

“STUDY OF THE PHYSICO-CHEMICAL PARAMETERS OF TWO LAKES AT NARDIPUR AND MANSA UNDER BIOTIC STRESS”

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Abstract: The present study deals with comparative study of the periodic and aperiodic variations of Physico-chemical status of two lakes, Nardipur and mansa of Gandhinagar District, Gujarat India. Nardipur Lakes was situated on Mansa-Kalol highway of Gujarat state and mansa lake was situated in village of mansa. Both Lakes having natural freshwater body and irregular in shape. Nardipur lake is located between 23⁰20'09''N to 23⁰20'11''N longitude and 72⁰33'47''E to 72⁰34'03''E Latitude and mansa lake is located between 23⁰25'47''N to 23⁰25'49''N longitude and 72⁰39'16''E to 72⁰39'26''E Latitude. Both are the oldest lake. Water is essential for living organisms. A comparative study of the periodic and aperiodic variation of Physico-chemical status of two lakes was studied in January to June months of year 2011. Both the lakes are biologically affected by various anthropogenic activities. In the present study water characteristics of two lakes have been compared as water quality. Different Parameters were 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.

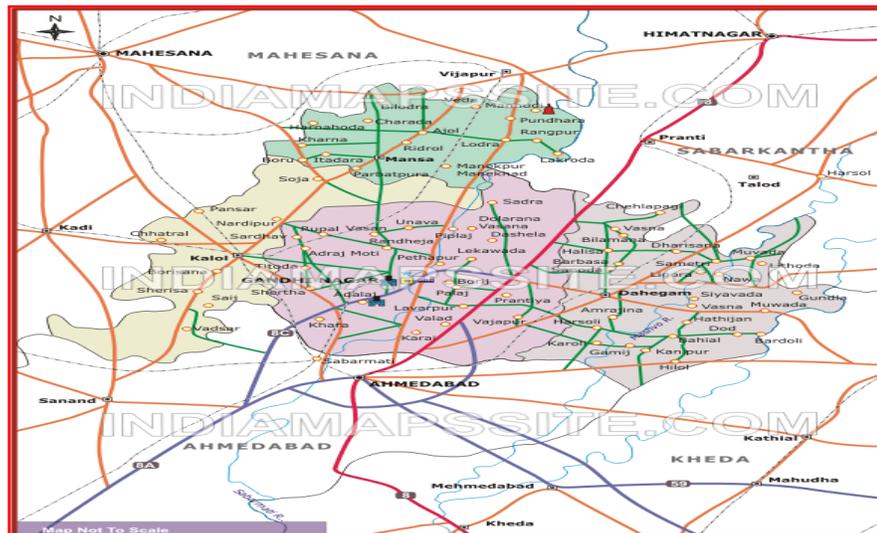
I. INTRODUCTION

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 populations. 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 Nardipur and Mansa Lake, which is man made water body situated in surrounding area of Mansa taluka and Kalol taluka, Dist: Gandhinagar, Gujarat. The studies on physico-chemical examinations of the water of both Lakes were carried out in January to June 2011 season. Analysis of water chemistry was carried out with changes in water chemistry. Collecting of water samples were fragmented as monthly time period. 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. as mentioned in standard APHA and AWWA (1985) methods. Nardipur lake is located between $23^{\circ}20'09''\text{N}$ to $23^{\circ}20'11''\text{N}$ longitude and $72^{\circ}33'47''\text{E}$ to $72^{\circ}34'03''\text{E}$ Latitude and Mansa lake lies between $23^{\circ}25'47''\text{N}$ to $23^{\circ}25'49''\text{N}$ longitude $72^{\circ}39'16''\text{E}$ to $72^{\circ}39'26''\text{E}$ Latitude. The climate of Gujarat is tropical in nature. The presence of 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 spread over northwest part of Gujarat comprising Kachchh district, western part of Banaskantha and Mehsana district. Visnagar city falls in Mehsana district. Scientific literatures were studied on climate information on Gujarat.

LOCATION MAP OF DIFFERENT LAKES BELONGS TO MANSAL & KALOL TALUKA SURROUNDING AREA



III. MATERIALS AND METHODS

In Nardipur lake and Mansa Lake was selected which is effected by domestic purpose sewage, man cleaning cloths, washing of cattle, small scale industrial effluents and worshipping activities. The Lakes were between big villages of Nardipur and Soja and also faces similar biotic stress.

The study was carried out from January to June 2011. The water samples were collected from 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 and AWWA (1985)

The Nardipur lake is shown in Table 1, Plate A with photo 1 to 4 and Mansa (Chandrasar) lake is shown in Table 2, Plate B with Photo 1 to 4 were presents a pictures of Lakes.

IV. RESULTS AND DISCUSSION

The physico-chemical parameters of both the lake were analyzed from January to June 2011. Nardipur lake Water parameter, graph, and photo are presented in table – 1, part:1, figure 1 to 4. and Mansa lake Water parameter, graph, and photo are presented in table – 2, part:2, figure 1 to 4. The pH of both the lakes is indicates the alkaline nature of lake and it is varies from 7.6 pH to 8.6 pH of Nardipur lake and 8.2 pH to 8.7 pH of Mansa lake. The Dissolved Oxygen varies from 5.6 mg/l to 6.8 mg/l of Nardipur and 6.3 mg/l to 6.7 mg/l of Mansa lake. Low content of dissolved Oxygen assign of organic pollution, it is also due to inorganic reductions like Hydrogen bisulphate,

Ammonia, Nitrates, Ferrous ions and other such oxidizing substances (Ara et al., 2003). The alkalinity in the both lakes varies from 92 mg/l to 110 mg/l of Nardipur lake and 357 mg/l to 380 mg/l of Mansa lake. The high alkalinity is a function of ion exchange, which is calcium ions are replaced by Sodium ions and later contributed to alkalinity (Sharma and John 2009). Alkalinity may also cause due to evolution of CO₂ during decomposition of organic matter. The Chloride content in Nardipur lake varies from 15.2 mg/l to 18.2 mg/l and in Mansa lake 169.1 mg/l to 180.1 mg/l. The chloride is one of the important indicators of pollution (Khare et al, 2007). The Nitrate in a both lake is indicates nil. 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 22.6 mg/l to 27.2mg/l in Nardipur lake and 45.3 mg/l to 56.7 mg/l in Mansa lake. 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 (Thilaga et al. 2005)). the variation in total dissolved solid was found to be 5.6 mg/l to 6.8 mg/l of Nardipur lake and 777 mg/l to 827 mg/l of Mansa lake. the variation in Electric conductivity was found to be 350 mg/l to 418 mg/l of Nardipur lake and 1146 mg/l to 1220 mg/l of Mansa lake.

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

Table – 1 Nardipur lake

Sr. No.	Test Parameters	Year-2011						Unit
		Jan.	Feb.	Mar.	Apr.	May.	June.	
1	pH	7.6	7.8	8.2	8.4	8.6	8.6	
2	Dissolved Oxygen	5.6	5.8	6.2	6.4	6.8	6.8	mg / lit.
3	Total Dissolved Solid	236	246	264	272	282	280	mg / lit.
4	Electric Conductivity	350	364	391	403	418	414	mg / lit.
5	Chloride	15.2	15.8	17.04	17.5	18.2	18.02	mg / lit.
6	Alkalinity	92	96	104	106	110	108	mg / lit.
7	Total Hardness	106	111	120	122	127	125	mg / lit.
8	Calcium	22.6	23.7	25.6	26.2	27.2	26.6	mg / lit.
9	Calcium Hardness	57	59	64	65	68	67	mg / lit.
10	Magnesium	12.2	12.5	13.6	13.8	14.4	14.1	mg / lit.
11	Magnesium Hardness	49	52	56	57	59	58	mg / lit.
12	Fluoride	1.61	1.7	1.84	1.87	1.93	1.91	mg / lit.
13	Nitrate	ND	ND	ND	ND	ND	ND	mg / lit.
14	C. O. D.	17.5	18.2	19.6	20.1	20.9	20.7	mg / lit.
15	B.O.D.(3 Day 27 C)	0.85	0.88	0.62	0.64	0.66	0.65	mg / lit.

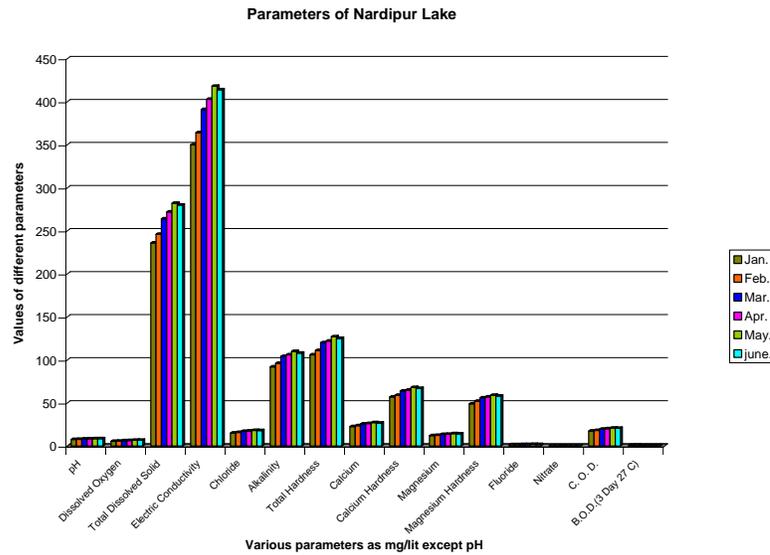
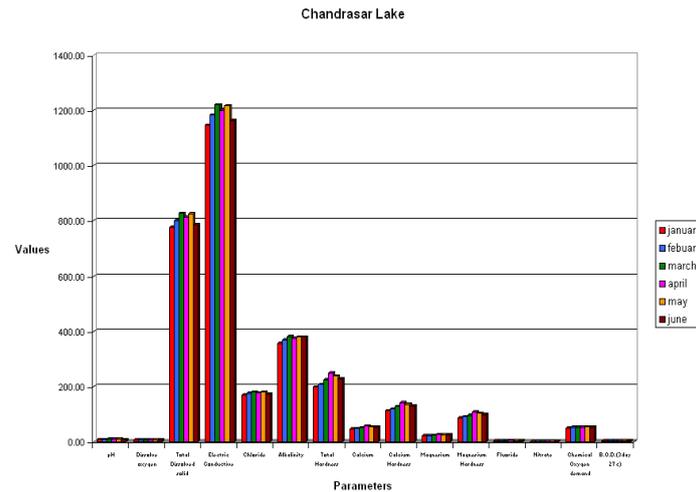


Table-2: Mansa lake

sr.nos	test parameter	Yera-2011						unit
		january	february	march	april	may	june	
1	pH	8.2	8.4	8.6	8.5	8.7	8.4	--
2	Dissolve oxygen	6.3	6.5	6.7	6.6	6.7	6.4	mg/l
3	Total Dissolved solid	777	802	827	814	826	786	mg/l
4	Electric Conductive	1146	1183	1220	1200	1217	1163	mg/l
5	Chloride	169.1	174.6	180.1	177.1	179.6	171.6	mg/l
6	Alkalinity	357	368	380	374	379	379	mg/l
7	Total Hardness	198	208	224	248	238	228	mg/l
8	Calcium	45.3	47.6	51.3	56.7	54.4	52.1	mg/l
9	Calcium Hardness	112	118	128	141	135	129	mg/l
10	Magnesium	20.9	21.9	23.4	26.0	25.0	24.0	mg/l
11	Magnesium Hardness	86	90	96	107	103	99	mg/l
12	Fluoride	3.40	3.56	3.80	4.23	4.07	3.91	mg/l
13	Nitrate	nd	nd	nd	nd	nd	Nd	mg/l
14	Chemical Oxygen demand	48.4	51.8	52.4	52.9	53.2	51.8	mg/l
15	B.O.D. (3day 27 c)	2.5	2.7	2.8	2.8	2.8	2.7	mg/l

All the parameters are in mg/lit. except pH



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