Int. J. Adv. Res. Sci. Technol. Volume 4, Issue 5, 2015, pp.441-444.

IJARST

International Journal of Advanced Research in Science and Technology

journal homepage: www.ijarst.com

ISSN 2319 – 1783 (Print)

ISSN 2320 – 1126 (Online)

Evaluation of Physico-Chemical Parameters to Assess the Water Quality of Fox Sagar Lake, Jeedimetla, Hyderabad, India.

Mohamemed Kadhem Abid[1]* and Praveen Raj Saxena[2]

[1]Department of Environmental Science, University College of Sciences, Osmania University. Hyderabad, Telanagan, India.
[2]Department of Applied Geochemistry, University College of Sciences, Osmania University. Hyderabad, Telanagan, India.

****Corresponding Author's E-mail: renosh2011@yahoo.com, Phone No: 8125172809***

A R T I C L E I N F O

Article history:

Received 22 May 2015
Accepted 09 Jun. 2015
Available online 12 Jun. 2015

Keywords:

Physico chemical parameters,
Fox Sagar Lake,
Hyderabad City,
Telangana state,
IS 10500: 2012.

PAPER-QR CODE

IJARST
Volume-4, Issue-5

A B S T R A C T

Physico-chemical characteristic study has been carried out on Fox Sagar Lake water of Hyderabad City, Telangana State. Lake water from 14 different locations were collected and analyzed for parameters like pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Total Alkalinity (TA), Total Hardness (TH), Calcium (Ca^{2+}), Magnesium (Mg^{2+}), Sulphate (SO_4^{2-}), Nitrate (NO_3^{2-}), Fluoride (F^-) and chloride (Cl^-) levels. The analytical results indicated that lake waters are slightly acidic to alkaline in nature and found that the physico-chemical parameters of lake waters are higher than the prescribed standard limits for drinking purposes (IS 10500: 2012).

Citation: *Mohamemed, et. al., Evaluation of Physico-Chemical Parameters to Assess the Water Quality of Fox Sagar Lake, Jeedimetla, Hyderabad, India. Int. J. Adv. Res. Sci. Technol. Volume 4, Issue 5, 2015, pp.441-444.*

Introduction:

Water is one of the most important compound to the Ecosystem. Better quality of water described by its Physical, Chemical and Biological Characteristics. Lakes and surface water reservoirs are the planet's most important freshwater resources and provide innumerable benefits. They are used for domestic and irrigation purposes, and provide ecosystems for aquatic life especially fish, thereby functioning as a source of essential protein, and for significant elements of the world's biological diversity. They have important social and economic benefits as a result of tourism and recreation, and are culturally and aesthetically important for people throughout the world. Anthropogenic impact on natural environments and especially on aquatic ecosystems is currently a topic of increasing concern. Due to increase in population, industrialization and urbanization, large quantities of sewage and industrial wastewater are discharged into lake has significantly contributed to the pollution of the lake. Water quality monitoring has a high priority for the determination of current conditions and long-term trends for effective management. The supply of safe water has a significant impact on the anticipation of water transmissible diseases.

In present study, an attempt has been made to understand hydro chemical characteristics of Fox Sagar Lake (Fig.1). Fox Sagar Lake is the fifth largest lake in India spreading about 2 square kilometres. Situated (17°30'–17°20'N and 78°30'–78°20'E) 1km west of Hyderabad–Nizamabad road at Jeedimetla near Kompally in Hyderabad. The local name of Fox Sagar Lake is Jeedimetla cheruvu or Kolla Cheruvu. This lake is famous for its natural beauty and also popular for fishing. Fox Sagar lake Hyderabad is characterised by semi-arid conditions. Due to population growth and unplanned urbanization and industrialization large quantities of industrial and domestic wastewaters polluting the lake. In addition to this considerable wastewater is directly discharged into the lakes from colonies located on the foreshore of the lake.

Materials and Methods:

The water samples from Fox Sagar lake were collected from fourteen different stations in the morning hours between 9 to 11am, in polythene covering the entire lake during post monsoon period (October 2014). Before waters sampling polyethylene bottles cleaned and rinsed thoroughly with water samples to be analysed. The water samples were immediately brought into laboratory for the estimation

of various Physico-Chemical parameters like pH, EC were recorded at the time of sample collection, by using pocket digital pH meter. The physico-chemical parameters were analyzed as per the standard procedures recommended by APHA, (American Public Health Association) 1998, and Central Pollution Control Board (CPCB), Guide manual: Water and Waste water analysis.

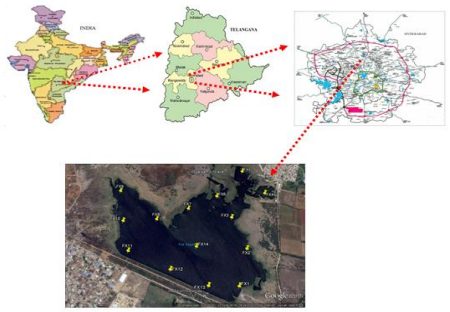

Fig.1: Location Map of the Study Area

Table: 1. Various physico-chemical analysis data of Fox Sagar Lake

S. No	pH	EC	TDS	TH	TA	Na^+	K^+	Ca^{2+}	Mg^{2+}	NO_3^{2-}	SO_4^{2-}	F^-	Cl^-
1	7.5	2300	1472	255	230	190	15	40	38	18	34	1.8	646
2	7.5	2300	1472	260	245	199	15	40	39	17	37	1.7	628
3	7.7	2300	1472	245	160	167	16	40	35	15	37	1.8	614
4	7.6	2200	1408	265	215	110	15	40	40	18	33	1.8	589
5	7.9	2200	1408	335	364	140	1	72	38	11	21	3.3	589
6	7.5	2400	1536	395	510	129	7	104	33	11	73	2.3	469
7	7.5	2500	1600	365	775	163	11	88	35	10	38	1.8	479
8	7.6	2300	1472	260	305	196	15	46	35	17	45	1.8	639
9	8.2	2300	1472	265	345	158	15	46	36	12	40	1.8	625
10	7.9	2300	1472	255	325	156	14	48	33	14	37	1.8	632
11	7.8	2300	1472	255	385	198	13	42	36	14	36	1.7	618
12	8.0	2300	1472	250	400	179	13	36	39	14	40	1.9	607
13	7.9	2300	1472	275	158	166	13	44	40	15	41	1.8	635
14	7.8	2300	1472	250	365	164	15	48	32	14	35	1.8	632

(**Note:** Note: pH in pH units, EC in µS/cm, TDS, TH, TA, Na+, K+, Ca2+, Mg2+, NO32-, SO42-, F-, Cl- are in mg/lit.)

Table: 2. Comparison of Physico-Chemical Analysis Data with IS 10500:2012

Water Parameters	Minimum	Maximum	Average	IS 10500:2012	% of samples exceeding acceptable limit
pH	7.5	8.2	7.7	6.5-8.5	0
EC (µS/cm)	2200	2500	2307	Not Mentioned	-
TDS (mg/l)	1408	1600	1477	500	100
Total Hardness (mg/l)	245	395	281	200	100
Total Alkalinity (mg/l)	158	775	342	200	85
Sodium (mg/l)	110	199	165	Not Mentioned	-
Potassium (mg/l)	1	16	13	Not Mentioned	-
Calcium (mg/l)	36	104	53	75	14
Magnesium (mg/l)	32	40	36	30	100
Nitrates (mg/l)	10	18	14	45	0
Sulphates (mg/l)	21	73	39	200	0
Fluoride (mg/l)	1.7	3.3	1.9	1	100
Chloride (mg/l)	469	646	600	250	100

Results and Discussion:

The results of a water quality assessment from Shah Hatim lake water are shown in Table. 1 and compared those values with IS 10500: 2012 guidelines for drinking water in Table.2.

pH:

The pH of water is a very important indication of its quality and provides important information in many types of geochemical equilibrium or solubility calculation (Hem., 1985). In the study area pH of the water samples varies from 7.5-8.2 pH units with an average of 7.7 pH units. The acceptable limit of pH is 6.5-8.5 (IS 10500:2012 guidelines for drinking water). All the samples are fall within the acceptable limit.

Electrical Conductivity (EC):

EC is the measure of the ability of an aqueous solution to convey an electric current. The conductivity measurement provides an indication of ionic concentration. In the study area EC of the water samples ranges from 2200-2500 micromhos/cm with an average of 2307.

Total Dissolved Solids (TDS):

In natural water, dissolved solids are composed mainly of carbonates, bicarbonates, chlorides, sulphates, phosphates, nitrates, calcium, magnesium, sodium, potassium, iron and manganese etc (Esmaeili H R., and Johal M S., 2005). In the study area TDS of the water samples ranges from 1408-1600 mg/litre with

an average of 1477 mg/lit. The acceptable limit of TDS is 500 mg/lit (IS 10500:2012). All samples (100%) are exceeding the acceptable limit.

Total Hardness:

Total Hardness includes sulphates, chlorides of calcium and magnesium. In most natural waters the predominant ions are those of bicarbonates associated mainly with calcium, to a lesser degree with Magnesium, and still less with sodium and potassium (Rafiullah M., et al., 2012). In the study area total hardness of the water samples ranges from 245-395 mg/lit with an average of 281 mg/lit. The acceptable limit of TH is 200 mg/lit (IS 10500:2012). All samples (100%) exceeding the acceptable limit.

Total Alkalinity:

In the study area total alkalinity of the water samples ranges from 158-775 mg/lit with an average of 342 mg/lit. The acceptable limit of TDS is 500 mg/lit (IS 10500:2012 guidelines for drinking water). The acceptable limit of TA is 200 mg/lit (IS 10500:2012). Twelve samples (85%) exceeding the acceptable limit.

Sodium (Na^+):

In the study area Sodium concentration of the water samples ranges from 110-199 mg/lit with an average of 165 mg/lit.

Potassium (K^+):

In the study area Potassium concentration of the water samples ranges from 1.0-16 mg/lit with an average of 13 mg/lit.

Calcium ($Ca2^+$):

Calcium is found abundantly in all natural water. The higher concentration of Calcium may be due to sewage coming from the surrounding residential areas. In the study area calcium concentration of the water samples ranges from 36-104 mg/lit with an average of 53 mg/lit. The acceptable limit of Ca^{2+} is 75 mg/lit (IS 10500:2012). Two samples (14%) are exceeding the acceptable limit.

Magnesium (Mg^{2+}):

Magnesium is often associated with calcium in all kinds of waters, but its concentration remains generally lower than the calcium (Venkatasubramani., and Meenambal., 2007). In the study area magnesium concentration of the water samples ranges from 32-40 mg/lit with an average of 36 mg/lit. The acceptable limit of Mg^{2+} is 30 mg/lit (IS 10500:2012). All samples (100%) exceeding the acceptable limit.

Nitrate (NO_3^{2-}):

In the study area Nitrate concentrations ranges from 10-18 mg/lit with an average of 14 mg/lit. The acceptable limit of NO_3^{2-} is 45 mg/lit (IS 10500:2012). All samples are within the acceptable limit.

Sulphates (SO_4^{2-}):

In the study area concentration of sulphates in the water samples ranges from 21-73 mg/lit with an average of 39 mg/lit. The acceptable limit of SO_4^{2-} is 200 mg/lit (IS 10500:2012). All samples are within the acceptable limit.

Fluorides (F^-):

Fluorosis is a disease caused by excessive fluoride concentration in drinking water. In the study area fluoride concentration in the water samples ranges from 1.7-3.3 mg/lit with an average of 1.9 mg/lit. The acceptable limit of F^- is 1.0 mg/lit (IS 10500:2012). All samples (100%) exceeding the acceptable limit.

Chlorides (Cl^-):

The salts of sodium, potassium and calcium contribute chlorides in water. In the study area chloride concentration in the water samples ranges from 469-646 mg/lit with an average of 600 mg/lit. The acceptable limit of Cl^- is 250 mg/lit (IS 10500:2012). All samples (100%) are exceeding the acceptable limit.

Conclusion:

It is concluded from the present study that majority of the samples has higher concentrations with regard to TDS, TA, TH, Mg^{2+}, F^- and Cl^- as per IS 10500:2012 specification for drinking water in lake water. The suggested measures to improve the lake water quality includes total ban on the activities that causes pollution. Finally, it is recommended that a policy has to be developed for water allocation linking ecological, hydrological and socio-economic aspects of life, with the involvement of all of the stake holders.

Acknowledgement:

I thank to **Prof. Praveen Raj Saxena**, Head, Dept of Applied Geochemistry, University College of Sciences, Osmania University for his valuable guidance during the project work. I also thankful to **Mr. Manchala Lingaswamy,** Research Scholar Dept of Environmental Science, Osmania University for his enormous support in carrying out my analytical work.

References:

1. American Public Health Association (APHA), 1998.study. Standard Methods for the Examination of water and wastewater, 20th Edition, Washington D.C.
2. Bureau of Indian Standard (BIS), Indian standard Drinking water Specification (Second Revision), Indian Standard (10500:2012).
3. S. A. Manjare, S. A. Vhanalakar and D.V. Muley., 2010. Analysis Of Water Quality Using Physico-Chemical Parameters Tamdalge Tank In Kolhapur District, Maharashtra. International Journal of Advanced Biotechnology and Research ISSN 0976-2612, Vol 1, Issue 2, Dec-2010, pp 115-119.
4. Achut Ram Pradhananga, Ramesh Kaji Shakya, Pawan Raj Shakya., 2013. Assessment of physico-chemical parameters of surface water quality of

Taudaha lake of Kathmandu and their comparison with other global published values. Bibechana 9 (2013) 141-150: BMHSS, p.141 (Online Publication: Nov., 2012)

5. N. Gantidis · M. Pervolarakis · K. Fytianos., Assessment of the quality characteristics of two lakes (Koronia and Volvi) of N. Greece. Environ Monit Assess (2007) 125:175–181.
6. Dong J D., Zhang Y Y., Zhang S., Wang Y.S., Yang Z.H., Wu M.L., (2010), "Identification of temporal and spatial variations of water quality in Sanya Bay, China by three way principal component analysis." *Environ Earth Sci* 60: 1673–1682.
7. Jadhav A S., Patil V N., Raut P D., (2013), "Systematic Investigation of Hydro-Chemical Characteristics of Six Different Lakes in and around Kolhapur city, Maharashtra, India." European Academic Research,Vol.I, Issue 8/ November 2013 ISSN 2286-4822.
8. Rafiullah M., Khan., Milind J., Jadhav., and Ustad I R., (2012), "Physicochemical analysis of Triveni lake water of Amravati district in Maharashtra, India." Bioscience Discovery 3 (1):64-66.