

(A High Impact Factor, Monthly, Peer Reviewed Journal)

*Visit: <u>www.ijirset.com</u>* Vol. 8, Issue 6, June 2019

# A Case Study on Water Quality Assessment of Lakes Near Shravanabelagola

Avinash G B<sup>1</sup>, Abhilash I N<sup>2</sup>, Darshan B Y<sup>3</sup>, Smitha D K<sup>4</sup> Umesha K R<sup>5</sup>

Assistant Professor, Department of Civil Engineering, BCE Engineering College, Shravanabelagola, Karnataka, India<sup>1</sup>

UG Students, Department of Civil Engineering, BCE Engineering College, Shravanabelagola, Karnataka, India<sup>2,3,4,5.</sup>

**ABSTRACT**: Lakes are important part of urban ecosystem and play a vital role in maintaining ecological balance. Lake water is used for many purposes such as drinking, irrigation, domestic purposes, and industrial. But the polluted water generated by the industries and homes which are not properly treated gets cycled back into lakes, resulting in the pollution of lakes. Janivara lake, Rachenahalli lake, Utthenahalli lake near shravanabelagola water is no more exception. The present study deals with the determination of water quality index on the basis of Weighted Arithmetic Index by studying various water quality parameters like Turbidity, Color, Taste and Odor, Temperature, pH, Total hardness, acidity, Total alkalinity, Total Dissolved Solids, Dissolved oxygen, Biological oxygen demand, etc. to assess the water quality for drinking and domestic purposes.

KEYWORDS: Lake water, water quality parameters, water quality.

### I. INTRODUCTION

Lakes are important part of urban ecosystem and play a vital role in maintaining ecological balance. Lake water is used for many purposes such as drinking, irrigation, domestic purposes, and industrial. But the polluted water generated by the industries and homes which are not properly treated gets cycled back into lakes, resulting in the pollution of lakes. Drinking water is an important constituent for all types of living begins. Surface water is one of the most valuable natural resources, with supports human health, economic development ecological diversity. Surface water is a valuable dynamic and replenishes able natural resources in present day and limited in extent. Surface water resources assessment of a region involves a detail study of surface water, including geology and hydrogeology, monitoring and production of well data. The water quality guidelines provide a limit value for each parameter for drinking water. It is necessary that the quality of drinking water should be checked at regular time interval, because due to use of contaminated drinking water, human population suffers from varied of waterborne disease. The availability of good quality water is an indispensable feature for preventing diseases and improving quality of life. It is necessary to know the details about different physiochemical parameters such as color, temperature, acidity, hardness, pH, sulphate, chloride, DO, BOD, COD, alkalify and used for testing of water quality. Heavy metals like Pb, Cr, Fe, Hg, etc. are of special concern because they produce water or chronic poisoning in aquatic animals. This synopsis summarized some water analyses with physiochemical parameters. Guidelines of different physiochemical parameters also have been given for comparing the value of real water sample. There is lot of parameter for drinking water quality parameter like world health organization (WHO), Indian standard IS 10500:2012, environmental protection agency (EPA). In present study drinking water quantity were analyse by various standard analytical methods.

### **II. OBJECTIVES**

- > To study the different physical characteristics of water available in different lakes near Shravanabelagola.
- > To study the different Chemical characteristics of water available in different lakes near Shravanabelagola.



(A High Impact Factor, Monthly, Peer Reviewed Journal)

*Visit: <u>www.ijirset.com</u>* Vol. 8, Issue 6, June 2019

### **III. LOCATIONS OF LAKES NEAR SHRAVANABELAGOLA**



- 1. Janivara Lake
- 2. Rachenahalli Lake
- 3. Utthenalli Lake



(A High Impact Factor, Monthly, Peer Reviewed Journal)

### Visit: www.ijirset.com

### Vol. 8, Issue 6, June 2019

### IV. TESTS AND RESULTS

### 4.1 PHYSICAL CHARACTERISTICS OF WATER

1. Turbidity of water

Table 1 Determination of turbidity of the samples

Lake	Turbidity value in NTU	BIS Tolerance limit of Turbidity value in NTU
	5	
Uthenalli		
	2	
Janivara		
	18	5 to 10
Rachenalli		

Both the water of Uthenalli and Janivara lakes are well within the permissible limit. Hence suitable to use for domestic purpose with primary treatment. But the water of Rachenalli Lake is not desirable to use for domestic purpose.

#### 2. Color

Table 2 Determination of colour of the samples

Lakes	Condition
Uthenalli	Colorless
Janivara	Colorless
Rachenalli	Light brown

The color of the Uthenalli and Janivara lake water are colorless but the water of Rachenalli lake water appears in light brown color which is not agreeable

### 4.2 CHEMICAL CHARACTERISTICS OF WATER

#### 4.2.1 ACIDITY

Acidity = (((T.V-Blank)\*Molecular wt of NaOH\*Normality of NaOH)/Sample taken)\*1000 mg/l



(A High Impact Factor, Monthly, Peer Reviewed Journal)

### *Visit: <u>www.ijirset.com</u>* Vol. 8, Issue 6, June 2019

Table 3 Determination of Acidity of the samples

Lakes	Initial burette reading	Final burette reading	Vol. of NaOH consumed in ml	Acidity Mg/l	BIS Desirable limit	BIS Permissible limit in the absence of alternate source
	5.4	5.8	0.4	4		
Uthenalli						
	0	0.4	0.4	4	5	10
Janivara					5	10
	5.8	6.7	0.9	18		
Rachenahalli						

Acidity of Uttenahalli and Janivara is within the permissible limit but Rachenahalli is exceeds the permissible limit

#### 4.2.2 ALKALINITY

Alkalinity =  $(((T.V-Blank)*Molecular wt of H_2SO_4*Normality of H_2SO_4)/Sample taken)*1000 mg/l$ 

Lakes	Initial burette reading	Final burette reading	Vol. of H <sub>2</sub> SO <sub>4</sub> consumed in ml	Alkalinity Mg/l	BIS Desirable limit	BIS Permissible limit in the absence of alternate source
Uthenalli	0	9.3	9.3	92.92		
Janivara	1	12.4	11.4	114.13	200	600
Rachenahalli	2	15	13	260.58		

Table 4 Determination of Alkalinity of the samples

The alkalinity of the Uthenalli and Janivara lake are well within the desirable limit but Rachenalli lake water exceeds the desirable limit

#### 4.2.3 HARDNESS (EDTA TITRIMETRIC METHOD) i. TOTAL HARDNESS

Total hardness = (Titrate value-blank)\*correction factor\*1000/Sample taken mg/l.

For the known standard hardness the actual CaCo2 to be consumed is 10ml, but it consumed 10.5ml therefore correction factor is 0.95



(A High Impact Factor, Monthly, Peer Reviewed Journal)

## Visit: <u>www.ijirset.com</u>

### Vol. 8, Issue 6, June 2019

### Table 5 Determination of Total Hardness of the samples

Lakes	Initial burette reading	Final burette reading	Vol. of EDTA consumed in ml	Total Hardness Mg/l	BIS Desirable limit Mg/l	BIS Permissible limit in the absence of alternate source Mg/l
Uthenalli	0	4	4	74.1		
Janivara	15	20.2	5.2	96.9	200	600
Rachenalli	31.7	43.1	11.4	214.7		

The total hardness of the Uttenahalli and Janivara lakes are within the desirable limit but Rachenahalli is exceeds the desirable limit

### ii. CALCIUM HARDNESS

Calcium hardness = (Titrate value-blank)\*1000/Sample taken mg/l

Table 6 Determination of Calcium Hardness of the samples

Lakes	Initial burette reading	Final burette reading	Vol. of EDTA consumed in ml	Calcium hardness mg/l	Calcium Mg/l	BIS Desirab le limit Mg/l	BIS Permissible limit in the absence of alternate source Mg/l
Uthenal li	8.8	11.9	3.1	60	24		
Janivara	26.1	28.9	2.8	54	21.6	75	200
Rachen alli	23.7	30.6	6.9	136	54.4		

The calcium hardness of the all lakes are within the desirable limit



(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

### Vol. 8, Issue 6, June 2019

#### iii. MAGNESIUM HARDNESS

Magnesium hardness = (Total hardness – calcium hardness) mg/lMagnesium = (Total hardness – calcium hardness)\*0.24, where molecular wt of magnesium is 0.24.

Table 7 Determination of	of Magnesium	Hardness of	the samples
--------------------------	--------------	-------------	-------------

			BIS
Lake	Magnesium	Magnesium	For drinking water
	hardness	Mg/l	source without
	Mg/l		conventional
			treatment but after
			disinfection Mg/l
	14.1	3.38	
Uthenalli			
	60.9	10.29	100
Janivara			
	78.7	18.88	
Rachenalli			

#### 4.2.4. DISSOLVED OXYGEN

Dissolved oxygen = ((Vol. of  $Na_2S_2O_3$  \*Molecular wt of oxygen \*Normality of  $Na_2S_2O_3$ )/Sample taken)\*1000 mg/l

Lakes	Vol. of sampl e taken	Initial burette reading	Final burette reading	Vol. of Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> consume d in ml	DO Mg/l	BIS Desirabl e limit	BIS Permissible limit in the absence of alternate source
Uthenalli	200	11	17.5	6.5	6.5		
Janivara	200	0	6	6	6	6	5-4
Rachenalli	200	6	10.7	4.7	4.7		

Table 8 Determination of Dissolved Oxygen of the samples

The DO of the Uttenahalli and Janivara lakes are exceeds the desirable limit but the Rachenahalli is within the desirable limit



(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 6, June 2019

### 4.2.5 BIO-CHEMICAL OXYGEN DEMAND

BOD = ((Initial DO – Final DO)/50)\*1000 mg/l

Lakes	Initial DO	Final DO	BOD in Mg/l	BIS Desirable limit	BIS Permissible limit in the absence of alternate source
Uthenalli	6.5	6.3	4	2	4
Janivara	6	5.8	4	2	4
Rachenahalli	4.7	2.2	50		

Table 9 Determination of Bio-Chemical Oxygen Demand of the samples

The BOD of the and uttenahalli and Janivara lake water is within permissible limit but Rachenahalli is exceeds the permissible limit

### 4.2.6. CHEMICAL OXYGEN DEMAND

Chemical oxygen demand = (((Blank-T.V)\*Molecular wt of oxygen \*Normality of FAS)/Sample taken)\*1000 mg/l

Table 10 Determination of Chemical Oxygen Demand of the samples

Lakes	Vol. of sample taken	Initial burette reading	Final burette reading	Vol. of FAS consumed in ml	COD Mg/l	BIS Desirable limit	BIS Permissible limit in the absence of alternate source	
Uthenalli	20	23.0	46.3	23.3	20.4			
Janivara	20	21.1	44.3	23.2	24.5	200	600	
Rachenalli	10	0	21.1	21.1	220.3			

The COD of the all lakes are within the desirable limit



(A High Impact Factor, Monthly, Peer Reviewed Journal)

### Visit: <u>www.ijirset.com</u>

### Vol. 8, Issue 6, June 2019

#### 4.2.7. CHLORIDES

Formula:-

Chlorides = (((T.V-Blank)\*Molecular wt of chloride \*Normality of AgNO3)/Sample taken)\*1000 mg/l

Lakes	Initial burette reading	Final burette reading	Vol. of AgNO <sub>3</sub> consumed in ml	Chlorides Mg/l	BIS Desirable limit	BIS Permissible limit in the absence of alternate source
	6	11.3	5.3	22.3		
Uthenalli						
	1	5.8	4.8	20.16		
Janivara					250	1000
	22.5	43.9	21.4	182.73		
Rachenahalli						

#### Table 11 Determination of Chloride content of the samples

### V. CONCLUSION

From the present study the following conclusions are

- ➢ It is observed that Physical characteristics of the Utthenalli and Janivara lake water is within the desirable limits, whereas the Rachenalli lake water exceeds the desirable limit as per the BIS standard.
- ➢ It is observed that Chemical characteristics of the Utthenalli and Janivara lake water is within the desirable limits, whereas the Rachenalli lake water exceeds the desirable limit as per the BIS standard.
- From the study of these Physical and Chemical characteristics of the lakes it is hence concluded that both Utthenalli and Janivara lake water can be used for domestic and agricultural purpose and it can be used for drinking water after the minimum primary treatment.
- > The Rachenalli lake is not suitable for domestic and drinking purpose and can be used for agriculture purposes with minimum treatment. But for the domestic and drinking purpose it requires primary treatment.

#### REFERENCES

- 1. Basavaraja D "Assessment of water quality of Rasthapur lake, Shahapur taluk, Yadgir district, Karanataka" 07 September 2018.
- BM Sreedhara Nayaka "Assessment of Physio-chemical parameters of Gundalamma Lake, Tumkur, Karnataka India" Volume 3; Issue 2; March 2018; Page No. 369-370
- Anima Upadhyay1 and M. Chandrakala2, "WATER QUALITY ASSESSMENT OF DALVOY LAKE WATER, MYSORE, KARNATAKA, INDIA" International Journal of Science, Environment and Technology, Vol. 5, No 5, 2016, 3254 – 3261
- Ravinder Kumar1., Alka S. Grover2 and Meenu Wats\*1, "ASSESSMENT OF WATER QUALITY STATUS OF LAKES IN HARYANA, INDIA" 28th July, 2018
- M.Mamatha, "Water Quality Assessment of Kukkarahalli Lake Water Mysore, Karnataka, India" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 [Volume: 04 Issue: 03 | Mar -2017.
- 6. M. Pejaver and M. Gurav have explained "Assessment of Physio-chemical parameters of Gundalamma Lake, Tumkur, Karnataka India" in 2014.
- 7. Shweta Tyagi, Bhavtosh Sharma, Prashant Singh, Rajendra Dobhal "Water Quality Assessment in Terms of Water Quality Index" August 07, 2013.
- 8. R. W. Gaikwad, V. V. Sasane has explained, the present work is aimed at assessing the water quality of around Lonar Lake. in 2011.
- 9. V. Pradhan, M. Mohsin, B. H. Gaikwad have studied, water quality of Chilika Lake in 2011.