



Physico-chemical study of water quality of Chakan Lake, District, Dadu, Sindh, Pakistan.

Z. A. PALH⁺⁺, A. R. ABBASI*, K. H. LASHERI*, S. MEGHWAR**, F. PANHWAR***

Centre for Environmental Sciences, University of Sindh, Jamshoro 76080, Sindh, Pakistan

Received 6th August 2015 and Revised 12th April 2016

Abstract: Physico-chemical studies of water quality of Chakan Lake, District, Dadu, Sindh, Pakistan were conducted on monthly basis throughout the year from December 2013 to November 2014. Inlet, outlet and center area of lake were selected as sampling stations. The obtained average results of Temp, pH, D.O, E.C, TDS, Salinity, Hardness, Chlorides, Alkalinity at were 29.13 °C, 8.4, respectively, near Inlet sampling areas. Near Centre sampling area of lake average results of Temp, pH, D.O, E.C, TDS, Salinity, Hardness, Chlorides, Alkalinity were 30.7°C, 8.66, 4.01 mg/L, 18.42 mg/L, 8826.7 mg/L, 9.51 mg/L, 2040.1 mg/L, 3986.3 mg/L and 949.1 mg/L respectively. Near outlet sampling area of lake average results of Temp, pH, D.O, E.C, TDS, Salinity, Hardness, Chlorides, Alkalinity were 31.7°C, 9.14 mg/L, 4.42 mg/L, 18.4 mg/L, 848 mg/L, 9.5 mg/L, 1890.8 mg/L, 3715 mg/L and 967 mg/L respectively.

Keywords: Saline water, Chikan Lake,

1. INTRODUCTION

Chakan Lake is the largest and oldest salt water lake in Sindh, it is located Palh village at geographical coordinates 26°57'3394N 67°51'0610E nearly 25 km in north from Dadu city. The lake covers an area of 142 meters. The lake collects water from numerous small agricultural channels from (Dadu Canal). It was nearly 12 meters deep in the beginning but continuously silting and deposition decaying has decreased the depth up to 5 to 7 meters. The lake has a lot of ecological and environmental importance. There are planktonic species important component of aquatic environment (Laghari *et al.* 1991; Leghari *et al.* 1992; Sahato *et al.* 2004). Phytoplankton species are essential components of aquatic ecosystems especially for productivity of water bodies hence they play role of producers in aquatic ecosystem. Fish population is dependent on the species directly either indirectly (Lashari *et al.* 2014). Water quality of water is prime factor with regarding its usage. Chakan saline lake remains a sweet water lake when receives more fresh water but since many years it has not received fresh water.

2. MATERIAL AND METHOD

The samples of Chakan Lake, Dadu, Sindh were taken from three location inlet, center and outlet from December 2013 to November 2014. samples were taken in well washed plastic bottles, for following water quality analysis. The pH of water samples was measured with pre calibrated Orion 420A pH meter. The TDS of the water samples were determined by using Orion 115 conductivity meter. The E.C of water samples was measured with pre calibrated Orion 115

conductivity meter with cleaned electrode by inserting in the water samples. The Cl were determine by AgNO₃ titration method. The hardness was determined by complex metric titration method. Alkalinity of water determining by titration method by using HCl (APHA 1989; Gupta 2011).

3. RESULT AND DECISION

The regular record of physic-chemical parameters of water samples of Chakan Lake at interval of 30 days carried during December 2013- November 2014.

1. Inlet water sample results of Chakan Lake:

The pH water was found in the range of 8 to 8.8 during the month of February highest pH was observed. The maximum water temperature was 43°C in the month of June and it was found reduced 18.2°C in the month of January. Total dissolved solid (TDS) was in range 1050 mg/l in the month of July, while highest 9980 mg/l observed in the month of June. The dissolved oxygen was found within range of 3.1 mg/l to 4.8 mg/l. The maximum conductivity was noted from 17.9 to 19.2 mS/cm. Chloride concentrations were observed from 3770 to 4170 mg/l. Alkalinity concentration from minimum to maximum was ranges from 905 to 1012 mg/l. Total hardness was recorded 1917 to 2220 mg/l.

2. Centre water sample results of Chakan Lake:

The pH water was found in the range of 7.9 to 10. The maximum water temperature was 45.5°C in the month of July and it was found reduced 19.3°C in the month of January. Total dissolved solids (TDS) were in the range of 1040 to 9920 mg/l. The dissolved oxygen was found within range of 3.6 mg/l to 4.7 mg/l. The

⁺⁺, Corresponding author: zameer_ali110@hotmail.com

*Department of Fresh Water Biology and Fisheries, University of Sindh, Jamshoro 76080, Sindh, Pakistan

** Department of Geography, University of Sindh, Pakistan

*** Department of Pharmacy, Faculty of Pharmacy, University of Sindh, Jamshoro 76080, Sindh, Pakistan

maximum conductivity was noted from 18 to 19.1 mS/cm. Chloride concentrations were observed from Alkalinity concentration from minimum to maximum was from 910 to 1015 mg/l..

3. Outlet water sample results of Chakan Lake:

The pH water was found in the range of 8.2 to 10. The maximum water temperature was 45°C in the month of June and it was found reduced 19.6°C in the month of January. Total dissolved solids (TDS) were in the range of 1050 to 9890 mg/l. The dissolved oxygen was found within range of 3.6vmg/l to 5.1 mg/l. The maximum conductivity was noted from 17.9 to 19 mS/cm.

Chloride concentrations were observed from 3240 to 4150 mg/l. Alkalinity concentration from minimum to maximum was ranges from 916 to 1040 mg/l. Total hardness was recorded 1970 to 1810 mg/l.

4. CONCLUSION

It was observed that water quality of Chakan Lake remains almost same in all three sampling locations through year. The lake shows that it is mostly remain highly saline due to very less fresh water supply. It is recommended that fresh water supply must be increased in order to maintain environmental and ecological beauty of lake.

Table 1.Water quality analysis of samples collected from Chakan Lake from 26-12-2013 to 26-11-14 at station 1(inlet area of lake).

s.no	date	Temp	pH	D.O	E.C	TDS	Salinity	Hardness	Chlorides	Alkalinity
1	26-12-2013	18.6	8.3	3.6	18.1	9370	9.1	2118	4170	905
2	25-01-2014	18.2	8.5	3.8	17.9	9255	9.1	2190	4050	980
3	24-02-2014	19.6	8.8	3.6	18.2	9430	9.4	2140	3970	915
4	27-03-2014	21.2	8.3	3.6	18.3	9676	9.6	2220	3960	930
5	26-04-2014	27	8.5	3.3	18.4	9703	9.7	2190	3910	990
6	25-05-2014	35	8.7	3.1	18.3	9915	9.9	2010	4010	920
7	26-06-2014	40	8	3.8	18.5	9980	9.8	1917	4024	940
8	27-07-2014	43	8	3.9	19.2	1012	10	1980	4038	990
9	24-08-2014	41	8.5	3.9	18.6	9830	9.8	1995	3770	1012
10	24-09-2014	33	8.4	4.4	18.3	9560	9.6	2012	3910	930
11	25-10-2014	26.5	8.7	4.6	18.2	9220	9.2	2060	3905	940
12	26-11-2014	26.5	8.2	4.8	18	9118	9.2	2010	3905	980
Max		43	8.8	4.8	19.2	9980	10	2220	4170	1012
Min		18.2	8	3.1	17.9	1012	9.1	1917	3770	905
Average		29.13	8.4	3.86	18.33	8839	9.53	2070.1	3968.5	952.6

Table 2. Water quality analysis of samples collected from Chakan Lake from 26-12-2013 to 26-11-14 at station 2 (Centre of the lake).

S.no	date	Temp	pH	D.O	E.C	TDS	Salinity	Hardness	Chlorides	Alkalinity
1	26-12-2013	19.3	8	4.1	18.3	9330	9.3	2040	3970	946
2	25-01-2014	19.4	8.5	4	18.2	9210	9.2	2006	3850	920
3	24-02-2014	20.9	9	3.9	18	9390	9.3	2105	3970	918
4	27-03-2014	20.9	8.6	3.9	18.1	9570	9.5	2110	4160	915
5	26-04-2014	26	8.9	3.7	18.3	9618	9.6	2270	4180	980
6	25-05-2014	38	10	3.6	18.4	9780	9.8	2290	4390	910
7	26-06-2014	42	9	3.7	18.5	9805	9.8	2115	4270	936
8	27-07-2014	45.5	9.2	3.9	19.1	1030	10.1	1970	4156	1015
9	24-08-2014	43	8	4	18.9	9920	9.9	1996	3960	990
10	24-09-2014	35	7.9	4.2	18.6	9618	9.4	1840	3850	980
11	25-10-2014	29.6	7.9	4.5	18.4	9430	9.2	1850	3540	970
12	26-11-2014	28.8	9	4.7	18.3	9220	9.1	1890	3540	910
Max		45.5	10	4.7	19.1	9920	10.1	2290	4390	1015
Min		19.3	7.9	3.6	18	1040	9.1	1840	3540	910
Average		30.7	8.66	4.01	18.42	8826.7	9.51	2040.1	3986.3	949.1

Table 3. Water quality analysis of samples collected from Chakan Lake from 26-12-2013 to 26-11-14 at station 3, (outlet of lake).

s.no	date	Temp	pH	D.O	E.C	TDS	Salinity	Hardness	Chlorides	Alkalinity
1	26-12-2013	19.8	9.1	5.1	17.9	9226	9.2	1860	3630	1040
2	25-01-2014	19.6	9	5	18	9305	9.3	1890	3520	1010
3	24-02-2014	22.5	9.4	4.9	18.3	9295	9.2	1890	3240	1030
4	27-03-2014	22.5	9	4.8	18.2	9605	9.6	1840	3370	980
5	26-04-2014	26.4	9	4.7	18.4	9690	9.4	1910	3690	980
6	25-05-2014	41.5	8.9	4.6	18.6	9770	9.5	1930	3840	930
7	26-06-2014	45	10	4.7	18.8	9890	9.8	1970	3970	916
8	27-07-2014	45	9.4	4.1	19	1050	10.2	1940	3990	938
9	24-08-2014	44	9.5	3.9	18.6	9870	9.8	1930	4105	938
10	24-09-2014	38	8.2	3.8	18.3	9640	9.4	1860	3915	970
11	25-10-2014	30.6	8.2	3.9	18.5	9520	9.3	1860	3660	926
12	26-11-2014	25.8	10	3.6	18.2	9316	9.3	1810	3650	946
Max		45	10	5.1	19	9890	10.2	1970	4105	1040
Min		19.6	8.2	3.6	17.9	1050	9.2	1810	3240	916
Average		31.7	9.14	4.42	18.4	8848	9.5	1890.8	3715	967

REFERENCES:

- APHA (1989). Standard methods for the examination of water and wastewater. 17th edition, American Public Health Association, Washington D.C.
- Gupta, P. K. (2011) Methods in Environmental Analysis Water, Soil and Air. 2nd Edition Agribios India.
- Laghari, M. K, K. Sultana, and T. Bano, (1991). Taxonomical studies under Noviculttes. Malka Parbat kaghar (part I) Biologia, 37 (2), 9-12
- Laghari, M. K and K Sultana (1992). Blue green algal flora of Kenjhar Lake, Sindh, Pakistan. Cryptogamic flora of Pakistan. National Science Museum Tokyo: 69-73
- Lashari, K H, S. H. Naqvi, Z. A. Palh, Z. A. Laghari, A. Z. Mastoi, G. A Sahto, and G. M Mastoi, (2014). The effects of physicochemical parameters on planktonic species population of Kenjhar Lake, District Thatta, Sindh, Pakistan. American Journal of Bioscience Vol:2 (2) 38-44.
- Sahato, G. A, K. H. Lashari and B. S. Shamroz (2004). Ecological survey of phytoplankton (oscillatoriaceae) of Kenjhar Lake, District, Thatta, Sindh, Pakistan. Hamdard Medicus, Vol:xlvi, No(4)