhra Pradesh abutting Bay of Bengal is also a part of the Coromandal coast that runs to a length of 960 km on the east coast of India. The two large rivers Godavari and Krishna, which originate in the west coast, join the sea with in a gap of 200 km between them. The rivers, in addition to suspended sediments coming through surface runoff, also receive discharge of domestic as well as treated and untreated industrial effluents. The water samples of various freshwater bodies from 80 different stations in the nine districts were collected and analysed for their physicochemical characteristics to determine the hydrogeochemical characteristics of the stretch of Andhra Pradesh.

INTRODUCTION

Andhra Pradesh having a coastline of 960 km stretch covering nine coastal districts lies on the east coast off Bay of Bengal. The coast has excellent stretch of hills and plains supporting excellent ecosystems. The Andhra Pradesh coast has rocky, sandy and muddy shores, as well. It supports variety of fauna and flora all along. The mangrove patches are seen sparsely spread over near river mouths (Coringa, Nellore, Visakhapatnam, etc.). The coast has nesting areas of olive Ridley turtles, nesting of migratory birds in lakes close to coastal stretch and coral patches off the coast supporting variety of marine organisms. The coast often experiences depressions and cyclones resulting in rain fall in addition to normal monsoons. The important coastal feature is two major rivers opening into Bay of Bengal on the east coast. The hydrography of waters over continental shelf and adjoining areas of the Bay of Bengal undergoes to distinct seasonal changes in response to the two reversible monsoons, i.e., south-west monsoon and north-east monsoon. The south-west monsoon occurs from June to September and north-east monsoon prevails from November to February. The general east ward flow in the north Indian Ocean during summer, which is called the south-west monsoon current, flows eastward south of India, turns around Srilanka and enters the Bay of Bengal. This intrusion appears first as a broad northward shallow flow in the central part of the Bay of Bengal during May. As the summer season advances it moves westward, intensifies and becomes narrow. During south-west monsoon strong south-west wind blows at a speed of about 15 to 20 km/s, whereas during north-east monsoon weak winds of 7 to 10 m/s prevail.

Along the east coast large quantities of freshwater are discharged into the Bay of Bengal through major rivers (Ganges, Mahanadi, Godavari, Krishna, Cauvery). This freshwater input dilutes the sea

water in the upper layers, thereby developing strong salinity gradients. The SW and NE reversible winds change the circulation pattern twice a year. This pattern leads to the upwelling and sinking phenomena. The Bay of Bengal is considered to be less productive although many major rivers bring in large quantities of nutrients. The less productivity is due to the narrow shelf, heavy cloud cover and less light penetration.

Most seawater pollution in India arises from land based sources like domestic water, agriculture run off and Industrial effluents. Next comes the shipping and associated ship building, ship breaking and port activities which contribute solid waste and pollution of the hinterlands. The steady increase of major industries in the coastal areas including thermal power plants use seawater as a resource and the coastal domain as a sink of altered seawater. The main objective of this study was to carry out the physicochemical analysis of water along the coast of Andhra Pradesh.

MATERIALS AND METHODS

The water samples were collected from 80 different stations in the nine districts for analysis. The water samples, in general, were collected from rivers, canals and agricultural drains. Some parameters like EC ($\mu\text{mho/cm}$), hydrogen-ion-activity (pH), and temperature of water samples were measured in the field using portable meters. The major physicochemical parameters like DO, BOD, COD, turbidity, fluorides, phosphates, sulphates, nitrates, TSS, and total solids were analysed in the laboratory. The analytical procedures used are according to APHA (1998).

RESULTS AND DISCUSSION

The pH is a measure of the intensity of acidity or alkalinity and measures the concentration of



Fig.1: pH values and its desirable limits (IS: 10500-1991) of water of coastal districts of Andhra Pradesh.

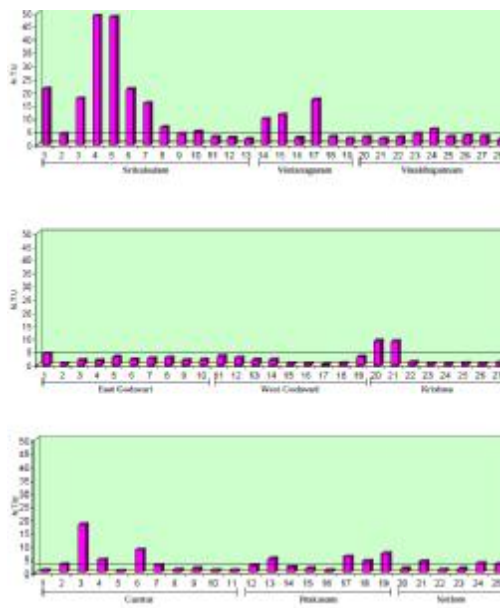


Fig. 2: Turbidity (NTU) value and its desirable limits (IS: 10500-1991) of water of coastal districts of Andhra Pradesh

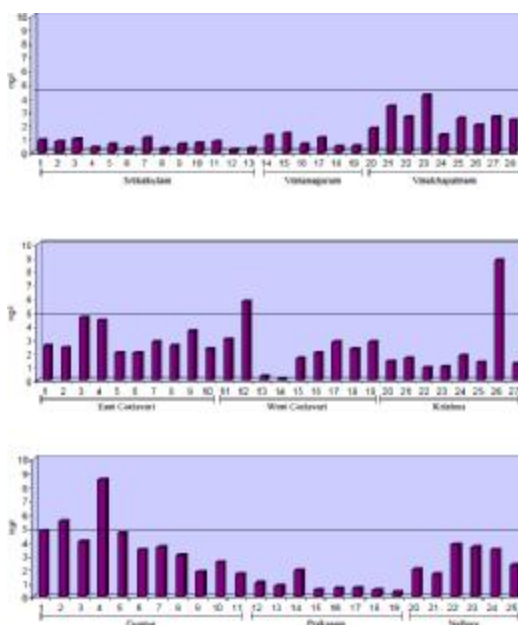


Fig. 3: Phosphate (mg/L) value and its desirable limits (IS: 10500-1991) of water of coastal districts of Andhra Pradesh.

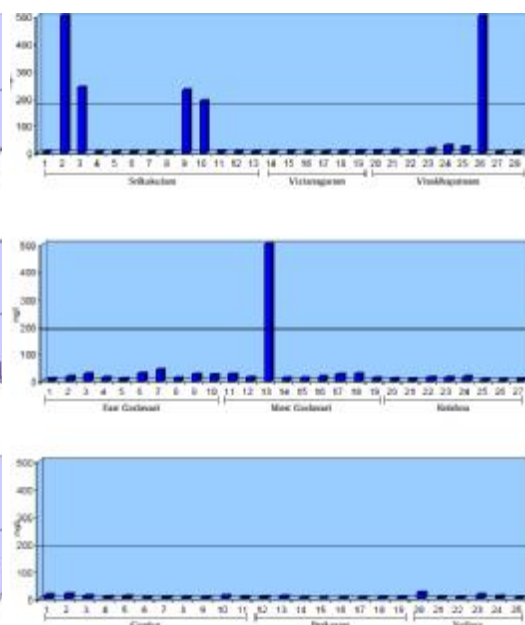


Fig. 4: Sulphate (mg/L) value and its desirable limits (IS: 10500-1991) of water of coastal districts of Andhra Pradesh.

hydrogen ions in water. It has no direct adverse affect on health, however, a value below 4.0 will produce sour taste and higher value above 8.5 show alkaline taste (Tiwari & Ali Manzoor 1998). The freshwater showed pH values ranging from 7.6 to 9.3 in the coastal areas (Fig. 1). The higher values were in agriculture irrigation canals.

The dissolved oxygen was more or less above 6.5 mg/L in most of the sampling sites except in three locations, Peddapuram, East Godavary (4.5 mg/L), Gannavaram, Eluru canal in Krishna district (4.7 mg/L) and Guduru, Pambagedda (5.4 mg/L) (Fig. 6). The reduction in dissolved oxygen content in water bodies is due to high oxygen demanding wastes as also reported by Choudhary (1991). In some of the stations high values of oxygen (10.6 mg/L) were recorded like Ogene canal, Narsaraopeta.

The phosphates have shown an increasing trend in Krishna district. The highest value was 8.8 mg/L in the Ramavarappadu, Krishna canal and Tenali, Ponnuru, Tungabhadra canal (8.5 mg/L). The East Godavari, West Godavari, Krishna and Guntur districts have shown higher values of phosphates (Fig. 3). Phosphates and nitrates are high in Guntur and Nellore districts (Figs. 3, 5).

Turbidity and total solids exceeded 20000 mg/L in Godavari water at Mandapeta in East Godavari district (Fig. 2). The river waters are used as dumping of solid waste and sewerage from the residential areas inhabiting close to the river. In addition to this, industrial wastes and quarrying of sand in the river bed are also contributing to these high solids in Godavari water. The same situation also presents at Venkatagiri in the Kyvalya river in Nellore District. Heavy metals were analysed and they are well within limits.



Fig. 5: Nitrate (mg/L) value and its desirable limits (IS: 10500-1991) of water of coastal districts of Andhra Pradesh.



Fig. 6: Dissolved oxygen (mg/L) value and its desirable limits (IS: 10500-1991) of water of coastal districts of Andhra Pradesh.

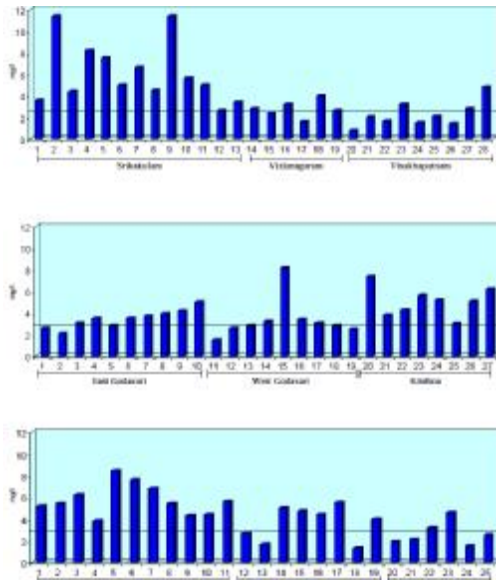


Fig. 7: BOD (mg/L) value and its desirable limits (IS: 10500-1991) of water of coastal districts of Andhra Pradesh.

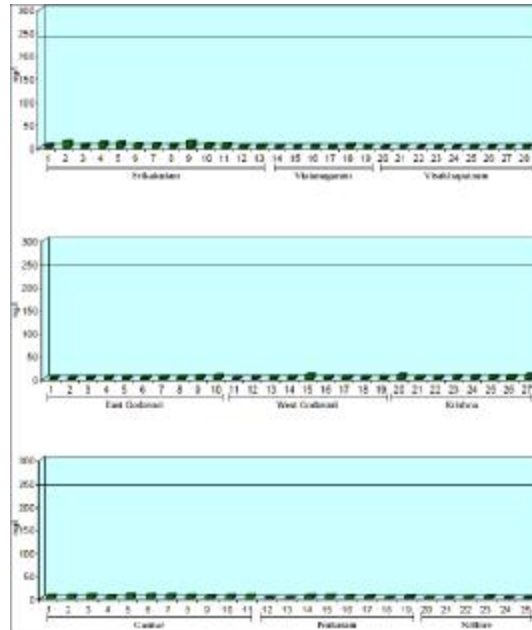


Fig. 8: COD (mg/L) value and its desirable limits (IS: 10500-1991) of water of coastal districts of Andhra Pradesh.

The rapid growth of population and technological and industrial boom have brought enormous problems and degradation of environment. Chemical and toxic elements are being let into the drains, streams and open spaces adjoining the industrial areas without any check. In this country 70% of the water is seriously polluted and 75% of illness and 80% of the child mortality are attributed to water pollution (World Water Resources 1994).

CONCLUSION

There is an imperative need for constant monitoring of the coastal zone. The Pollution Control Boards in the charge for these coastal districts in association with the district authorities would periodically monitor the development activities in the coastal mandals.

Eco-friendly tourism should be given priority. The tourists are instructed not to use any plastics and non-biodegradable materials. The water from resorts should be given a primary treatment before being disposed off into the marine environment.

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