

“COMPARISON OF THE PHYSICO-CHEMICAL PARAMETERS OF TWO LAKES AT LODRA AND SOJA UNDER BIOTIC STRESS”

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Abstract: The presented study deals with comparative study of the periodic and aperiodic variations of Physico-chemical status of two lakes belongs of Lodra Lake and Soja Lake of Gandhinagar District, Gujarat India. Lodra Lake is situated on the High-way to Gandhinagar-Vijapur, of Gujarat state and Soja Lake is situated on the High-way to Kalol-Mansa, of Gujarat state. Lodra Lake is natural freshwater body having 6.18 hectares area & an irregular in shape. Lodra Lake is located between 72°42'46''E to 72°43'23''E latitude and 23°27'06''N to 23°28'01''N longitude. It is oldest lake of Mansa taluka known as Dudheshwar Mahadev Talav, constructed before year 1910. Soja lake is located between 72°34'58''E to 72°35'05''E latitude and 23°21'47''N to 23°22'49''N Longitude. Both lake are oldest and natural freshwater body. Water is essential for living organisms especially like Flora and Fauna, observed through various field trips. A comparative study of the periodic and a periodic variations of Physico-chemical status of two lakes were studied in year January to June 2011. Both the lakes are biotically affected by various anthropogenic activities. In the present study water characteristics of two lakes have been compared the water quality. Different Parameters analyzed like pH, Fluoride, COD, BOD, Chloride, Alkalinity, Total Hardness, Calcium, Calcium Hardness, Magnesium, Magnesium Hardness, DO, EC and TDS. The result indicates that the both lakes are in polluted condition.

Key words: Water characteristics, physico-chemical status, biotic stress.

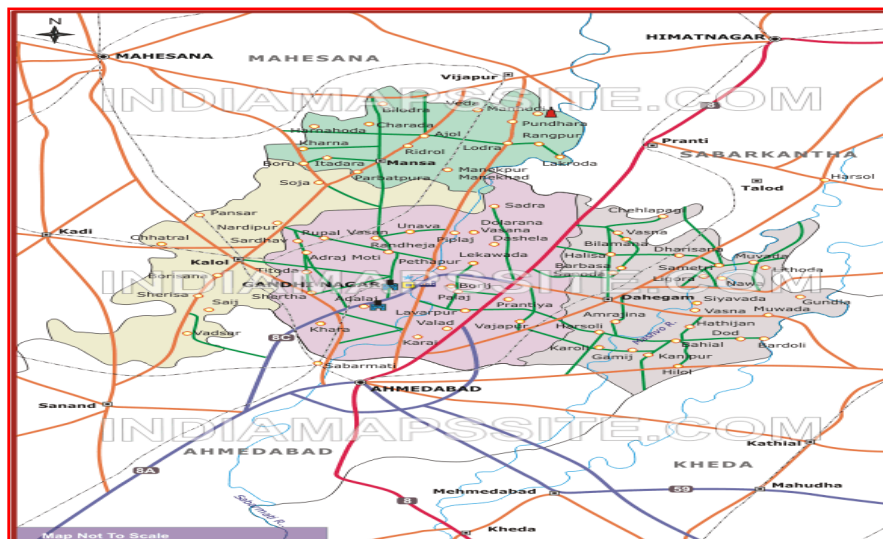
I. INTRODUCTION

Fresh water habitats occupy a relatively small portion of the earth surface as compared to marine and terrestrial habitats, but their importance to man is far greater than their areas. Fresh water is the most suitable and cheapest source for domestic and industrial needs and they provide convenient waste disposal systems. The increased demand of water as a consequence of population growth, agriculture and industrial development building construction has forced environmentalists to determine the chemical, physical and biological characteristics of natural water resources (Regina & Nabi, 2003). Temporary ponds are found throughout the world. Though, there are considerable regional differences in their type and method of formation, many physical, chemical and biological properties are quite similar. The worldwide distribution of water body type leads to a large variety of temporary pond type due to climate and geological differences (Solanki et al., 2007). Stagnant water bodies have more complex and fragile ecosystems in comparison to running water bodies as they lack self cleaning ability and hence, readily accumulate greater quantities of pollutants. Increased anthropogenic activities in and around the water bodies damage the aquatic systems and ultimately the physicochemical properties of water. The man is abusing water resources at a large scale. The effort to conserve these resources is present need. Factors that influence the sustainability of such lentic systems are temperature, transparency, salinity, biogenic salts, dissolved gases etc. (Munawar, 1970; Misra and Yadav, 1978). Since, ponds are favourable habitats for a variety of flora-fauna and anthropogenic society, so its regular monitoring is necessary for control. Recently, lot of work has been done on changing ecological behavior of ponds (Mahananda et al., 2005; Kanungo et al., 2006; Gupta et al., 2008; Banerjee and Mandal, 2009). In the

present study, two important ponds of different district were chosen for comparing the impact of biotic activities on physico-chemical characteristics of pond's water. The study was performed during January, 2011 to June, 2011..

II. STUDY AREA

A study of the water quality of the Lodra and Soja Lake, which is man-made water body. The Lodra Lake situated in Mansa taluka and Soja Lake situated in Kalol taluka, Dist: Gandhinagar, Gujarat. The studies on physico-chemical and biological examinations of the water of both Lake were carried out in Jan-June 2011 season. Analysis of water chemistry was carried out with changes in water chemistry. Sites were selected for sampling water samples. Water samples of both Lake were examined for various physico-chemical parameters as pH, Total Hardness, Chloride Content, Carbonates, Bicarbonates, Calcium and Magnesium Content, Calcium and Magnesium Hardness, Alkalinity, Nitrates and Electric Conductivity (EC) etc. by standard APHA (2005) methods. Lodra Lake is located between 72°42'46"E to 72°43'23"E latitude and 23°27'06"N to 23°28'01"N longitude and Soja Lake is located between 72°34'58"E to 72°35'05"E latitude and 23°21'47"N to 23°22'49"N longitude. Both lakes are oldest and natural freshwater bodies. The climate of Gujarat is tropical in nature. The presence of the Arabian Sea in the west modifies the climate of Gujarat resulting in three prominent climates, i.e.: arid, semi-arid, and sub-humid. The arid climate spreads over the northwest part of Gujarat comprising Kachchh district, western part of Banaskantha and Mehsana districts. Visnagar city falls in Mehsana district. Scientific literature on climate information on Gujarat.



III. MATERIALS AND METHODS

In Lodra Lake and Soja Lake, which was selected, was affected by domestic purpose sewage, man cleaning cloths, washing of castles, small scale industrial effluents and worshipping activities. The pond was in big villages of Lodra and Soja and also faces similar biotic stress.

The study was carried out from January to June 2011. The water samples were collected from the surface near the margins of the pond between 9-00 to 11-00 AM. The analysis of physico-chemical parameters was done by following the standard methods (APHA, 1985).

The Lodra Lake was named as Plate:1 (one), Table 1, and Soja Lake was named as Plate:2 (two), Table 2.

IV. RESULTS AND DISCUSSION

The physico-chemical parameters of both the lakes were analyzed from January to June 2011. And are presented in Lodra Lake in table -1 and Plate 1, figure 1 to 4. And Soja Lake in table -2 and Plate 2, figure 1 to 4. The pH of both the ponds indicates the alkaline nature of the lake and varies from 7.6 pH to 8.3 pH of Lodra Lake and 8.3 pH to 8.8 pH of Soja Lake.

pH to 8.8 pH of soja lake. The dissolved Oxygen varies from 5.8mg /l. to 6.6mg/l of lodra lake and 6.2 mg/l to 7.0 mg/l of soja lake. Low content of dissolved Oxygen is a sign of organic pollution, it's also due to inorganic reductants like Hydrogen sulphide, Ammonia, Nitrates, Ferrous ions and other such oxidisable substances (Ara et al. , 2003) The alkalinity in the both lake varies from 76mg/l to 88mg/l of lodra lake and 364 mg/l to 412 mg/l of soja lake respectively. The high alkalinity is a function of ions exchange, that is calcium ions are replaced by Sodium ions and later contributed to alkalinity (Sharma and John 2009). Alkalinity may also be caused due to evolution of CO₂ during decomposition of organic matter. The Chloride content in lake -1 and lake-2 varies from 17.04 mg/l to 19.8mg/l of lodra lake and 176.2 mg/l to 199.2 mg/l of soja lake respectively. The chloride is one of the important indicators of pollution (Khare et al. , 2007) The Nitrate in a both lake is not indicated. The main source of Nitrate is the run-off and decomposition of Organic matter. The higher inflow of water and consequent land drainage cause high value of Nitrate. (Thilanga et al . 2005). The variation in Calcium was found to be 16.8 mg/l to 21.6 mg/l of lodra lake and 47.1 mg/l to 53.2 mg/l of soja lake respectively. Calcium is linked with the Carbon dioxide and is an important constituent of the skeletal structure of organisms. Calcium forms the most abundant ions in fresh water. (Thilanga et al. 2005). The variation in total dissolved solid was found to be 56 mg/l to 64 mg/l of lodra lake and 832 mg/l to 939 mg/l of soja lake. The variation in Electric conductivity was found to be 78 mg/l to 110 mg/l of lodra lake and 1241 mg/l to 1401 mg/l of soja.

From the result obtained it can be concluded that both lakes are polluted. Fresh water bodies due to the continuous discharge of domestic waste like sewage, drainage, cleaning clothes, cattle and vehicle washing and run-off high amount of nutrients lead to eutrophication. The result also indicates that the soja lake is a comparatively more polluted due to greater biotic stress.

Table-1: Lodra lake

sr.nos	test parameter	Yera-2011						unit
		january	february	march	april	may	june	
1	pH	7.6	7.8	8	8.2	8.3	8.3	---
2	Dissolve oxygen	5.8	6.0	6.2	6.6	6.4	6.3	mg/l
3	Total Dissolved solid	56	58	60	61	64	64	mg/l
4	Electric Conductive	78	82	88	91	110	108	mg/l
5	Chloride	19.8	18.4	17.04	18.2	18.8	19.1	mg/l
6	Alkalinity	76	81	88	82	83	84	mg/l
7	Total Hardness	76	83	92	100	105	98	mg/l
8	Calcium	16.8	17.6	19.2	20.4	21.6	20.4	mg/l
9	Calcium Hardness	42	44	48	51	54	51	mg/l
10	Magnesium	9.3	10.7	10.7	11.9	12.3	11.3	mg/l
11	Magnesium Hardness	34	39	44	49	51	47	mg/l
12	Fluoride	1.68	1.71	1.84	2.2	2.42	2.21	mg/l
13	Nitrate	nd	nd	nd	nd	nd	nd	mg/l
14	Chemical Oxygen demand	36.4	32.8	39.2	41.2	38.4	36.2	mg/l
15	B.O.D.(3day 27 c)	0.17	0.19	0.25	0.58	0.67	0.71	mg/l

All the parameters are in mg/lit. except pH

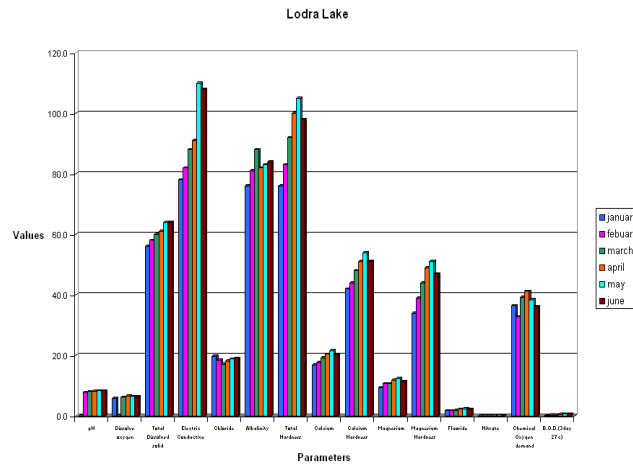
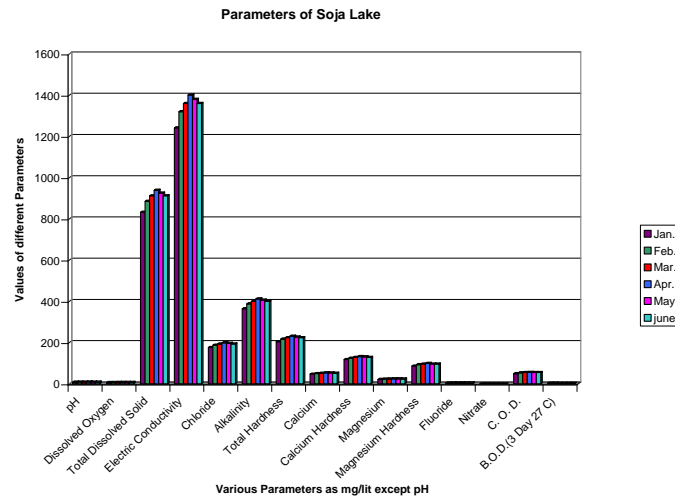


Table – 2 : Soja lake

Sr. No.	Test Parameters	Year-2011						Unit
		Jan.	Feb.	Mar.	Apr.	May.	june.	
1	pH	8.3	8.4	8.6	8.8	8.4	8.3	
2	Dissolved Oxygen	6.2	6.6	6.8	7	6.9	6.8	mg / lit.
3	Total Dissolved Solid	832	885	912	939	925	912	mg / lit.
4	Electric Conductivity	1241	1320	1360	1401	1380	1360	mg / lit.
5	Chloride	176.2	187.4	193.1	199.2	196.3	193.1	mg / lit.
6	Alkalinity	364	388	400	412	406	400	mg / lit.
7	Total Hardness	204	217	224	231	227	224	mg / lit.
8	Calcium	47.1	49.7	51.3	53.2	52.8	51.3	mg / lit.
9	Calcium Hardness	118	124	128	132	131	128	mg / lit.
10	Magnesium	21.6	22.7	23.4	24.1	24.2	23.4	mg / lit.
11	Magnesium Hardness	86	93	96	99	96	96	mg / lit.
12	Fluoride	3.89	4.21	4.35	4.49	4.35	4.35	mg / lit.
13	Nitrate	00	00	00	00	00	00	mg / lit.
14	C. O. D.	49.1	53.1	54.9	55.7	54.9	54.9	mg / lit.
15	B.O.D.(3 Day 27 C)	2.7	2.9	2.1	2	2	2.4	mg / lit.

All the parameter are in mg/l except pH.



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