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Assessment of Physico- Chemical Parameters of Water of Ulsoor Lake in Bangalore, Karnataka

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Abstract: The Physico- Chemical parameters of Ulsoor Lake have been investigated. The water samples were collected from a point near the middle of the lake and analyzed for water quality parameters viz. Temperature, Dissolved oxygen, Biological oxygen demand (BOD), Chemical oxygen demand (COD), Electrical conductivity (EC), Total Hardness, Total dissolved solids (TDS), chloride, sulphate and nitrate. The result were compared with values prescribed by WHO and other standards for drinking water quality. The pH exceeded the maximum limit of 9.0 recommended in the standards for treated wastewater. BOD exceeded permissible limit of 6 mg/l prescribed by WHO. EC exceeds the limit as per Europian standard. The nitrate levels were within the limits prescribed by all drinking water standards. All other parameters were all well within permissible limits. The water is safe based on most of the chemical parameters, the water may be unsafe due to poor microbial quality. This study was carried out from March 2011 to February 2012.

Keywords: Physico-chemical parameters, Ulsoor like, TDS, Total Hardness, BOD, COD

INTRODUCTION

Water is one of the most vital resource for continuance of life on earth. The metropolitan cities of India are under the pressure of water scarcity because during last few decades, it has been found that water bodies get polluted due to increased human activities[1-4], industrialization, urbanization and agriculture etc. as a result of which causes water born diseases which effect human health[5-8]. Pollution is one of the most burning issues in front of human being, it causes damage to the human being on the

one hand and his property on the other hand. Pollution is an undesirable change in the chemical, biological or physical properties of air, water and soil that have harmful effect on the life.

Domestic sewage and industrial effluents falling into water bodies change the water quality and lead to eutrophication[9].Characteristic of water bodies influence the quality of water individually and in combination with various pollutants influencing the biota therein[10]

Water quality monitoring should be done on priority basis for the determination of current conditions and long term trends for effective management. The supply of safe water has a impact on the anticipation of water transmissible diseases[11]. The presence of a large quantity of toxic chemicals, nitrites, nitrate and organic compounds in water may cause adverse effect on the human health and leads to chronic diseases[11]. Therefore, it is necessary to frequently monitor water quality used for drinking purposes.

MATERIALS AND METHODS

Ulsoor Lake is one of the biggest and most beautiful lakes of the Bangalore city. It is located in the north-eastern fringe of the city, close to the eastern terminus of the M. G. Road. The lake derives its name from the locality where it is situated, namely, Ulsoor. The beauty of the lake is enhanced by the presence of several islands doting it. The Latitude of Ulsoor Lake is 12.983246800000000000. The Longitude of Ulsoor Lake is 77.619960799999940000. Sampling was made once during the study period between 11.00 AM to 17.00 PM on each sampling day. The water samples for physical and chemical water quality were taken from a point near the middle of the lake.

Table 1: Physico- Chemical Parameters of Water in Ulsoor Lake

Parameters	Range	Standard	Source
Temperature (^{o}C)	18.5 - 27.6	------	----
pH	7.12 – 9.80	6.5 – 9.2	WHO
DO(mg/l)	10.2 – 13.7	5.0 – 10.0	Chapman & Kimstiach
BOD(mg/l)	19.8 – 29.5	6.0	WHO
COD(mg/l)	160.4 – 249.2	-----	------
EC (micromhos/cm)	618 - 627	400	EuropianStd.
Total Alkalinity(mg/l)	362 - 612	120	WHO
Total Hardness(mg/l)	198 - 1900	500	WHO
TDS(mg/l)	375 - 590	500	WHO
Chloride(mg/l)	77.4 – 81.7	250	WHO
Sulphate(mg/l)	30.5 – 48.3	250	WHO
Phosphate(mg/l)	2.0 – 2.50	0.1	
Nitrate(mg/l)	0.5 – 9.4	10	UPSH

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The samples for the routine analysis of parameters were collected in 500ml polyethylene bottles. The DO samples were collected in 250ml glass bottles and fixed in field with Winkler's reagent. The samples for determining the BOD were collected in 250ml dark bottles. The temperature (^{0}C), pH and conductivity (micromhos/cm) were determined in the field. The methods used for determining Total hardness, Total alkalinity, COD, Nitrate, Phosphate, Sulphate, Total dissolved solids were adopted from APHA[12]

RESULTS AND DISCUSSION

Table 1 summarizes the range of values for important parameters and compares this against the most stringent drinking water standards available. *The Water temperature was taken as a routine measure and varied from 18.5 to 27.6^{0}C depending on the time of sampling*. The pH of water is an important indication of its quality and provide significant information in many types of geochemical equilibrium solubility calculation[13]. The pH is varied from 7.12 to 9.80, the pH indicates that the water is slightly alkaline. The photosynthesis and respiration of algae in eutrophic waters may influence[14] the pH. Dissolved oxygen below 5 mg/l affects the functioning of aquatic life[15]. The DO ranges in between 10.2 to 13.7. Unpolluted water have BOD of 2 mg/ l or less[15] and WHO standard indicates as 6 mg/ l. The Ulsoor Lake has exceeded these limits. The EC values of the lake are ranges between 618 – 627 micro mhos/cm which exceeded the limit of EC as per Europian standard. The alkalinity values ranges from 362 – 612 mg/l which exceeded the limit as per WHO standard. The alkalinity in water is may be due to the dissolution of carbon dioxide in water[16]. The chloride content ranges from 77.4 to 81.1 mg/ l and hence all the samples fall within the desirable limit of 250 mg/l of WHO. The limits of chloride have been laid down primarily from taste. However, no adverse health effects on humans have been reported from intake of water containing even higher content of chloride [17]. Hardness is the property of water which do not produce lather with soap[18]. The value of hardness ranges between 198 to 1900 mg/ l which is within the maximum permissible limit according to WHO. The TDS value ranges between 375 to 590 mg/l and COD values ranges from 160.4 to 249.2 mg/l. Sulphate ranges in between 30.5 to 48.3 mg/l. Nitrate levels were within limits prescribed by all drinking water standards. Nitrate in excess of 0.2 mg/ l tend to stimulate algal growth and a little as 0.01mg/l of phosphorus can trigger algal blooms. The water quality, especially its green colour and undesirable colour associated with algae is a strong deterrent for drinking purpose.

CONCLUSION

The pH exceeded the maximum limit of 9.0 recommended in the standards for treated wastewater. BOD exceeded permissible limit of 6 mg/l said by the WHO standards. EC exceeds the limit as per Europian standard. The nitrate levels were within limits prescribed by all drinking water standards. All other parameters were all well within permissible limits. The water is safe based on most of the chemical parameters examined, the water may be unsafe due to poor microbial quality. The aesthetic quality water, especially its green colour and the undesirable odour associated with algae is a strong deterrent for drinking, although the water quality managers parameters. This lake mainly used for domestic purposes.

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