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A STUDY ON THE WATER POLLUTION OF KAYALPATTINAM AREA, TUTICORIN, TAMILNADU

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ABSTRACT

Industries without a concern for the environment deteriorate the land, water and air in an area. When the industrial activity is located in the coastal zone the harm it causes to the varied components of the environment becomes irreparable. Unless the nature and consequences of pollution are understood properly and preventive measures are adopted the area not only the land but also the adjoining sea would witness the effects of physical, chemical and organic pollutants released from the industry. A case study of pollution of the surface and subsurface water nearer to coast is presented to highlight the need for the remedial measures.

INTRODUCTION

Coast is a geomorphic entity by the interaction of lithosphere, atmosphere with hydrosphere. The environment prevailing in this region is unique in several respects. This environment, considered to be an interface between the geomorphic processes of land and oceans has evoked the interests of scientists of varied fields for over four decades. The dynamic nature of the coast is well exemplified by the development of diversified geomorphic units (Ahmed, 1972) like beaches, intertidal areas, wetlands and inland areas in the proximity of coastal watersheds and areas affected by floods due to cyclones and related phenomenon. Each of the geomorphic feature is characterized by specific environmental conditions supporting distinctive flora and fauna

(Pethick, 1984). They also have a role in supporting the varied activities of human life. Urbanization and industrialization and use of coastal areas for varies industrial activities deteriorate the coastal environment. The present study is carries out to understand and highlight the physical and chemical characteristics of water due to the presence of an industry along a segment of the coast of Tamilnadu.

Study Area

The study area is a part of the eastern coast of Tamilnadu namely Tuticorin. The topography from Kayalpattinam to Punnakayal can be described as a coastal plain. It forms a part of toposheeet no 58L/2. It falls between latitude N 8^0 33′- N 8^o 39′ and longitude E 78^0 4′ –E 78^0 9′. (Fig.1) The area is characterized by sandy beach. Apart from this beach ridges, sandy flats, and creeks are some of the geomorphic features observed in the area (Loveson and Rajamanickam, 1988).

Methodology

Field work has been undertaken to observe the effects of water pollution in terms of the changes in the physical an chemical characteristics of ground and surface water. During fieldwork, it was planned to collect water samples to infer the different physical and chemical parameters, to understand the nature and extent of pollution. About eleven samples have been collected on the basis of physical observation and their locations are shown in fig. No. 1. Parameters like temperature, pH, free carbon-di-oxide, alkalinity, dissolved oxygen and sulphide are recorded immediately after collecting the samples. Dissolved oxygen, is estimated by Winkler's method. The water samples wee analyzed for the parameters such as dissolved oxygen (DO), Salinity, calcium, and magnesium using titrimetric methods. Electrical conductivity (ec) was determined using the conductometric method. Nitrate and phosphate were analyzed by spectrophotometric methods. Flame photometric method was adopted for the estimation of potassium and sodium. The trace elements were estimated under GBC702 atomic absorption spectrophotometry (APHA, 1995; Indian standards, 1983.).

RESULTS

Table 1 shows the results obtained by physical observation and chemical analysis of water samples collected from the study area.

DISCUSSION

It is observed from the pH values that water is slightly alkaline (varying from 3.23 to 8.51) but these values are within the highest desirable limit as prescribed by CPHEEO (1983) standards.

Turbidity is within permissible limits, but exceeds the highest desirable limit prescribed by CPHEEO (1983) standards. The turbidity value varies

TABLE - 1

Sr. No.	Parameters	Stn.1 KM1	Stn.2 SI	Stn.3 AM	Stn.4 KI	Stn.5 KTI	Stn.6 KOS	Stn.7 PL	Stn.8 PL1	Stn.9 PL2	Stn.10 KM2	Stn.11 KM3
1.	Colour	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
2.	Odour	None	None	None	None	None	None	None	None	None	None	None
3.	Turbidity	1.0	1.0	1.0	1.0	1.0	15.0	1.0	1.0	1.0	1.0	1.0
4.	Total dissolved solids	2912.0	5306.0	9086.0	25410.0	5754.0	17780.0	34860.0	36750.0	38780.0	5117.0	1206.0
5.	Electrical Conductivity	4160.0	7580.0	12980.0	36300.0	8220.0	25400.0	49800.0	52500.0	55400.00	7310.0	1723.0
6.	pH	6.9	7.4	7.2	7.5	7.9	3023.0	8.0	8.3	8.1	8.5	7.9
7.	Alkalinity as $CaCo_3$ Total	452.0	340.0	3.04.0	440.0	372.0	80.0	136.0	140.0	140.0	148.0	320.0
8.	Total hardness	860.0	720.0	1720.0	4920.0	1020.0	3200.0	4200.0	4530.0	6850.0	840.0	400.0
9.	Calcium as Ca	208.0	172.0	416.0	1200.0	240.0	768.0	1000.0	1096.0	1652.0	204.0	96.0
10.	Magnesium as Mg	82.0	70.0	163.0	461.0	101.0	307.0	408.0	430.0	653.0	79.0	38.0
11.	Iron as Fe	0	0	0	0	0	10.0	0.0	0.0	0.0	0.0	0.0
12.	Manganese as Mn	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
13.	Nitrate as NO_3	187.0	125.0	208.0	104.0	156.0	8.0	4.0	4.0	4.0	198.0	4.0
14.	Chloride as Cl	900.00	2200.0	3600.0	10400.0	2600.00	7800.0	14600.00	15600.0	19100.0	2200.0	232.0
15.	Fluoride as F	0.4	0.6	0.4	0.6	0.8	0.8	1.2	1.2	1.2	0.4	0.4
16.	Sulphate as SO_4	84.0	251.0	668.0	4175.0	251.0	1253.0	2505.0	2672.0	2839.0	418.0	134.0
17.	Phosphate as PO_4	0.4	0.4	0	0	0.05	0	0	0.0	0.0	0.0	0.05

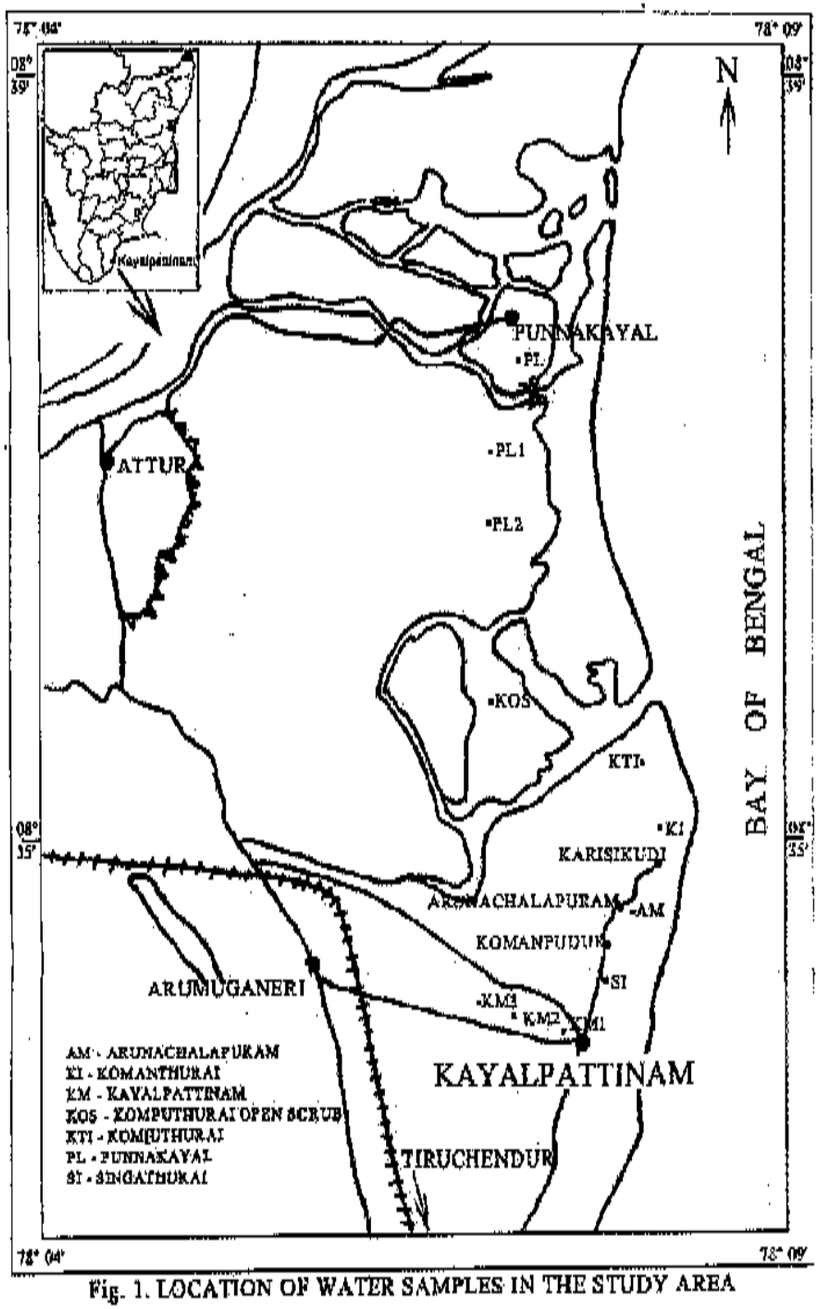

Fig. 1. LOCATION OF WATER SAMPLES IN THE STUDY AREA

FIG. 1 - LOCATION OF WATER SAMPLES IN THE STUDY AREA

from 1 to 15 NTU.

Total Dissolved Solids (TDS) and total solids (TS) are found to exceed the permissible limits. The values range from from 1206 to 38780 mg/L. This is a cause of grace concern.

Total hardness of all water samples are within the permissible limit according to CPHEEO (1983) standards ranging from 400 to 6850 mg/L as $CaCO_3$ equivalent. Water having 75 to 150 mg/L as $CaCO_3$ equivalent hardness is categorized as moderately hard and the results of the present investigation are in the same group.

Magensium content ranges from 38 to 653 mg/L $CaCO_3$ equivalent, which is within the tolerance limit for magnesium given by WHO.

The amount of iron is very ranging from 0 to 10 mg/L. so there is no alarming sensation from iron contamination.

All the samples analyzed are free from sulphate pollution as $SO4^{2-}$ content varies from 84 to 4175 mg/L; which is within the permissible limit according to CPHEEO (1983) standards.

The maximum allowable limit for nitrate is 4 to 208 mg/L according to CPHEEO (1983) standards report, and less than 20 mg/L according to ICMR. All water samples are free from nitrate pollution.

There is no specific permissible limit for phosphates. Natural waters generally contain total phosphorus concentration less than 0.4 mg/L. All water samples (except one pond water) are free from phosphate pollution.

CONCLUSION

On the basis of the field observations and laboratory study it has been concluded that the water both surface and subsurface existing in the area is polluted and the levels of pollution are unacceptable. It is one of the effects of the presence of a chemical industry which makes the coastal environment in the area highly vulnerable. The practice of letting the effluents without any pre treatment affects the soil and water of the study area which can not be rectified.

In most of the water samples the presence of high TDS causes the water to be chemically unportable.

Kayalpattinam being a town situated near the place where the influence of effluents is maximum tends to be the most affected. The population of the town and the adjoining areas in course of time would loose the sources of good quality ground water. The surface water of the area is contaminated which can readily be said on the basis of the colour and smell.

The percolation of this water underground is causing additions of varies non-metallic and non-metallic elements into the groundwater.

The existing practice of using water only for domestic purposes underlines the level of awareness of the people about the pollution, but with the continued pollution it is recommended that the people must be educated not to use the

water for any purpose as it would cause skin diseases.

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Compensation for use of biological resource

A study commissioned by UNEP and the World Intellectual Property organization (WIPO), presented in February 2004 at the Conference of the Parties to the Convention on Biological Diversity in Kuala Lumpur, highlights the complexities of componsating countries, communities and indigensous peoples for knowledge and genetic resources. It also discusses practical issues in regard to ensuring equitable sharing of benefits of access to and use of such resources.

The independent study by Anil K.Gupta, a well-known expert on benefit sharing in relation to genetic resources and traditional knowledge, underlines shortcomings in existing voluntary agreements and suggests how these could be improved to ensure that the custodians of genetic resources and traditional knowledge receieve a share of any benefits derived from their commercial use.

The examples cited include a medication derived from an Indian plant with apparent fatigue-relieving properties being sought from plants and animals, particularly in the genetically rich developing world. A key issue at the Kualalumpur meeting was the need to develop an intenational "access and benefit sharing" systsem to promote breakthroughs from plant and animasl sources, while recognizing the rights of those who cultivate and preserve the resources an/or understand their uses.

In Germany annual retail sales of over the counter herbal drugs are estiamted at US$ 3.5 billion. An article in the UK's *New Scientist* magazine in January, on a study to be published by WWF says 4000 to 10,000 plant species may be at risk world wide because demand for herbal remedies threatens natural habitats and wild medicinal plants are being harvested to extinction. Establishing rules by which companies and local communitiies share in the profits and the non monetary benefits of harvesting such resources should generate incentives to conserve biodiversity and reduce the threat of overexploitation.

Intellectual property has been a controversial but important tool in establishing benefit-sharing regimes. Use of traditional knowledge to be protected through intellectual property measures that respect the collective interests and cultural values of traditional communities.

The recently adopted Bonn Guidelines on access and benefit sharing outline roles and responbilities both for those doing 'bio-prospecting" and for those with the knowledge and genetic resources. A key issue at Kualalumpour was whether such voluntary guidelines are adequate.

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