Research article Available online www.ijsrr.org ISSN: 2279–0543

International Journal of Scientific Research and Reviews

Physico-Chemical Study of Silisher Lake, Alwar

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ABSTRACT

Present study is undertaken to access the water quality of Silisher Lake by observing different physico-chemical parameters during the year of 2013-14. High water temperature, BOD, PH, total hardness, TDS, Phosphate, Nitrate, and dissolved organic matter and low depth of visibility and dissolved oxygen showed heavy load of organic matter in the lake and water quality is deteriorating rapidly due to intense human activities and influx of agricultural pollutants.

KEYWORDS: Physico-chemical, Silisher Lake

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INTRODUCTION

Siliserh Lake is a water body which once considered as divine source of water for drinking and irrigation purpose is now increasingly being abused and severely polluted. Disposal of domestic waste in lake is causing undesirable change in physico-chemical and biological characteristics of the water. Water is essential commodity for human being which is required by them in its pure form. The physical properties of water, in any aquatic ecosystem, are largely dependent on the meteorological conditions of the area and chemical properties of the water[1].

Anthropogenic nutrient enrichments cause serious alteration in aquatic ecosystems[2]. Chemical characteristic of water not only alter the physical properties of the medium but also exert significant effect on the distribution and metabolic activities of organisms, which in turn change the chemical qualities of water in due course of time[3].

Many workers have paid attention on the studies of physico-chemical quality of water[1,4,5]. The objectives of present study are to detect changes in different physico-chemical parameters of the Silisher Lake. The study will help us to know the role of pollutants in deterioration of water quality of this reservoir in different seasons round the year.

MATERIAL AND METHODS

Study Area:

The Silisher Lake is a large man made water body that forms a significant environmental feature and lies to south west of historical city Alwar. The lake is approximately 130 ha in its full spread and has a catchment falls in a dense rural area of 15.5 sq. KM. For analysis of water quality, 4 sampling sites have been selected, 2 sites towards the dam and 2 on opposite west side of the lake. Samplings at different sites were made at monthly intervals from July, 2013 to June 2014. Samples were collected in clean and dry containers and various physico-chemical features were estimated as per standard methods of APHA (2005) and Trivedy and Goyal (1986). Hardness was estimated by EDTA titrimetric method. Free CO2 were determined by titrimetric method. Dissolved oxygen by curing Wrinkler`s azide modification method and chloride by using titrimetric method. Temperature and pH by clinical thermometer and pH meter respectively.

RESULT AND DISCUSSION

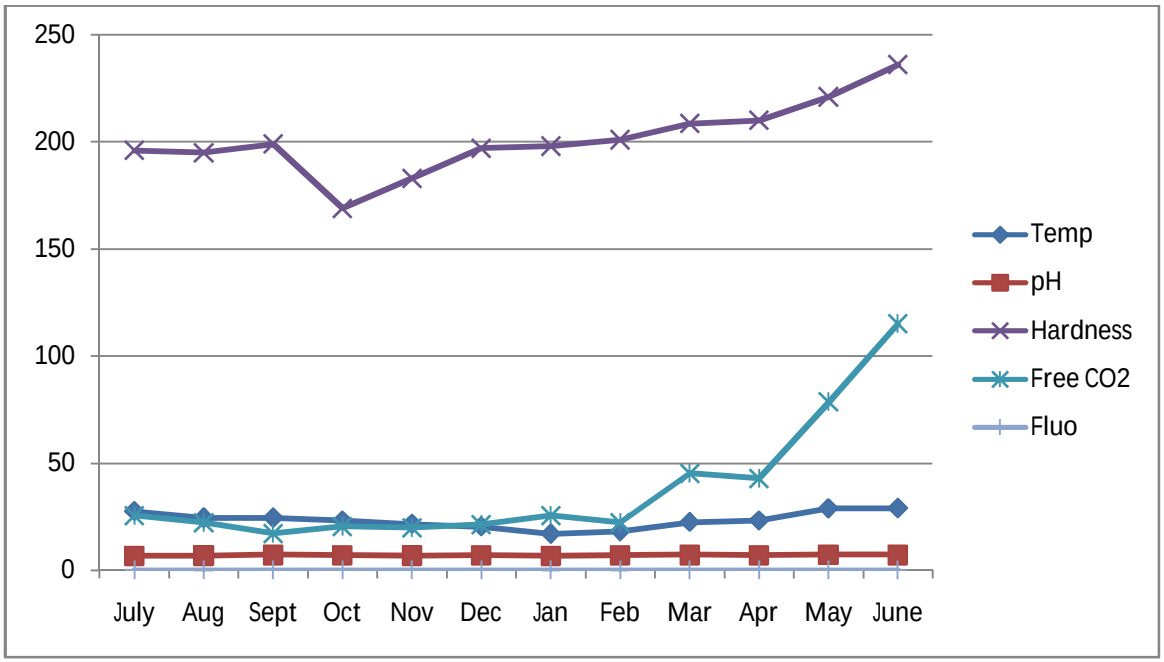
Table: 1 The observations taken from July, 2013 to Dec, 2013.

Parameters	July	August	Sept	October	Nov	Dec
Temp ˚C	27.5	24.4	24.4	23.2	21.6	20.4
pH	6.8	6.9	7.2	7.0	6.9	7.1
Alkalinity (mg/L)	368.5	445.0	785	755	486	555
Hardness (ppm)	196	195	199	169	183	197
Free CO2 (mg/L)	25.6	22.2	17.2	20.5	19.8	21.4
Chloride (mg/L)	511.2	549.87	465.4	547.05	591.43	360.2
Fluoride	0.012	0.0011	0.010	0.008	0.007	0.008
TDS (mg/L)	711	802	755	685	692	732
Dissolved O2 (mg/L)	8.8	10.2	11.5	9.6	10.5	11.1
BOD (mg/L)	13.8	13.9	12.2	14.2	12.2	13.3
COD (mg/L)	96.7	99.1	93.5	88.9	97.0	98.5

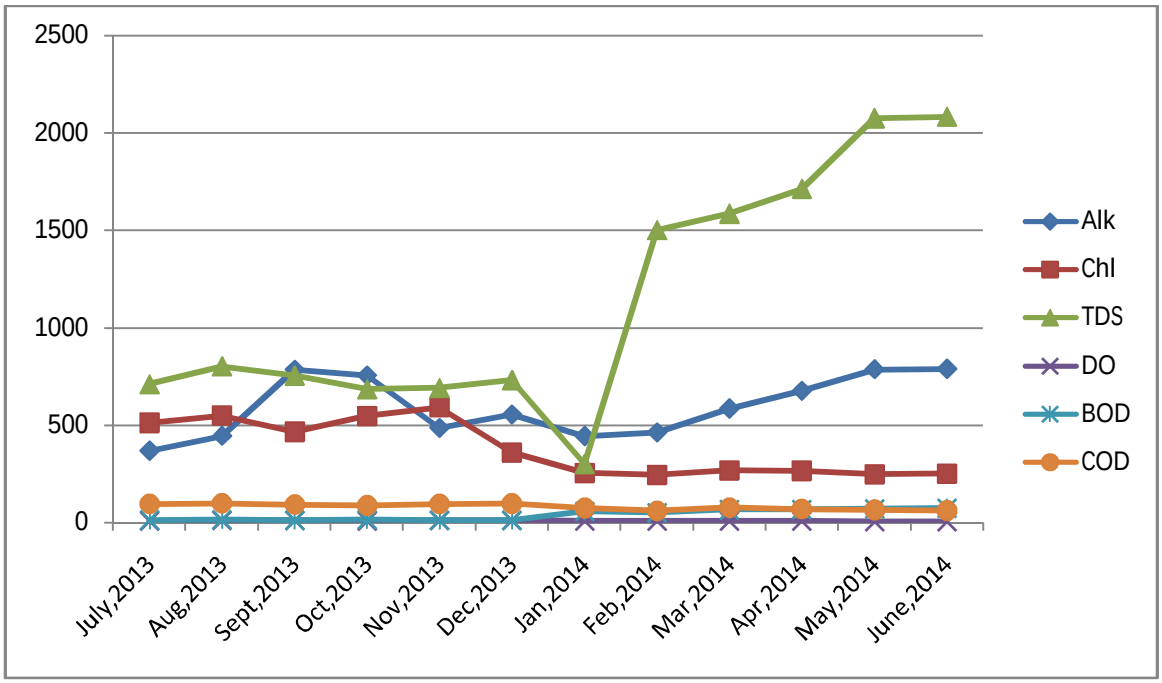
Table :2 The observations taken from January 2014 to June, 2014.

Parameters	January	February	March	April	May	June
Temp ˚C	17.0	18.2	22.4	23.2	28.8	28.9
pH	6.8	7.0	7.2	7.1	7.3	7.2
Alkalinity (mg/L)	444.2	462.3	585.5	676	787	789
Hardness (ppm)	198	201	208.5	210	221	236
Free CO2 (mg/L)	25.6	22.2	45.2	42.8	78.6	115
Chloride (mg/L)	255	245	268	266	248	252
Fluoride (Mg/L)	0.005	0.004	0.012	0.010	0.008	0.008
TDS (mg/L)	301.1	1501	1586	1713	2075	2083
Dissolved O2 (mg/L)	9.83	9.83	7.5	7.7	5.98	5.2
BOD (mg/L)	57.43	50.72	66.52	69.6	70.45	74.55
COD (mg/L)	75	61.2	77.6	69.5	66	62.3

Note: The values are average of samples collected from 4 sites of the lake monthly. The average rainfall during the year 2013-14 was 886.6 mm.

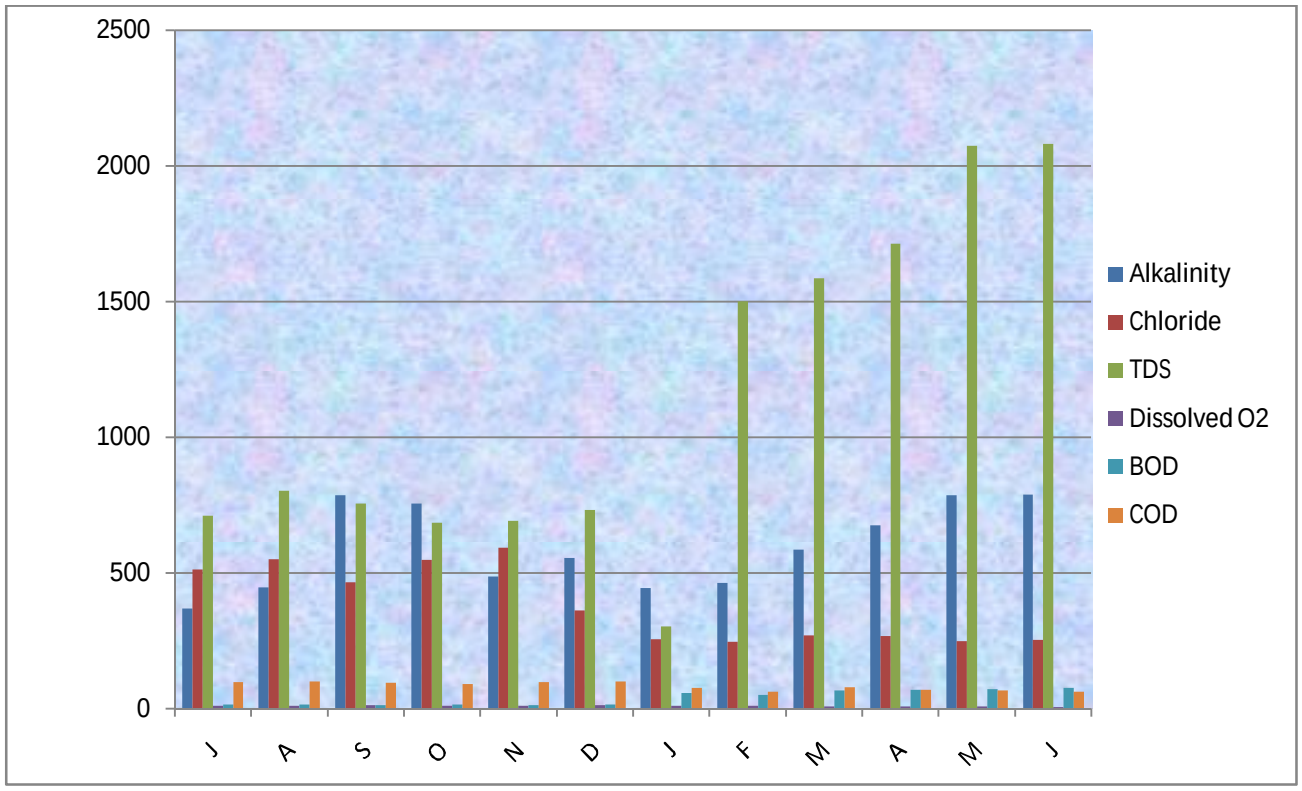


Graph: (A)

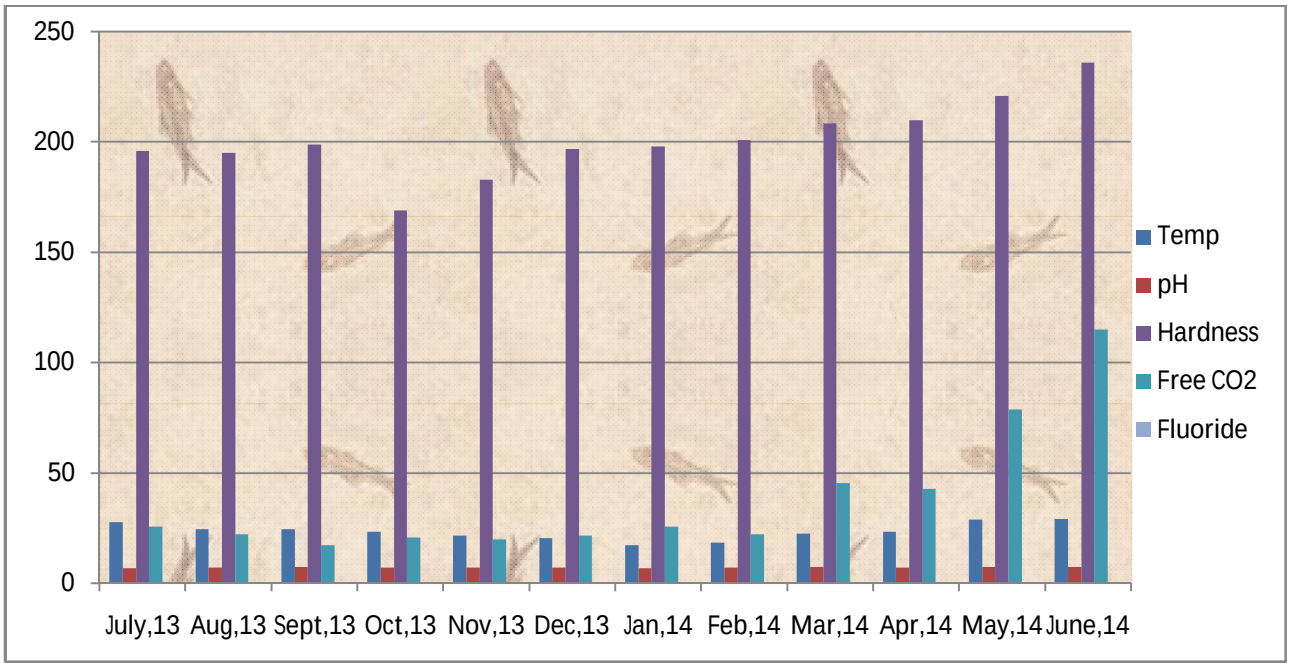


Graph: (B)

Fig:1. (A) and (B) Graphical presentation of monthly data with Physico-chemical parameters.



(A)



(B)

Fig: (A) and (B) Graphical presentation of monthly data with Physico-chemical parameters.

Temperature: The temperature fluctuated between 17.0 (in January) to 28.9 ˚C in June 2014 (Table 2). Higher temperature 28.9 ˚C in June, 2014 was probably due to increase load of suspended solids, lake soil particles and decomposed organic matter in the lake water because suspended solids absorb more heat.

pH- The pH exhibit acidic and alkaline in nature and ranged between 6.8 to 7.3 ˚C. Minimum pH was found in July, 2013 and January, 2014, and maximum in May, 2014. Acidic nature of lake water in monsoon and winter could be attributed to reduce photosynthetic activity.

Alkalinity – The total alkalinity fluctuated between 789 to 368.5 mg/ litre with the highest value in the month of June 2014. The alkalinity in water is caused by carbonate bicarbonate and hydroxyl ions. Because alkalinity value correlate positively with the pattern of rainfall and this implies that surface runoff from the Silisher Lake contains substances which contribute to alkalinity.

Hardness- The mean value of hardness has been found to vary between 169 (October,2013) to 236 ppm (June, 2014). The higher hardness may be ascribed to accumulation of dissolved materials due to increasing pollution from surrounding agricultural fields and tourist wastage of eatables.

Free Carbon dioxide- During the study period of investigation, the mean value of free Carbon dioxide varied between 17.2 (September, 2013) to 115 mg/litre (June, 2014). Carbon dioxide exhibited an inverse relation with dissolved oxygen. A gradual rise in dissolve oxygen and fall of free carbon dioxide level had probably disrupted the equilibrium between these two gases.

Chloride- The mean value of chloride content in the lake is 379.93 mg/litre. The peak chloride values during the early mansoon tend to increase sharply till the post monsoon approaches. The peak chloride value can be attributed to the surface run off, rich in animal origin and organic waste. Kavita Sahni and Pooja Solutia have also found similar results during the study on Mansagar Lake, Jaipur[7].

Fluoride- The mean value of fluoride content in the lake is 0.00775 Mg/L. The peak fluoride values during summer season can be attributed to the surface run off, rich in animal origin and organic waste. Even though this level is not harmful to the aquatic life, and not more than normal level of fluoride standard determined by WHO.

Total Dissolved Solids- The total dissolved solids fluctuated between 685 (October, 2013) to 2083 mg/litre (in June, 2014) which show hard water character. Further total hardness exhibits a change with low value in monsoon season and high range in between winter season.

Chemical Oxygen Demand- The COD values ranged from 51.2 to 99.1 Mg/litre. Its higher value during winter may be due to higher organic load.

Dissolved Oxygen - The dissolved oxygen content of water indicates health of an ecosystem. The value of DO range from 5.2 to 11.5 Mg/litre. The low value during the monsoon may be due to high load of suspended particles, soil particles; decomposed organic matter which reach the water and reduce the penetration of light that in turn lowers photosynthesis. In winter O2 holding capacity of water increases therefore rise in O2 content seen in the winters. Similar results were also reported by Subramanyam *et.al.* (2003) and Babu Harish *et al* (2006). The conclusion from the present study may be drawn that the Silisher Lake is going to be contaminated day by day with human activities and ultimately eutrophication lead to affect plankton, fish and other aquatic life.

ACKNOWLEDGEMENT

Author is grateful to the supervisors for their kind cooperation and encouragement and especially to my wife for her constant persuasion and inspiration.

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