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Characterization Of Physico Chemical Parameters In Water Samples Of River Bhavani

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ABSTRACT

Three stations were selected to a stretch of 65 km along the North bank of River Bhavani. The samples were collected tri-monthly between 9am -11am during the first week of July and October 2013 and January and April 2014. The analysis indicated that the water samples were found to process high BOD, COD, TDS and pH as well as lesser oxygen and EC. This induces that the quality of water in river at the study area was greatly affected due to the discharge of pollutants. Therefore a continuous monitoring and surveillance are at most important to protect the river water from degradation.

Key Words: Physicochemical Parameters, Water Samples, Sampling Stations, River Bhavani.

INTRODUCTION

Industrialization, urbanization and exploitation of natural resources are major causes for pollution in cities and towns. In India, the industrial development has resulted in the establishment of several industries. As a result, the water gets contaminated with harmful pollutants and become unsuitable for all the legitimate uses including agricultural purpose.

According to Rastogi and Jayaraj (1987), billions of gallons of waste waters from cities, house settlements, Industries and agricultural fields are thrown into water courses to such an extent that 70% of stream and river of india contain polluted water.

Almost all industries produce some kind of organic and inorganic chemical waste. When there are discharged into water bodies along with municipal sewers result in aquatic degradation. These pollutants are mainly toxic chemicals which cause a chain of undesirable effects on water quality and aquatic organisms. The quality of an aquatic ecosystem is mainly dependent on the physical and chemical nature of water and also on biological diversity. Therefore there is a need for the evaluation of water quality with respect to various water quality parameters in water bodies.

River Bhavani is one of the important tributaries of Cauvery river originating from Western Ghats, Nilgiris district to a stretch of 217 km. on its way, it is found to receive pollutants from tanneries, textile industries, sugar mills, dyeing units, bleaching factories and paper mills as well as municipal sewage. A number of workers have made studies pertaining to the water quality in Indian rivers (Vinothini and Narayanan 2008; Govindaraj *et al* 2009; Prasath and Daniel 2010; Rathore 2014). Recently singare and Dhabarde (2014) has pointed out that majority of waterbodies are contaminates due to the aquatic pollution.

Therefore The Present Investigation Has Been Carried Out To Study The Physico Chemical Nature Of The River Bhavani.

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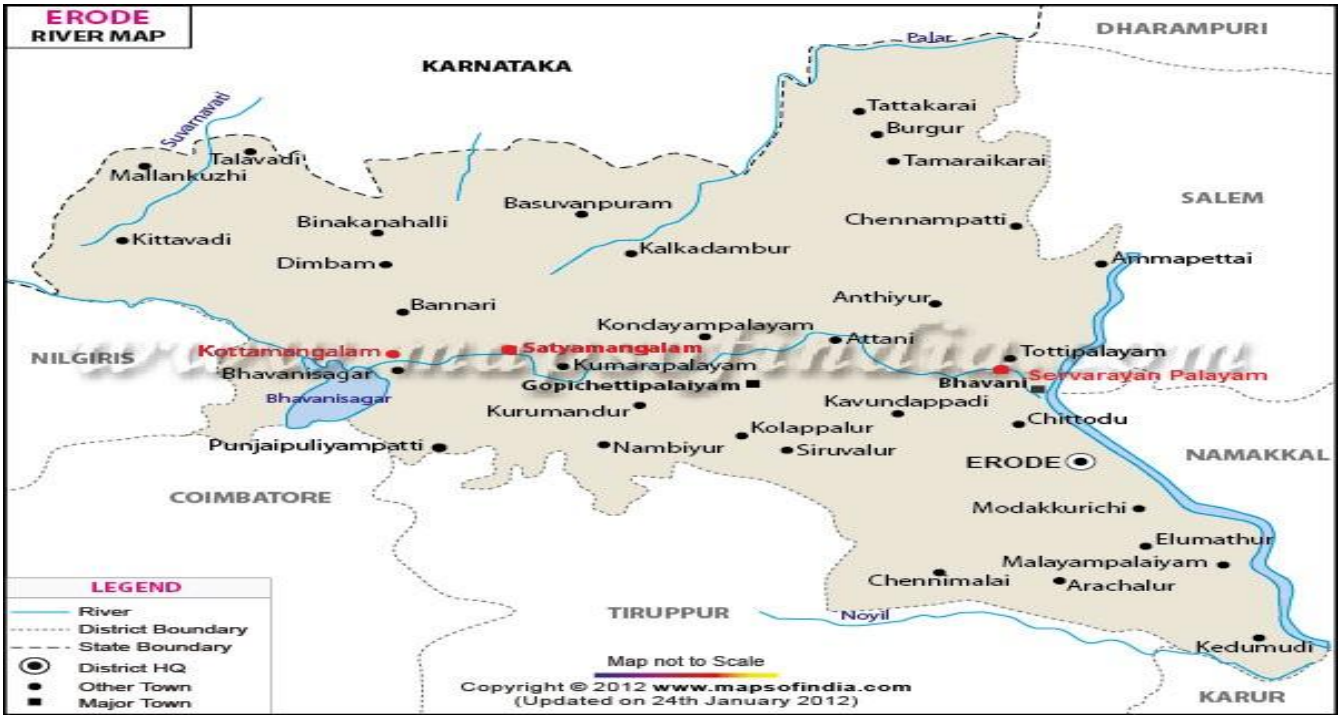
Figure-1. Study area and collection stations in River Bhavani



MATERIALS AND METHODS

Study Area

In the Bhavani river, three stations namely kottamangalam, Sathyamangalam and Servarayan palayam were selected about to a stretch of 65 km from Bhavani shagar dam (Fig 1) along the north bank of the river.

Station I – It was the upstream point at kottamangalam 20km away from Bhavani shagar dam. It receives the effluents from paper mill.

Station II – It was the downstream point at Sathyamangalam 20km away from Kothamangalam. It receives municipal wastes from the town.

Station III – It was the downstream point 25km away from station II.It receives effluent from the dyeing factories located at the different areas.

In each station of the study area, the water samples were collected trimonthly between 9am – 11 am during the first week of July and October, 2013 and January and April, 2014. The samples were collected in plastic canes of 2 liters capacity after through with the sample water. In each station the surface water was collected at a short distance (3 meters) from the bank of the river, brought to the laboratory and presented at 4^{o}C.

Various physicochemical characteristic of the water sample were determined by the stand and methods given by APHA (1998) in the laboratory except the heavy metals which were determined at SITRA laboratory, Coimbatore, Tamilnadu, India.

RESULTS AND DISSCUSION

The data for the analysis of physicochemical characteristics of water samples collected at various stations during different periods are presented in Table1 In general the water samples analysed in the present work are characterized by having high BOD, COD, TDS and pH with lesser oxygen content and EC. The colour variations noticed in the samples would be due to the discharge of coloured effluents increasing the BOD and COD of receiving water. The colour persist the long distances in flowing waters, restrict photosynthesis and inhabit the aquatic biota.

The water with higher temperature could hold less oxygen increase biodegradation and promote growth of blue green algae. The increased water temperature might elevate the metabolic rate and physiological demand for oxygen (Francis–Floud, 2003) and reduce the solubility of oxygen and amplify the odour due to an aerobic reaction (Akan et al 2008)

The alkaline side of pH in the water samples would cause pronounced effect on the toxicity of chemicals which would exert more toxicity on organisms. In the present study, the water sample process higher concentration of TSS which exceed the limits given by WHO (2008). It is established that a higher amount of salts in water bodies might interfere with the respiration of fishes (Klein 1972). The water samples are found to contain lesser oxygen content and this could be due to high organic load which is more vigorous in warm waters. In addition an increased water temperature

would result in increased water temperature would result in increased DO.

The water samples from various stations in the present work are found to possess higher values of BOD and COD which are positively correlated with pH and temperature. This implies the presence of larger Concentrations of non – biodegradable chemicals which could accelerate the bacterial growth and reduce the bacterial growth and reduce the oxygen level in the river water. A change in salinity in the water courses could cause alterations in the electro conductivity, pH, and density and relative proposition of ions affecting the solubility of oxygen in combinations with the water temperature.

As far as the heavy metal concerned a higher quantity of zinc, cadmium and lead in the water samples from the station - II and III than from the station – I. The industrial effluents and sewage are major water pollutant containing one or more chemical toxicants especially heavy metals. They enter the food chain of aquatic ecosystem through bioaccumulation and biomagnifications, affect the metabolic activities and altered the physiological state of organisms.

From the present study it is evident that the quality of water in River Bhavani at the study area is greatly affected due to the discharge of pollutants. In such places more than one toxic chemicals may be present causing considerable negative effects in the water quality and organisms especially in fishes. Therefore sustainable habitat conservation could require similar studies like these of present work to identify core areas and regulate the discharge of pollutants in to the river water. This means a continuous monitoring and surveillance are of at most important to protect the river water from further degradation.

CONCLUSION

River Bhavani is important tributaries of Cauvery River. It is evident that the quality of water is affected due to the discharge of pollutants. Therefore the present investigation reveals, there should be continuous monitoring and surveillance are necessary to protect the river water from further degradation.

Conflict of Interests

Authors declare that there is no conflict of interests regarding the publication of this paper

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Table-1. Physiochemical characteristics of water samples collected at different stations during various months

Characteristics	STATIONS											
	I				II				III			
Various months	July 2013	Oct 2013	Jan 2014	April 2014	July 2013	Oct 2013	Jan 2014	April 2014	July 2013	Oct 2013	Jan 2014	April 2014
Colour	Brownish	Colourless	Colourless	Colourless	Brownish	Brownish	Colourless	Colourless	Brownish	Brownish	Dark brownish	Dark brownish
Temperature °C	26.0	23.0	24.2	26.2	28.0	26.0	27.0	28.5	27.0	25.0	28.0	29.0
pH	7.6	7.4	7.4	7.3	7.9	7.5	7.5	7.9	7.8	7.2	7.6	8.0
EC(mmhos)	310	190	200	320	920	900	910	990	1300	1100	1200	1400
TSS	2360	1900	2000	2375	2050	2000	2045	2100	2370	2100	2280	2380
TDS	1310	1240	1240	1500	1240	1160	1230	1540	1650	1100	1310	1650
Total hardness	33.1	28.5	28.2	36.7	65.3	32.4	32.2	56.7	56.5	22.1	26.2	62.5
DO	0.7	0.5	0.4	0.6	0.9	1.5	1.6	1.2	1.4	1.5	1.1	1.0
BOD	1.6	1.0	1.5	1.6	3.2	1.8	1.7	4.0	3.4	1.6	1.7	4.9
COD	23.0	17.5	25.2	5.4	90	80	90	100	95	78	98	110
Zinc	0.280	0.246	0.225	0.21	2.180	1.921	1.892	2.423	0.433	0.621	0.561	0.321
Cadmium	1.38	1.21	1.16	1.41	0.731	o.692	0.692	0.891	0.920	0.886	0.843	0.923
Lead	0.114	0.128	0.136	0.14	0.541	0.52	0.484	0.642	1.154	1.132	1.142	1.186

All parameters are express as mg/l except colour and pH

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