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"Studies on the Physico-Chemical Status of Two Lakes- Deliya Lake and Malap Lake, Under Biotic Stress" of Visnagar Taluka in Mehsana District, Gujarat, India

[1]H. V. Joshi, [2]Dr. R. S. Patel

[1] Department of Biology, Gujarat Arts & Science College
[2] Department of Biology, KKSJ Science College, Maninagar , Ahmedabad, Gujarat, India.

Abstract- Visnagar city is located in north Gujarat (72 30 n and 73 30 n 23 0 e and 23 35 e). Visnagar taluka is popularly known as '*Shikshan Nagari'* and also known as Copper city. The climate of visnagar is tropical arid to marginal semi-arid. It is strongly periodic and seasonal. There are many fresh water bodies are situated at and around Visnagar taluka. The present study deals with the physico-chemical status of two lakes, deliya lake and Malap lake, under biotic stress". Deliya lake is natural fresh water body having 19 hector area & circular in shape. It is located between latitude23^0 41' 60''N longitude72^0 32' 60'' E. it is oldest lake of visnagar. It is also known as hanuman temple talav. Constructed before 10'th century. Another historical lake is Malap lake , is also situated near Visnagar. Malap lake is natural fresh water body having 4 hector area. These water bodies has dense growth of algae and planktons in its. Physico-chemical status of two lakes belongs to Visnagar Taluka 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 carried out like temperature, pH, Fluoride, COD, BOD, Phosphate, Sodium, Chloride, Alkalinity, Total Hardness, Calcium, DO and TDS. The result indicates that the both lakes are in polluted condition. It is evident that Malap Lake was found to be more polluted in compare to Deliya Lake. Mittal & Sengar (1990) investigated phytoplankton diversity in relation to certain physico-chemical characteristics and observed direct correlation with conductivity, dissolved solids, suspended solids, turbidity, D.O. and B.O.D. Tripathi and Pandey (1990) observed higher value of total hardness and stated that it may be due to polluted water of the ponds. Various physico-chemical parameter like 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 phosphate, chloride, done and measured here data where analyzed by standard international method mentioned in APHA(2005).

Index Terms- Water characteristics , physico -chemical status, biotic stress

I. INTRODUCTION

Fresh water habitats occupy relatively small portion of the earth's surface as compare to marine and terrestrial habitats but their importance to man is far greater than their areas. Fresh water are the most suitable and cheapest source for domestic and industrial needs and they provide convenient waste disposal systems. The increased demand of water as consequence of population growth agriculture and industrial development has forced environmentalist to determined chemical physical and biological characteristics of natural water resource(Regina and Nabi,2003) water is one of the important source, to sustain life and has long been suspected of being the source of much human illness source of surface water and ground water have became increasingly contaminated due to increase industrial and agricultural activity the public desires water that is low in hardness and total solids non-corrosive and non scale farming. Pollution is most burning problems before the mankind. It causes damages to the human being on the one hand and is property on the other hand. In some of the cases it has became the root cause of their destruction of human being by producing various kinds of pollution resulting in various types of diseases. Deterioration in the quality and quantity of the crops. Pollution is an undesirable change in the physical biological or chemical characteristics of air, water and soils that have affected on the living organisms. The man is abusing natural water resources at large scale the efforts to conserve this resources is the present need. Factors the influence the sustainability of such lentic systems are temperature transparency salinity biogenic salts dissolved gases etc. (Munawar, 1970, Mishra and Yadav, 1978) since lakes are favourable habitats for a variety of Flora- Fauna and also used by the anthrpogenic society. So its regular monitoring is necessary for control recently lot of work has been done on changing ecological behavior of lakes (Mahanada et al.2005, Kanungo et al. 2006, Gupta et al 2008. Banerjee and Mandal 2009) in the present study two important.

II. STUDY AREA

Visnagar taluka is popularly known as 'Shikshan Nagari' and also known as Copper city is located between **Latitude**: 23° 41' 60 N, **Longitude**: 72° 32' 60 E. There are many fresh water bodies are situated at and around Visnagar taluka, Dist. Mehsana, Gujarat, India. These water bodies has dense growth of algae and

planktons in its. The area have several water bodies out of 2 water bodies are selected viz.,

1. Deliya lake (mostly used for domestic purpose)
2. Malap lake (mostly used for domestic purpose)

III. MATERIALS AND METHODS

In deliya and Malap lakes were selected which affected by domestic sewage, scale industrial effluents and worshiping activities. Deliya and Malap lakes are also faces similar biotic stress. Water samples were collected from both lakes, once in month, from January-2011 to june-2011 in between 9:00 am to 11:00 am at on regular interval of 30 days. The analysis of physico - chemical parameters was done by following the standard method (APHA.2005)

The deliya lake is named as lake-1 and the Malap lake is named as lake -2. Quality of water is depended on various affecting climatic factors the data of various factors are collected from different source and own observation. Physico-chemical and biological parameters samples were collected at regular interval from selected water bodies by proper method.

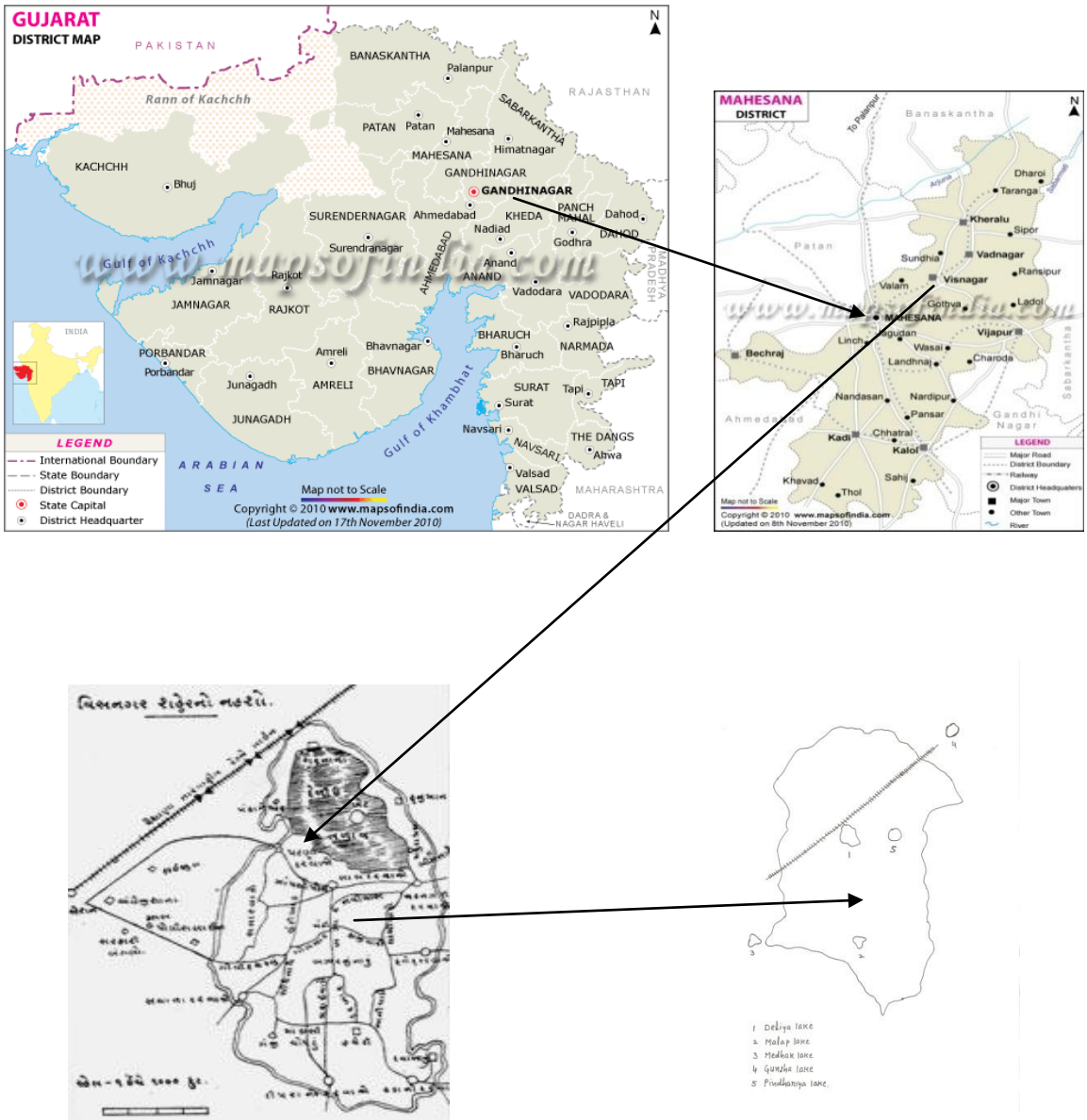
IV. PARAMETERS

- Temperature
- pH
- Alkalinity
- Total hardness
- TDS
- Dissolved oxygen (DO)
- Flouride
- Phosphate
- Sodium
- Chloride
- Ca
- BOD
- COD

For the analysis of above parameters standard methods and suggested in various text books reference books, paper etc applied.

Identify the constructs of a Journal – Essentially a journal consists of five major sections. The number of pages may vary depending upon the topic of research work but generally comprises up to 5 to 7 pages. These are:

Study Area Map



Maps showing

1. Gujarat state map
2. Mehsana district map
3. Visnagar city (Study areas) map
4. Different lakes spot maps

Plate:1 Deliya lake

Photo:1

Photo:2

Photo:3

Photo:4

Plate:2 Malap Lake

Photo:1

Photo:2

Photo:3

Photo:4

DELIYA LAKE							
Sr .no	**parameters**	**Period of analysis**					
		Jan.11	Feb.11	Mar.11	Apr.11	May.11	Jun.11
1	pH	7.3	7.2	7.3	7.3	7.9	8.1
2	Temp	20.2	23.8	26.4	36.1	37.2	32.1
3	Calcium	52.2	49.8	45.6	41.7	42.2	41.8
4	Fluoride	1.8	1.9	2.1	2.2	2.4	2.3
5	COD	62.1	61.8	68.4	78.4	79.9	79.6
6	BOD	1.2	1.3	1.2	0.5	0.6	0.4
7	Phosphate	0.019	0.029	0.128	0.176	0.18	0.193
8	Sodium	96	98	102	110	118	113
9	Chloride	270.4	260.2	180.6	130.6	132.2	130.1
10	Alkalinity	170	192	215	280	310	290
11	Total Hardness	160	163	178	176	185	181
12	DO	1.9	2.1	2.1	2.2	2.4	2.1
13	TDS	480	510	540	620	690	670

Note: All the parameters are in mg/l except pH and TEMP

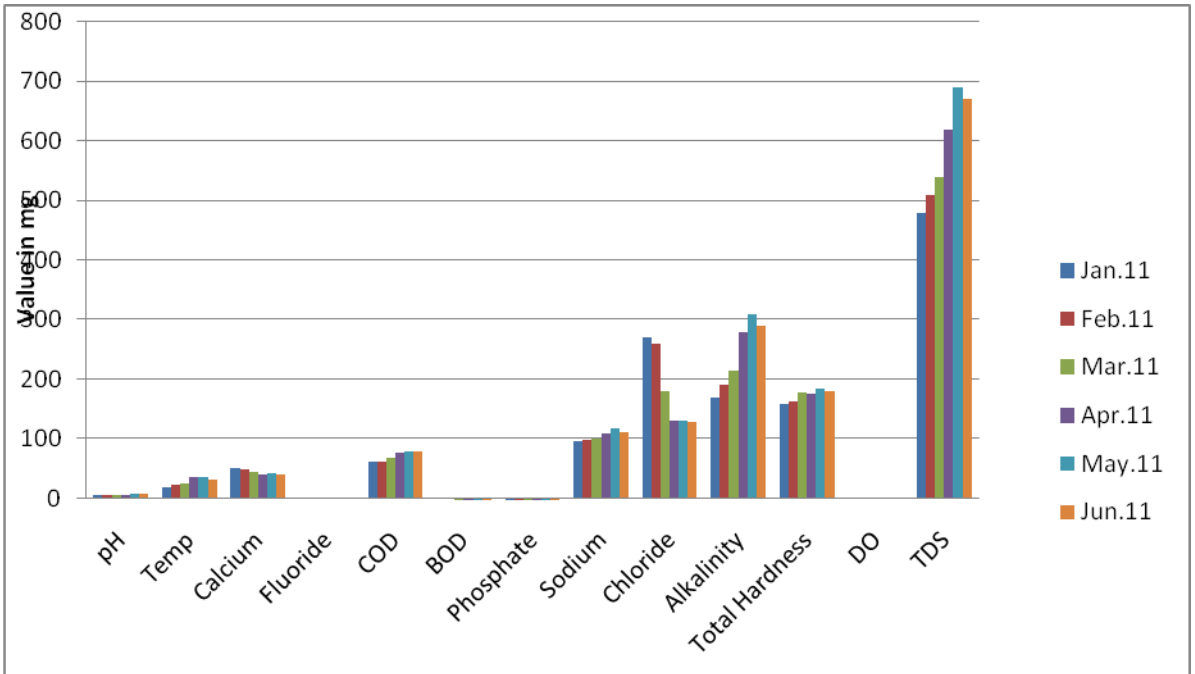


Fig.1: Physico- Chemical analysis of water sample from Deliya Lake during Jan- 11 to June - 11

MALAP LAKE							
Sr.No.	**parameters**	**Period of analysis**					
		Jan.1	**Feb.11**	**Mar.11**	**Apr.11**	**May.11**	**Jun.11**
1	**pH**	7	7.1	7.1	7.2	7.3	8.1
2	**Temp**	28	29	32	35	36	38
3	**Calcium**	43.8	41.1	37.2	34.4	33.7	32.3
4	**Fluoride**	23.35	21.77	19.7	18.36	18.18	17.39
5	**COD**	61	57	51	48	47	45
6	**BOD**	29.02	26.6	23.8	22.4	22.2	21.06
7	**Phosphate**	13.19	12.12	10.85	10.21	9.94	9.57
8	**Sodium**	269	252	226	212	208	199
9	**Chloride**	390.2	370.4	360.2	190.1	198.8	192.4
10	**Alkalinity**	210	230	255	290	336	310
11	**Total hardness**	301	281	254	237	232	224
12	**DO**	3.2	3.7	3.8	4.2	5.4	5.1
13	**TDS**	510	508	630	690	748	720

All the parameters are in mg/l except pH and TEMP

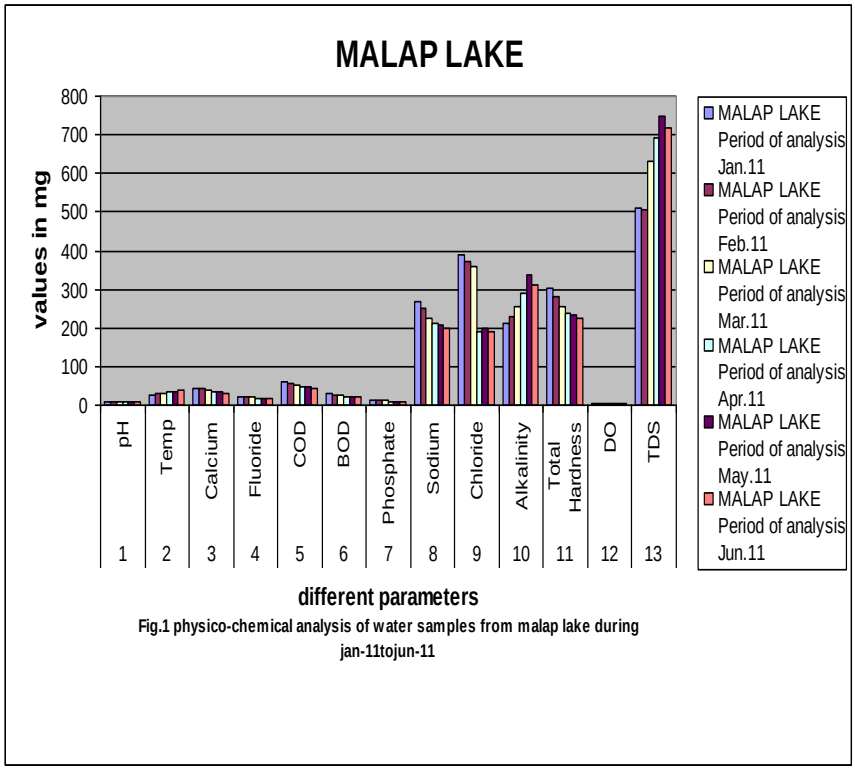


Fig.1 physico-chemical analysis of water samples from malap lake during jan-11tojun-11

V. RESULT AND DISSCUSSION

The physico-chemical parameters of Delia and Malap lakes were analyzed from January-2011 To June 2011. It shows in table 1&2 and fig. 1&2. The temperature of two lakes are 20.2^0c to 37.2^0c. and 28^oc to38^oc. The temperature affects to biotic rate of living organisms (Gupta et al 2008). The pH of both lakes indicate the alkaline nature of lakes and it's various from 7.2 to 8.1 and 7 to 8.1 pH., the dissolved oxygen observed various, from 1.9 mg/l to 2.4 mg/l and 3.2 mg/l to 5.4 mg/l low content of dissolved oxygen assign of organic pollution. It's also due to inorganic feductants lake hydrogen sulphide ,ammonia ,nitride, ferrous ion and other such Oxidisable substance(Ara et al.,

2003).The alklinity in the both lakes various from. 170 mg/l to 310 mg/l and 210 mg/l to 336 mg/l respectively. The high alkalinity is a function of ions exchange that is calcium ions are replace by sodium ion and later contributed to alkalinity (sharam and john 2009) alkalinity may also caused due to evolution of co_2 during decomposition of organic matter. The chloride content in both lakes are various from 130.1mg/l to 270.4mg/l. and 190.1mg/l to 390.2mg/l. the chloride is one of the important indicator of pollution (khare at 2007). The calcium content in both lake various from 41.7mg/l to 52.2mg/l and 32.3mg/l to 43.8mg/l respectively calcium is linked with the carbon dioxide and is an important constituent of the skeletal structure of organisms. Calcium from the most abundant ions in fresh water(thilaga et al.2005). Sodium recorded highest value was 118mg/l at lake 1 during may 2011 and lowest was 96mg/l in January 2011 and lake 2 highest value was 269mg/l and lowest value was 199mg/l during june2011. During June 2011 the fluoride content in both lake various from 1.8 mg/l to 2.4 mg/l and 17.39mg/l to 23.35mg/l fluoride causes dental florists bending of vertebral column deformation of knee joint and of the bone of the body. Total dissolved solids content in both lakes various from 480 mg/l to 690mg/l and 508mg/l to 748mg/l respectively. Total hardness of the water sample were observed in both lakes various from 160mg/l to 185mg/l and 224mg/l to 301mg/l. The hardness of water indicates water quality. From the result obtained it can be concluded that both lakes are polluted because fresh water bodies continuous discharged of domestic sewage and run of high amount of nutrients lead to eutrophication. The result also indicates that Malap lake is more polluted than Deliya lake due to greater biotic stress.

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AUTHORS

First Author – V. Joshi, Department of Biology, Gujarat arts & Science College, E.mail: hvjoshizoology@gmail.com
Second Author – Dr. R. S. Patel, Department of Biology, KKSJ Science College, Maninagar , Ahmedabad, Gujarat, India, Email: rspbotany72@yahoo.co.in