Effects of non-point source pollution in Ground Water near Bathi Lake.

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Abstract - Ground water contamination is nearly always results of human activity. In areas where population density is high and human use of the land is intensive, ground water is especially vulnerable. Virtually any activity whereby chemicals or wastes may be released to the environment, either intentionally or accidentally, has the potential to pollute ground water. When ground water become contaminated, it is difficult and expensive to clean up. In the present study an attempt has been made to study the various physic-chemical parameters of Ground water in and around Bathi Lake which provides a basis for managing ground water effectively and preventing it from possible pollution by domestic waste water and agricultural runoff.

In the present study, the bore well samples are collected from 5 different bore wells situated in and around Bathi Lake, at a distance of 200 to 250m from the lake periphery. The water quality is analysed as per APHA standards and water quality is assessed for its suitability for drinking and irrigation purpose and further soil will be tested for NPK Values.

Key Words: Ground Water Quality, Non-point Source pollution, Salinity Hazards, Bathi Lake

1. INTRODUCTION

Water is very essential and precious natural resource for sustaining life on this planet. Owing to the increase in population and indiscriminate utilization, this vital resource is now under tremendous pressure.

Ground water due to percolation of domestic and industrial wastewater and run-off from agricultural land is getting polluted continuous human activities are posing threat to the ecology to Ground water around Bathi lake and it causes health problems, decrease agricultural yields and profits, destroy fertile agricultural lands, jeopardizes livelihoods, increase costs of infrastructure maintenance and industrial processes and changes or even destroys eco systems. Hence the present study is carried out to assess the status of Ground water quality due to various non-point source pollution.

Physico-chemical parameters like pH, Electrical conductivity Acidity, alkalinity, chlorides, Total hardness, are studied during 2015 to 2016.

1.1 Study area

Bathi Lake is situated between 14°28'27" North latitude and 75°52'12"East Longitude .This tanks is located about 6 kms from Davanagere city, Karnataka. It falls under the Haridra watershed of Tungabhadra catchment of Krishna river basin.

1.2 Sampling:

The choice of sampling stations was influenced by the various uses of the water and their location, relative magnitude and importance. Water quality analysis is carried out 5 different bore well stations for physico-chemical analysis during the year 2015-2016.The sampling procedure is done as per APHA Standards. Bi-Monthly sampling is done for this study. The below figure represents the sampling points of Bathi lake at an average interval of 200-250 meters from lake periphery and further soil samples are also collected at different stations around the lake periphery at a distance 150-300 meters and tested for parameters like pH, EC, Nitrogen, phosphorous, potassium.

Fig-1: Ground water Sampling Locations of Bathi Lake

Fig-2: Soil sampling locations of Bathi Lake

2. Materials and Methodology

In this study Ground water samples are collected at 5 different locations as shown in the above figure. Sampling points are selected at an average interval of 200 to 250 meters distance from the lake. 9 Physico – chemical parameters were analysed by standard methods suggested in APHA. Analysis is done in the laboratory. Soil sample are collected at 4 different location as shown in the above figure and at an average distance of 150 to 300 meters. The following table represents the parameters analysed and the method employed for analysis. Soil around the lake periphery is also tested for the parameters like pH, EC, Nitrates, sodium, potassium, phosphorous and Sodium Absorption Ratio.

Table: 1 Parameters and methods employed in the physico chemical analysis of water samples

Sl no	Parameter	Methods
1	pH	Digital pH meter
2	EC	Digital Conductivity meter
3	Alkalinity	Titrimetric method
4	Chlorides	Gravimetric method
5	Total Hardness	Titrimetric method
6	Sodium	Flame photometry method
7	Potassium	Flame photometry method
8	Magnesium	Titrimetric method

3. RESULTS AND DISCUSSIONS

The physico chemical parameters of Ground water near Bathi Lake are as follows. In the subsequent step the results of the samples are presented below and discussed.

3.1 Ground water Quality Results near Bathi lake periphery.
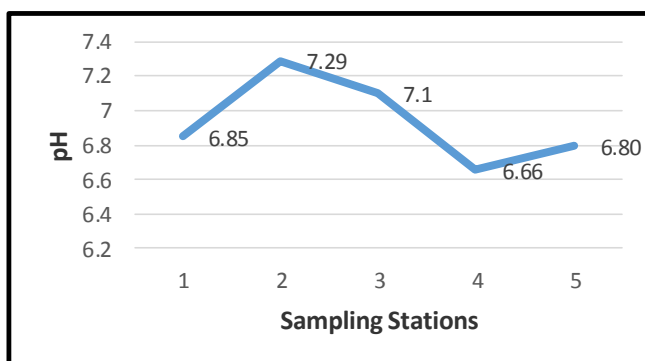
Chart -1: Average values of pH at Bathi Lake

The maximum value is found at station no.2 is 7.29 mg\l and minimum value is found at station no.4 is 6.66 mg\l.
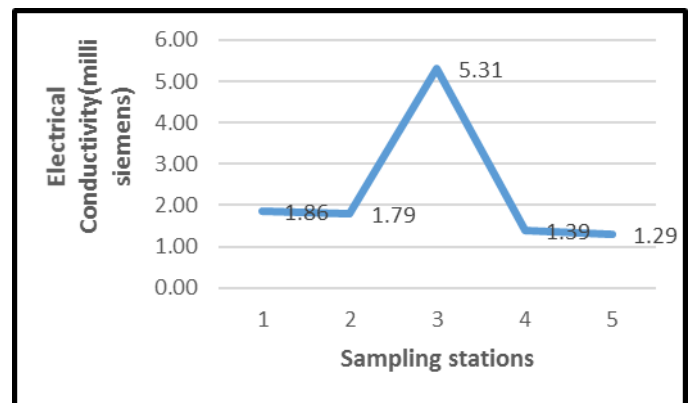
Chart -2: Average values of Electrical Conductivity at Bathi Lake

The maximum value is found at station no. 3 is 5.31 milli siemens and minimum value is found at station no.5 is 1.29 milli siemens.
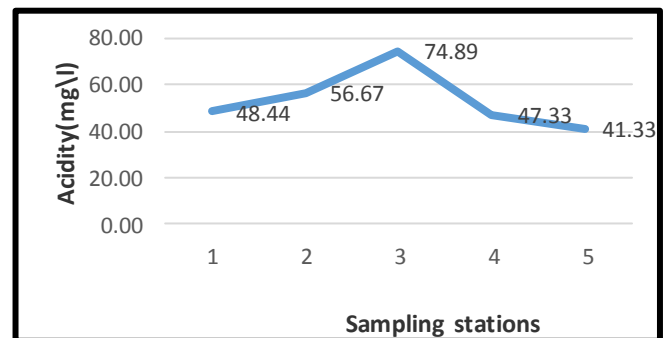

Chart -3: Average values of Acidity at Bathi Lake

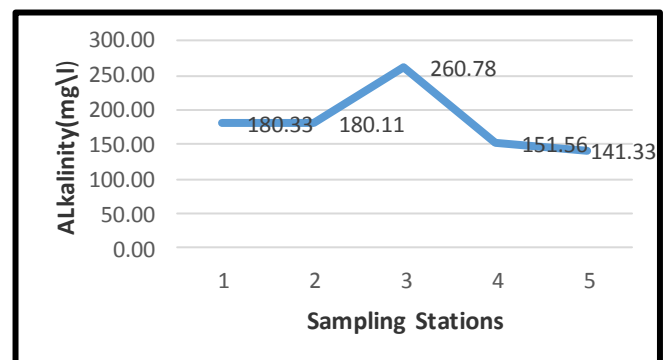The maximum value is found at station no.3 is 74.89 mg\l and minimum value is found at station no.5 41.33 mg\l.

Chart -4: Average values of Total Alkalinity at Bathi Lake

The maximum value is found at station no.3 is 260.78 mg/l and minimum value is found at station no.5 is 141.33 mg\l.
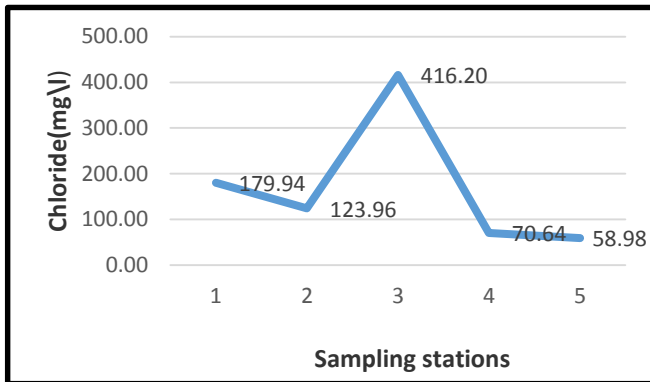
Chart -5: Average values of Chloride at Bathi Lake

The maximum value is found at station no.3 is 416.20 mg/l and minimum value is found at station no.5 is 58.98 mg/l.
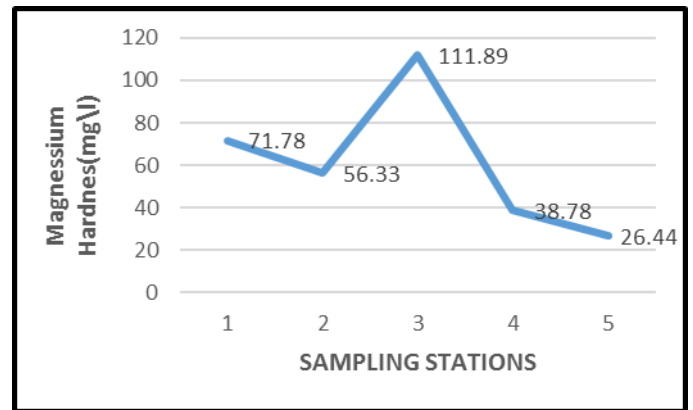

Chart -6: Average values of Total Hardness at Bathi Lake

The maximum value is found at station no.3 is 164.56 mg\l and minimum value is found at station no.5 is 80.11 mg\l.

Chart -7: Average values of Calcium Hardness at Bathi Lake

The maximum value is found at station no.2 is 75.44 mg/l and minimum value is found at station no.5 is 53.67mg\l.

Chart -8: Average values of Magnesium Hardness at Bathi Lake

The maximum value is found at station no.3 is 111.89 mg\l and minimum value is found at station no.5 is 26.44 mg\l.
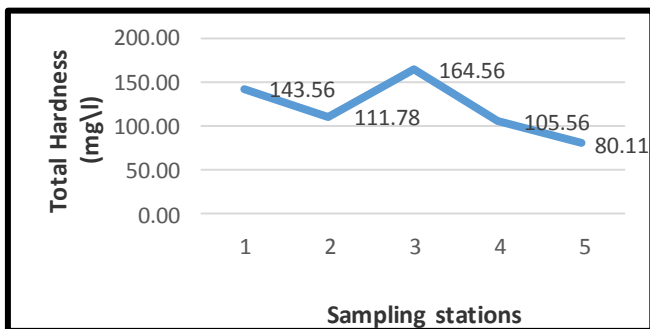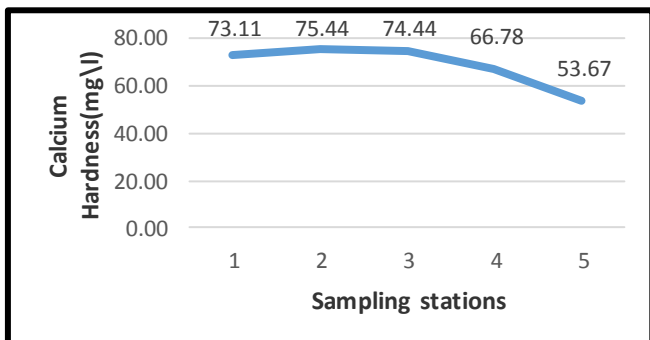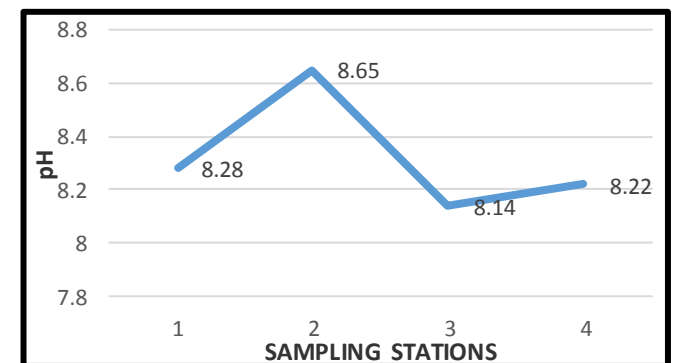
3.2 Soil Sample Results near Bathi Lake are presented below and discussed.

Chart -9: Average values of pH at Bathi Lake

The maximum value is found at station no.2 is 8.65 and minimum value is found at station no3 is 8.14
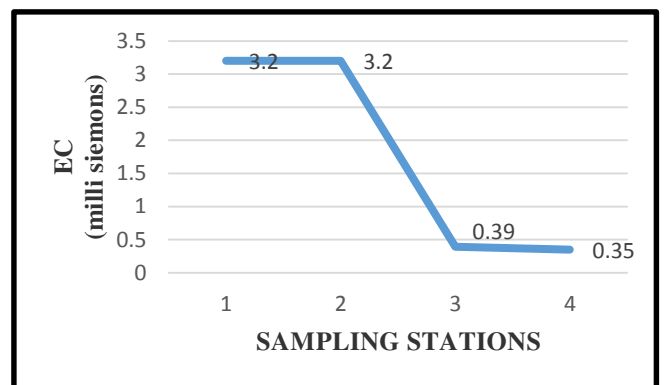

Chart -10: Average values of Electrical Conductivity at Bathi Lake

The maximum value is found at station no.1 and 2 is 3.2 milli siemens and minimum value is found at station no.4 is 0.35 milli siemens.
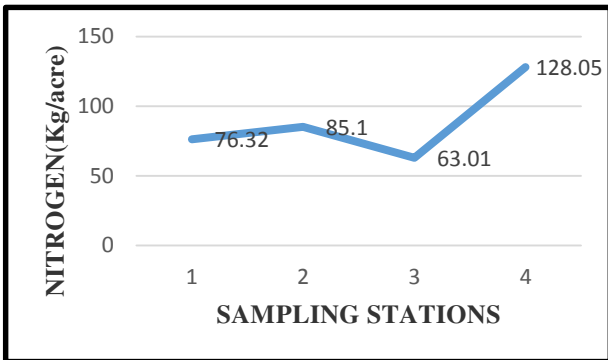

Chart -11: Average values of Nitrogen at Bathi Lake

The maximum value is found at station no.5 is 128.05 kg\acre and minimum value is found at station no.3 is 63.01 kg\acre.
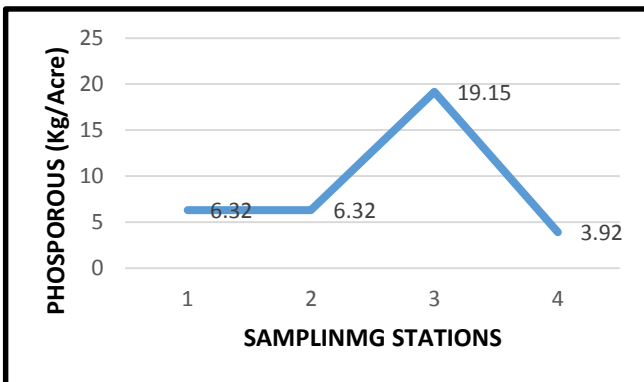

Chart -12: Average values of phosporous at Bathi Lake

The maximum value is found at station no.3 is 19.15 kg\acre and minimum value is found at station no.4 is 3.92 kg/acre
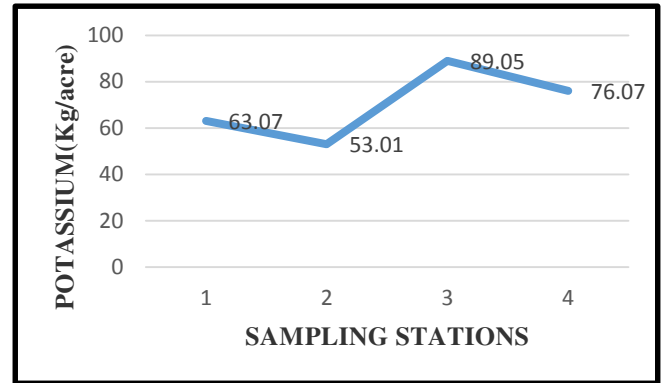

Chart -13: Average values of potassium at Bathi Lake

The maximum value is found at station no.3 is 89.05 kg\acre and minimum value is found at station no.2 is 53.01 kg\acre.
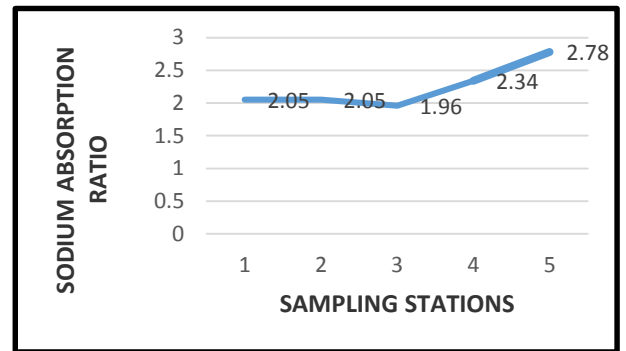

Chart -14: Average values of Sodium Absorption Ratio at Bathi Lake

The maximum value is found at station no.1 and 2 is 2.78 and minimum value is found at station no.3 is 1.96.

4. CONCLUSIONS

In the present study, the physico-chemical characteristics of the different Ground water samples varied considerably during the study period. The results reveal that among the variables studied pH, Chlorides, Total Hardness, Alkalinity, acidity are the parameters that bring variation in Ground water quality especially at sampling station no.3, this could be due to the increased anthropogenic activities being carried out by the people, agricultural run-off, disposal of Industrial effluent which will leach the pollutants into the lake as well as to ground water.

The results of soil samples reveal that among the variables studied pH, EC at sampling station 2 has more variations similarly for sample 3 phosphorous, potassium are the parameters that bring variation in Soil quality which may be due to the leaching property of soil which is mostly composed of Black cotton at sampling station no.3 and sampling station no.2. Consumption of contaminated water causes a variety of health problems to human health as well as to the aquatic life.

Water quality of ground water especially at sample No.3 is contaminated as the values of alkalinity, pH, Chlorides has shown higher values in comparison with IS:10500-1991 drinking water quality standards. According the results the water at sample No.3 is polluted and unfit for drinking purposes, also the SAR Values are found to be high in the range of 2.78 at sampling station 5 which will also pose impact to irrigation potential of groundwater. It can be concluded that out of all the sampling stations, station No.3 is more contaminated which may be due to the non point source pollution occurring near this station.

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