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Original Research Paper

Study of Physicochemical Characteristics of Mangalore Coastal Waters

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ABSTRACT

Mangalore coast is present at the western part of the Western Ghats of the Indian peninsula located at 12°49'N and stretched to about 22 kms. This region is meant for many useful and convenient sources for the development of the country's economy. Because of its scenic beauty, it attracts huge crowd of tourists across the globe. Along with the tourism, this coastal region also receives pollution load from the various industries located nearby. The preliminary study carried out at the coastal region of Mangalore by considering six randomly selected study sites, located at points where river water enters the sea. Various parameters of water analysis in these study sites have revealed differences from one site to the other. The mean values of the estimated characteristics were represented graphically. These values prompt to carry out further research to substantiate using statistical methods.

INTRODUCTION

Water and soil pollution due to industrialization is a common problem, creating acute insanitation effects. Industrial effluents are constantly adding up, toxic substances into water bodies at a very high rate, especially in industrial zones. Most of the wastewater discharged into the surrounding water bodies disturbs the ecological balance and deteriorates the water quality. However, anthropogenic impacts associated with agricultural practices, mineral exploration, industrial processes and solid waste management are important contributions to heavy metal contamination of natural ecosystems (Alumaa et at. 2002). In addition to the indirect impact of sewage effluents, the discharge of hazardous chemicals such as heavy metals and pesticides further aggravate the situation. These chemicals are known to have direct impact due to their tendency to magnify and accumulate in the trophic chains and their possible entrance to human beings through contaminated fish.

The rivers, which flow towards the west namely the Nethravathi and Gurupura, which were free from human intervention few years ago, have become victim of man induced environmental degradation due to dumping of huge quantity of waste materials. Presently, India is the largest manufacturer as well as Consumer of pesticides in Southern Asia. Pesticides play an important role in control of pests in agriculture and public health programs. Pesticide pollution in different places has been well documented (Sivaswamy 1984, Srivastava et al. 1996, Sing et al. 1998, Sankaram 2005).

Rivers running through various land-use activities are exposed to a combination of pollutants from point to non-point sources of various strengths (Samanta et al. 2005). The water bodies are major life supporting systems facing ecological degradation today due to irrational human interference and unsustainable development. The demographic pressure or the anthropogenic disturbances

on our water resources and their ecosystems will irrevocably damage and destroy the rich biodiversity supported by it. Two important rivers Nethravathi and Gurupura, which flow towards west carry the pollution load of the area and finally merge in the Arabian Sea. Thus, the discharge by the nearby polluting industries, chemical factories, oil refineries and iron ore companies along with discharge through point and non-point sources into the rivers finally reach the Arabian Sea. Mangalore coast is also one of the polluted coasts of Karnataka. This study is focused on the physicochemical characteristics of Mangalore coastal waters, which are deviated vastly from the WHO standards.

MATERIALS AND METHODS

Effluent samples were collected from six different randomly selected locations of the study area (S1 to S6) along the Mangalore coastal area three times during 2007, premonsoon, monsoon and post monsoon. The location of the study site is given in Fig. 1. The sampling was done during morning hours. The surface water temperature was measured on the spot and recorded. The effluent samples from the sampling locations were collected in well cleaned polythene bottles. Before collection of the samples, the bottles were washed with freshwater. Finally, the bottles were tightly closed and brought to the laboratory for further analysis. Physicochemical analysis of the collected samples was done by adopting standard methods (APHA 1995). Statistical analysis, various methods and graphs are used to study and interpret the water analysis data.

RESULTS AND DISCUSSION

The results obtained from the analysis of water samples of different sampling locations of Mangalore coastal area are shown in Figs. 2 to 6 and discussed.

Calcium: The concentration of calcium during monsoon was comparatively lower than the other two seasons. It varied between 7.6 and 680 mg/L. According to Ohle (1995) any value above 25 mg/L is an indication of calcium rich water.

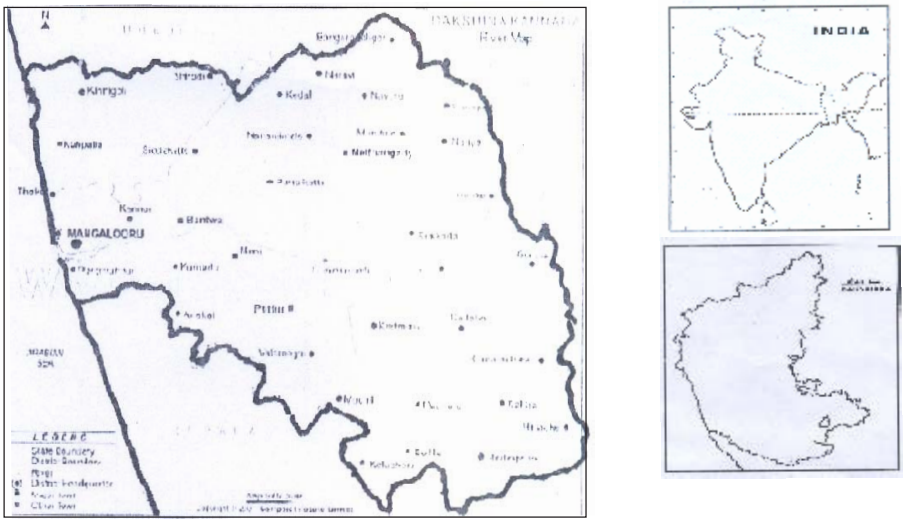

Fig. 1: Location map of the study area.

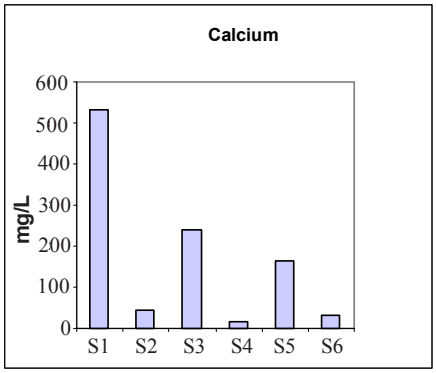

Fig. 2: Mean values of calcium in study sites.

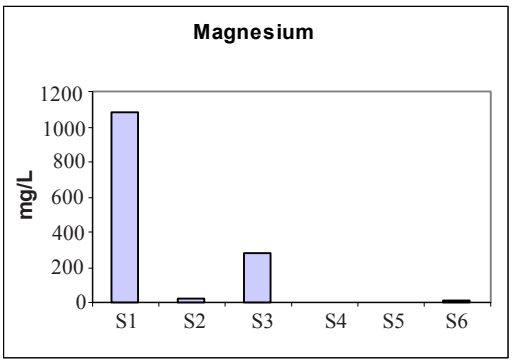

Fig. 3: Mean values of magnesium in study sites.

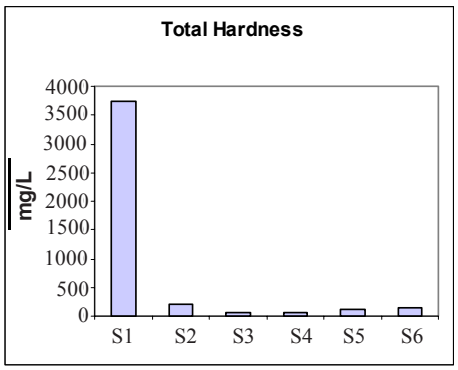

Fig. 4: Mean values of total hardness in study sites.

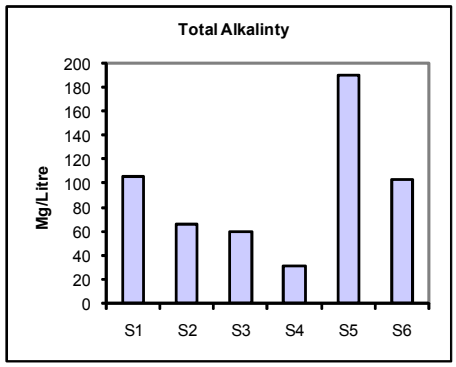

Fig. 5: Mean values of total alkalinity in study sites.

Magnesium: Magnesium is often associated with calcium in all kinds of waters, but its concentration remains generally lower than calcium (Venkatasubramani & Meenambal 2007). Magnesium is essential for chlorophyll growth and acts as a limiting factor for the growth of phytoplankton (Dagaonkar & Saksena 1992). Therefore, depletion of Mg reduces phytoplankton population (Dwivedi et al. 2000). Effluents, rich in heavy metals, also increase the level of these metals.

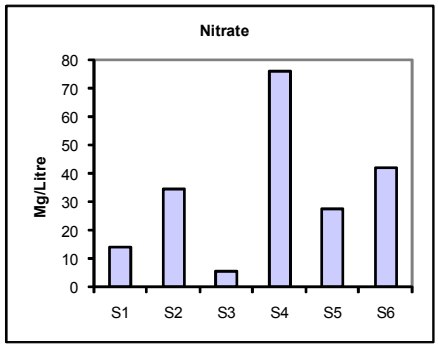

Fig. 6: Mean values of nitrate in study sites.

Total hardness: The Total hardness of the samples under test varied from 4.1 mg/L to 6700 mg/L. High level of hardness increases toxicity of zinc to fish (Lloyd 1960). The sampling station S1 shows high value of hardness in the post monsoon season. Almost among all the sampling stations S3 shows the lowest value. High hardness of aquatic ecosystem points out towards eutrophication (Pandy 2008). Total hardness shows highly significant positive correlation with calcium and magnesium.

Total alkalinity: The total alkalinity in the present samples varied from 7 to 408 g/L. Highest value was recorded during post monsoon. Total alkalinity is less during monsoon season. According to

Nayak et al. (1982) and Ghosh & George (1989) the higher alkalinity indicates pollution. Highest phytoplankton density during post monsoon could be linked to this as natural waters containing 40 mg/L or more total alkalinity are more productive (Manna & Das 2004).

Nitrate: Nitrate value rises with increased source of industrial waste and addition of domestic sewage. Nutrients are considered as one of the most important parameters in the estuarine environment influencing growth, reproduction and metabolic activities of living beings. The distribution of nutrients is mainly based on the season; tidal condition and freshwater flow from land source. The highest value of nitrate (144.04 mg/L) was recorded during premonsoon season. Nitrate value increases with increased source of industrial waste and addition of domestic sewage. The main source of nitrate in a water body is decomposition of organic nitrogenous matter.

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REFERENCES

Alumaa, P.U., Kirso, V., Petersell and E Steinnes 2002. Sorption of toxic heavy metals to soils. Int. J. Hyg. Envir. Hlth., 204: 375-376.

APHA 1995. Standard Methods for the Examination of Water and Wastewaters. 19th Edn. American Public Health Association, Washington D.C.

Dagaonkar, A. and Saksena, D.N. 1992. Physico-chemical and biological charecterisation of a temple tank Kaila Sagar, Gwalior, M.P. J. Hydrobiol., 8: 11-19.

Dwivedi, R.K., Khan, M.A., Singh, H.P., Singh, D.N. and Tyagi, R.K. 2002. Production dynamics and fisheries development in Naktara reservoir, M.P., India. J. Inland. Fish. Soc. India, 32: 81-86.

Ghosh, A. and George, J. P. 1989. Studies on the abiotic factors and zooplankton in polluted urban reservoir Hussain Sagar, Hyderbad. Impact on water quality and embryonic development in fishes. Ind. J. Environ., 31: 49-49.

Lloyd, R. 1960. The toxicity of zinc sulfate to rainbow trout. Ann. Appl. Biol., 48: 84-94.

Manna, S.K. and Das, 2004. Impact of river Moosi in river Krishna. 1. Limnochemistry. Pollut. Res., 23: 117-124.

Mishra, S.R. and Saksena, D.N. 1989. Industrial effluent pollution at Birlanagar, Gwolior. Pollut. Res., 8: 76-86.

Nayak, T.R., Ikyer, S.J. and Jaish, S.C. 1982. Seasonal variation of rotifiers and certain physico-chemical factors of Matyatal Punna, M.P., India. Comp. Phy. Ecol., 7:165-169.

Ohle, B.W. 1995. Bei Ursachen der rasanten seeneutrophierung vern.d. Internat. Ver f. hoer.u.angew. Limno., 12: 375-382.

Pandey, J. 2008. Microbial biomass at land water interface and its role in regulating ecosystem properties of a freshwater dry tropical woodland lake. J. Environ. Biol., 29: 333-337.

Samanta, S., Mitra, K., Chandra, K., Saha, S., Bandopadhya and Ghosh, A. 2005. Heavy metals in water of the rivers Hoogly and Haldi at Haldia and their impact on fish. J. Environ. Biol., 26: 517-523.

Sankaram Kisnam 2005. Organochlorine and organophosphorus pesticides residue in groundwater and surface water of Kanpur, U.P., India. Environ. Int., 31: 113-120.

Saxena, D.N. and Mishra, S.R. 1990. On the planktonic fauna of industrial waste water from Birlanagar, Gwalior. Geobios Report, 9:186-188.

Sivaswamy, Narendra 1984. Occurrence of organochlorine pesticides along the Madras coast. J. Environ. Biol., 10: 179-184.

Srivastava, V.K., Singh, B.B., Vipulkumar and Gupta, R.P. 1996. Organochlorine pesticide residue analysis in the river water and fishes. J. Environ. Res., 6: 163-170.

Singh, B.B., Gupta, R.P. and Srivastava, V.K. 1998. Status of pesticides residue in the fishes and selected rivers of Eastern Uttar Pradesh. J. Environ. Res., 8: 110-119.

Venkatasubramani, R. and Meenambal, T. 2007. Study of the sub surface water quality in Mettupalayam taluk of Coimbatore district, Tamilnadu. Nat. Environ. Pollut. Tech., 6: 307-310.