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

Pradeep A V[1], Anup G .A[2], Mohammed Yaseen[3] , Aravinda H.B[4]

[1]*Research Scholar Dept. of Civil Engineering, GMIT, Davangere*
[2] *Research Scholar Dept. of Civil Engineering, GMIT, Davangere*
[3]Assistant Professor, Dept. of Civil Engineering, GMIT, Davangere, Karnataka, INDIA
[4] Professor & Head, Dept. of Civil Engineering, BIET, Davanagere, Karnataka, INDIA

Abstract - *The alarming rate of deterioration of water quality of fresh water resources is now a global problem. Fresh water ecosystems are considered as one of the most important natural resources for the survivability of all the living organisms of the biosphere. The decreasing fresh water availability is causing scarcity of water among surface sources which compels people to use and exploit ground water .Ground water exploitation is not only in India but also all over the world. Excessive use of ground water throughout the world has impacted the quality and quantity of water. Apart from the surface water sources ground water is also contaminated by various sources like point and non-point sources. In the present study an attempt has been made to study the various physico-chemical parameters of Ground water near Avaragere Lake which provides a basis for managing ground water effectively and preventing it from possible pollution by domestic waste water and agricultural runoff.*

***Key Words*: Ground Water Quality, Non-point Source pollution, Salinity Hazards, Avaragere 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. In many of the urban areas the water quality of lakes is being deteriorated due to anthropogenic activities and other biological activities. So the use of Ground water is more. Anthropogenic stresses, particularly the untreated waste water discharge and release of chemicals and agriculture run-off entering into water bodies and to the land may adversely effect the ground water.

The excess of salts content is one of the major concerns with water used for irrigation. A high salt concentration present in the water and soil will negatively affect the crop yields, degrade the land and pollute groundwater. Hence the Salinity content in water and soil is tested.

Urbanization and industrial development in the Davanagere City during the last decade have provoked some serious concern for the environment, as the city is selected as Smart city development by Govt.of India. Anthropogenic activities like intensive agriculture around the Avaragere Lake, animal washing and vehicle washing non-point source pollution sources like untreated domestic waste water, agriculture run-off are the important sources of pollution. Hence the present study is carried out carried out to assess the status of Ground water quality. Physico chemical parameters like pH, acidity, alkalinity, chlorides, and total hardness are studied during 2015 to 2016.

1.1 Study area

Avaragere Lake is situated between $14^0$43'88" North latitude and $75^0$95'33" East Longitude. This lake is located about 8 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 station was influenced by the various uses of the water and their location, relative magnitude and importance. Water quality analysis is carried out 5 different 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 Avaragere lake.

Fig-1: Ground Water sampling points of Avaragere Lake

Fig-2: Soil Sampling Location of Avaragere Lake

2. Materials and Methodology

In this study Ground water samples are collected at 5 different locations as shown in the above figure-1 Sampling points are selected at an average interval of 200 to 250 meters distance from the lake. Periphery. Eight 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-2 and at an average distance of 150 to 300 meters from the lake periphery. The following table represents the parameters analysed and the method employed for analysis.

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 5 different ground water samples near Avaragere Lake are plotted below and discussed.

3.1Ground water Quality Results near Avaragere lake periphery.

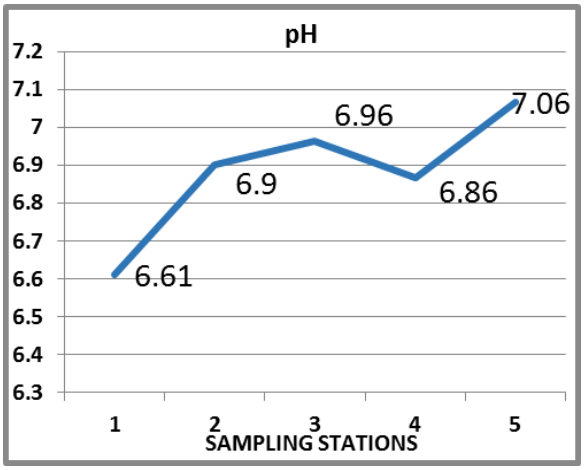

Chart -1: Average value of pH

The maximum value is 7.06 and minimum value is 6.61

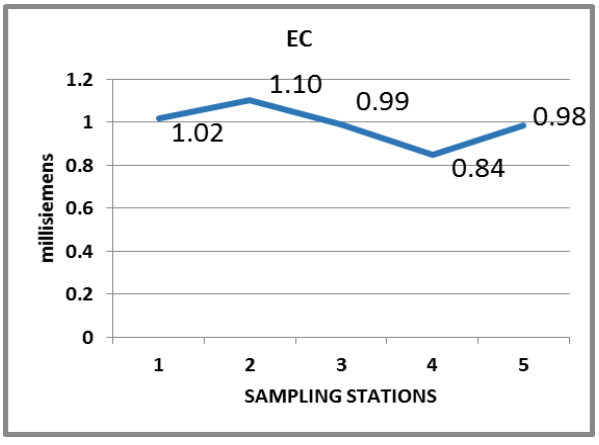

Chart -2: Average value of Electrical Conductivity

The maximum value is 1.10 and minimum value is 0.84

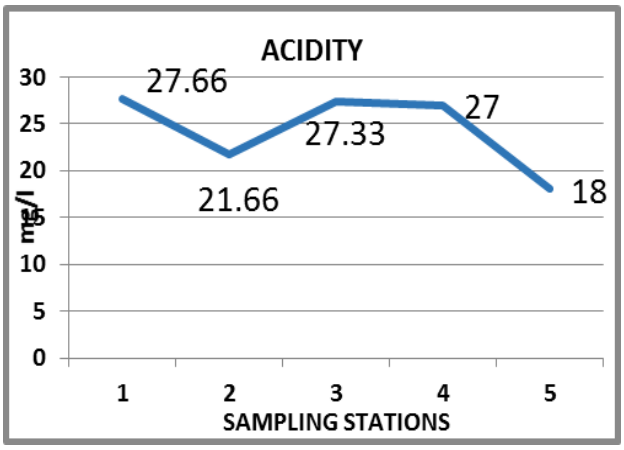

Chart -3: Average value of Acidity

The maximum value is 27.66 and minimum value is 18

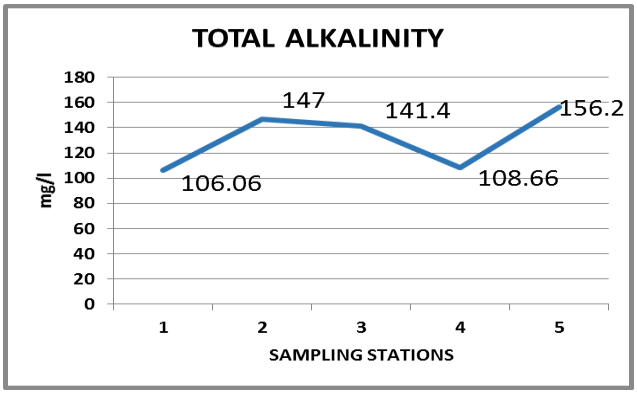

Chart -4: Average value of Total Alkalinity

The maximum value is 156.2 and minimum value is 106.06

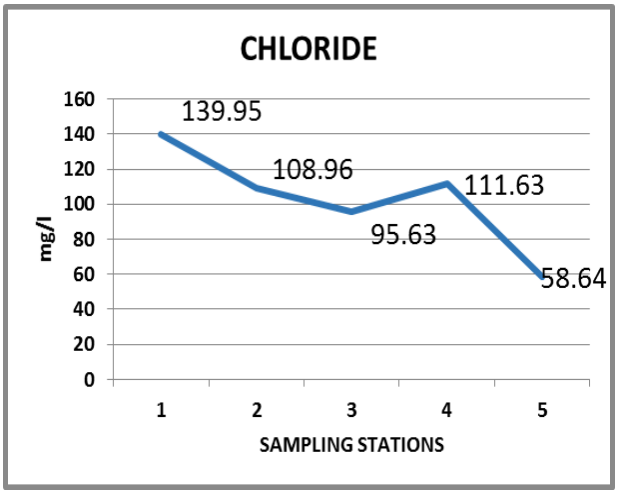

Chart -5: Average value of Chloride

The maximum value is 139.95 and minimum value is 58.64

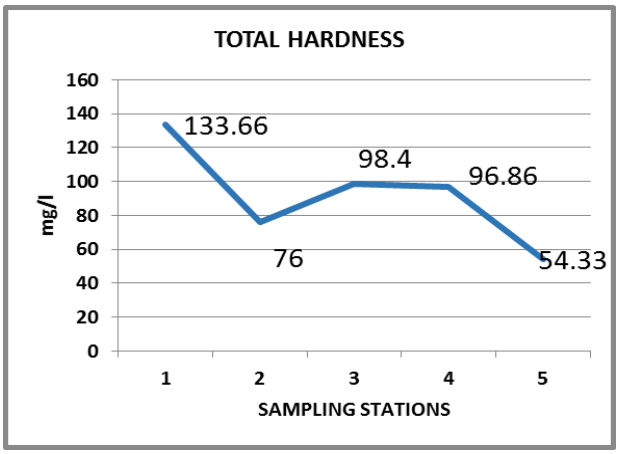

Chart -6: Average value of Total Hardness

The maximum value is 133.66 and minimum value is 54.33

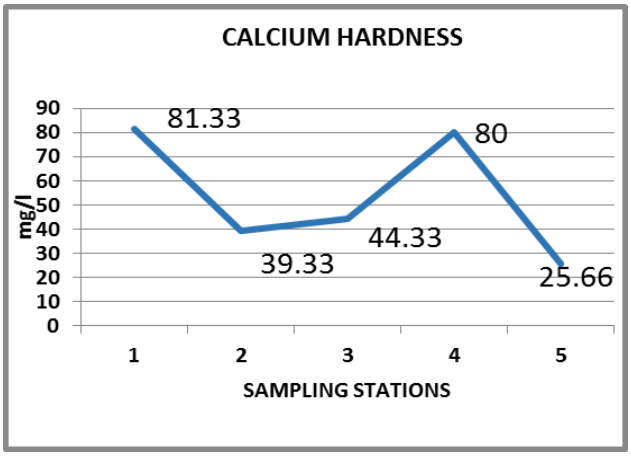

Chart -7: Average value of Calcium Hardness

The maximum value is 81.33 and minimum value is 25.66

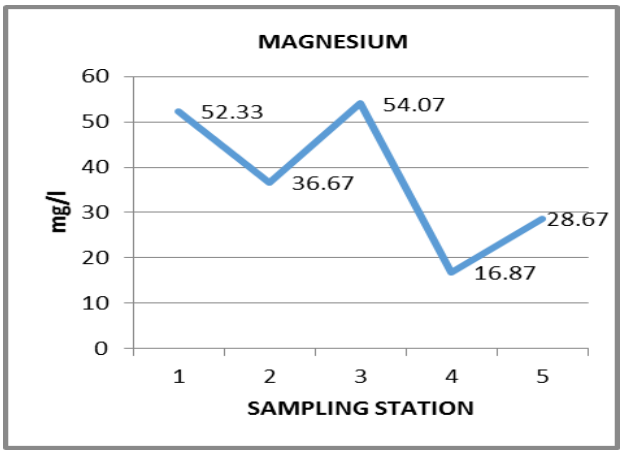

Chart -8: Average value of Magnesium Hardness

The maximum value is 54.07 and minimum value is 16.87

3.2 Soil Sample Results near Avaragere Lake.

In the subsequent step the soil is also analysed for the parameters pH, EC, Nitrogen, Potassium and phosphorous graphs are plotted and discussed to understand the process of non-point source pollution of ground water samples near Avaragere Lake.

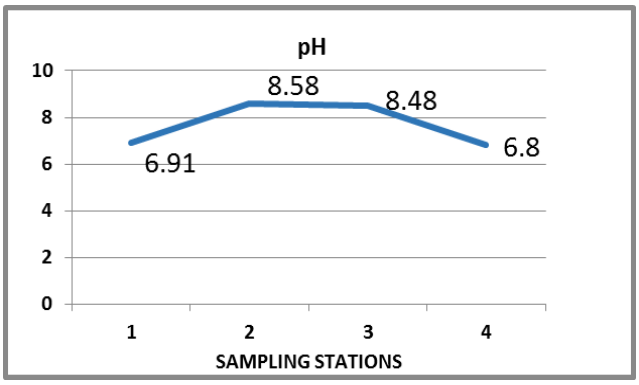

Chart -9: Average value of pH

The maximum value is 8.58 and minimum value is 6.8

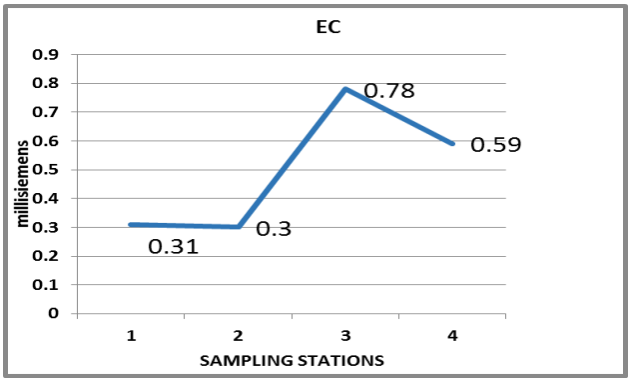

Chart -10: Average value of Electrical Conductivity

The maximum value is 0.78 and minimum value is 0.3

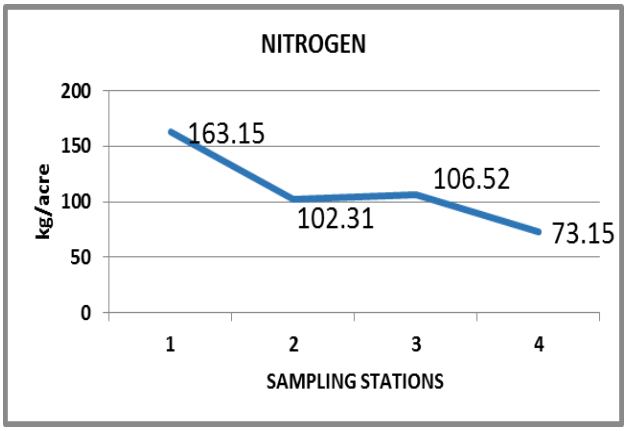

Chart -11: Average value of Nitrogen

The maximum value is 163.15 and minimum value is 73.15

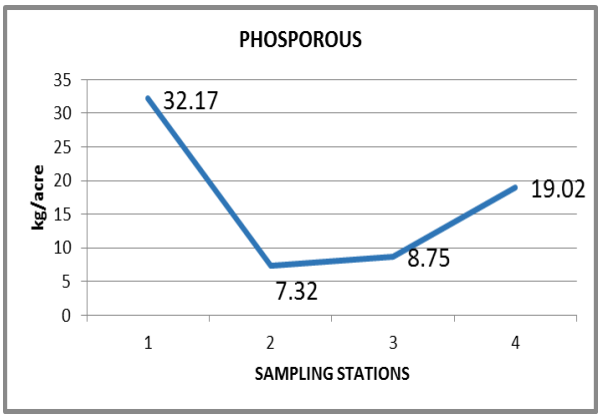

Chart -12: Average value of phosphorous

The maximum value is 32.17 and minimum value is 7.32

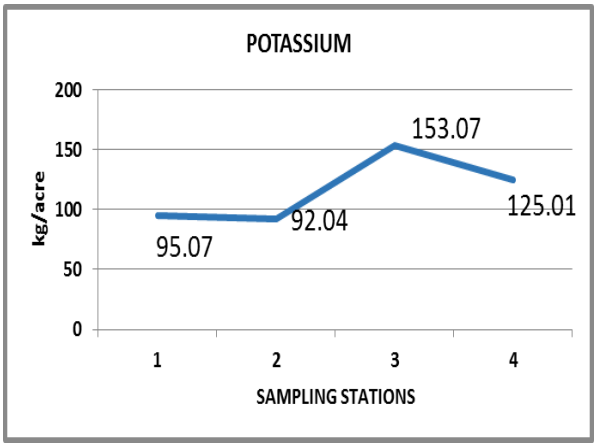

Chart -13: Average value of Potassium

The maximum value is 153.07 and minimum value is 92.04

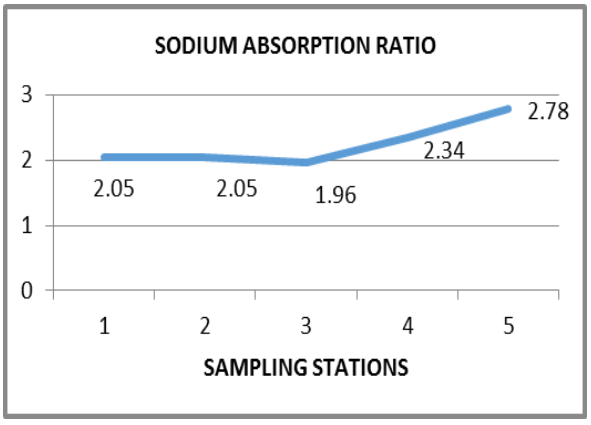

Chart -14: Average value of SAR Result

The maximum value is 2.78 and minimum value is 1.96

4. CONCLUSIONS

In the present study, the physico-chemical characteristics of ground water of different sites are analysed during the study period. The variables studied pH, alkalinity, chlorides, total hardness does show more variations in the ground water quality at all the 5 sampling stations, but most of them are well within the limits of drinking water quality standards as per IS:10500-1991

The results of soil samples and salinity content also lies within the desirable limits. But the tested values obtained shows that it is near to desirable limits. So the ground water around the avaragere lake periphery is not contaminated. If the same process of animal washing, agricultural runoff, and sewage runoff is continued at the same rate, then there is a possibility of contamination in the near future.

By taking further precautions, like over exploitation of ground water for irrigation, excessive application of fertilizers and pesticides to lands in and around the lake periphery. We can maintain or reduce the contamination of ground water and also the lake water in the near future.

Efforts should be taken to recharge ground water by excavating the soil up to 3m around the bore well & appropriate filter media should be used in the pit so that during rainy season the ground water is recharged to which the ground water quality as well as quantity will be improved.

ACKNOWLEDGEMENT

We are thankfull to the Dept. of Civil Engineering, GMIT, Davangere, we are also highly thankful to the Dept. of Civil Engineering, BIET, Davangere, we also extend our thanks to ICAR-KRISHI VIGYAN Kendra Davanagere.

REFERENCES

[1]. Wilma subra and Jeff waters, "Non-Point Source Pollution", Subra Company, Inc. P 0. Box 9813 New Iberia, LA 70562, Phone: (3 18) 367-22 16, Fax: (318) 367-2217 Lake Pontchartrain Basin Foundation, P. 0. Box 6965, Phone: (504) 836-22 15, Metairie, LA 70009-6965.

[2]. Shoemaker et al (1990), "Pesticide movement in groundwater",

[3]. Qiang-kun Li, Juan Sun and Ya-wei Hu (2001), "Preliminary Establishment of Agricultural Non-Point Source Pollution Model", Yellows River Institute of Hydraulic Research, YRCC Zhengzhou, China.

[4]. A. A. Mamun and M. N. Salleh, "Challenges in non-point source pollution-sampling and testing", Bioenvironmental Engineering Research Centre (BERC), Department of Biotechnology Engineering, Kulliyyah of Engineering, International Islamic University Malaysia (IIUM), Jalan Gombak, 53100 Kuala Lumpur, Malaysia.

[5]. RAMACHANDRA.T.V AND SHWETAMALA, "Groundwater quality impairment due to mismanagement of biodegradable waste", Energy & Wetlands Research Group, Centre for Ecological Sciences, Centre for Sustainable Technologies (Astra) and Centre for infrastructure, Sustainable Transportation and Urban Planning [Cist UP] Indian Institute of Science, Bangalore, Karnataka, 560 012.

[6]. Qiang-kun Li, Juan Sun and Ya-wei Hu (2001), "Preliminary Establishment of Agricultural Non-Point Source Pollution Model", Yellows River Institute of Hydraulic Research, YRCC Zhengzhou, China.

[7].Bilin Lu1, 2, Wenli Ling1, Xiaohai Tian3*, Song Liu4, Xiufang Gao2, "The Evolutionary Trend of Water Environments in the Sihu Lake Drainage Basin", 1 Faculty of Earth Sciences China University of Geosciences Wuhan, China 2 Department of geochemistry Yangtze University Jingzhou, China 3 Faculty of Agronomy Yangtze University Jingzhou, China

[8].The Karnataka Ground Water (Regulation and Control of Development and Management) Act, (2011)

BIOGRAPHIES

Pradeep A V, Research Scholar Dept. of Civil Engineering, GMIT Davangere

Anup G A, Research Scholar Dept. of Civil Engineering, GMIT Davangere

Working as Assistant professor in the Department of Civil Engineering GMIT Davanagere, Research Scholar in the VTU Belgaum and working in the area of water and waste water treatment pollution and prevention.

Working as Professor and Head in the Department of Civil Engineering from past 31 Years. i) Member of Institute of Engineers. ii) Life member of ISTE. iii) Member, Karnataka Vijnana Parishad, Bangalore. iv) Fellow of Institute of Environmental Engineers. vi)Scientist of Year Awards 2011 by National Environmental Science Academy, New Delhi