



COMPARISON OF THE PHYSICO-CHEMICAL STATUS OF TWO LAKES- MALAP LAKE AND MINDHAL LAKE, UNDER BIOTIC STRESS OF VISNAGAR TALUKA IN MEHSANA DISTRICT, GUJARAT, INDIA

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ABSTRACT:

Visnagar city is located in north Gujarat 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, malap lake and mindhal lake, under biotic stress". malap lake is natural fresh water body. Another historical lake is mindhal lake, is also situated near Visnagar. mindhal lake is natural fresh water body having 3.5 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 Deliya Lake was found to be more polluted in compare to Pindhariya 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).

KEY WORDS: *Water characteristics, physico-chemical status, Biotic stress.*

INTRODUCTION:

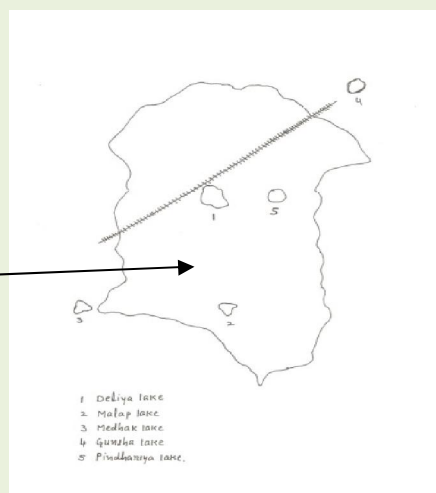
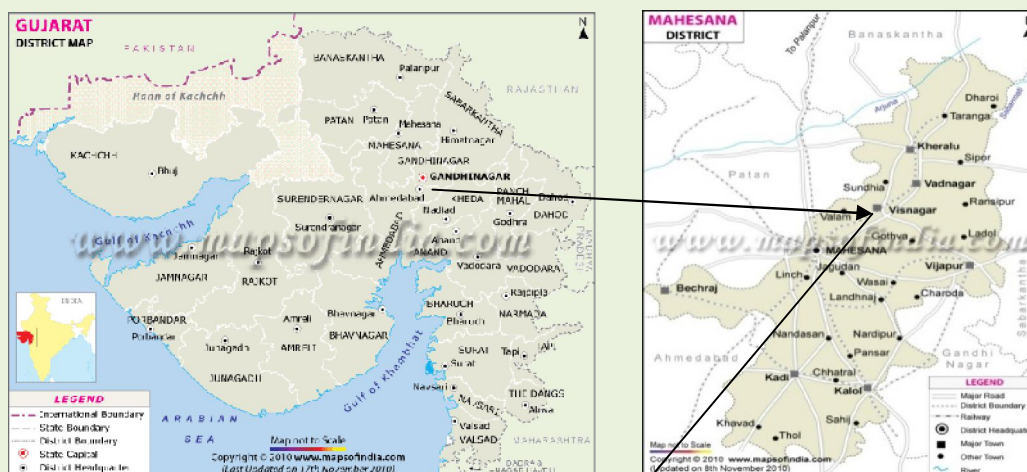
Fresh water habitats occupy relatively small portion of the earth's surface as compare to marine and terrestrial habitats but their importance to man is far greater than their areas. Fresh water are the most suitable and cheapest source for domestic and industrial needs and they provide convenient waste 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 become 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 forming. 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 become 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 favorable habitats for a variety of Flora- Fauna and also used by the anthropogenic 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.

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. Malap (mostly used for domestic purpose)
2. Mindhal (mostly used for domestic purpose)

Study Area Map



Maps showing

1. Gujarat state map
2. Mehsana district map
3. Visnagar city (Study areas) map

Different lakes spot maps

METHODOLOGY:

In malap and mindhal lake was selected because which is affected by domestic sewage scale industrial effluents and worshipping activities. Water samples were collected from both lakes once in month from January-2011 to june-2011 in between 9:00am to 11:00am at on regular interval of 30 days. The analysis of physico-chemical parameters was done by following the standard method (APHA.2005) The malap lake is named as lake-1 and the mindhal lake was named as lake -2. The water sample 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 slandered methods (APHA,1985) Quality of water is depended on various affecting climatic factors the data of various factors are collected from different source and own observation To determine physico-chemical and biological parameters samples collected at regular interval from selected water bodies by proper method. Different parameters like Temperature, pH, Alkalinity, Total hardness, TDS, Dissolved oxygen (DO), Fluoride ,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 for this paper. I have taken photographs of the lakes in various views to show their real situation.

RESULTS AND DISCUSSION:

The physico-chemical parameter of Malap and Mindhal lakes were analyzed from January-2011 To june 2011.and are presented in table 1&2 and fig. 1&2. The temperature in lake 1&2 various from 38⁰c to 28⁰c. and 37⁰c to 27⁰c. Respectively. The temperature affect the me to biotic rate of living organism (gupta et al 2008). The pH of both lakes indicate the alkaline nature of lakes and it's various from 8.1 to 7 and 7 to 8.8 pH. the dissolved oxygen various from 5.4 mg/l to 3.2 mg/l and 3.8 mg/l to 1.6 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 ox disable substance(are at 2003).the alklinity in the both lake various from. 336 mg/l to 210 mg/l and 344 mg/l to 309 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 CO₂ during decomposition of organic matter. The chloride content in both lakes various from 190.1mg/l to 390.2mg/l. and 144.4mg/l to 204mg/l. the chloride is one of the important indicator of pollution (khare at 2007). The calcium content in both lake various from 32.3mg/l to 43.8mg/l and 37.4mg/l to 52.9mg/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 269mg/l at lake 1 during Jan 2011 and lowest was 199mg/l in June 2011 and lake 2 highest value was 272 mg/l during May 2011 and lowest value was 192mg/l during February

2011. The fluoride content in both lake varies from 17.39 mg/l to 23.35 mg/l and 0.9mg/l to 1.4mg/l fluoride causes dental fluorosis bending of vertebral column deformation of knee joint and of the bone of the body. Total dissolved solids content in both lake varies from 508 mg/l to 748mg/l and 660mg/l to 932mg/l respectively. Total hardness of the water sample was observed in both lake varies from 160mg/l to 185mg/l and 57mg/l to 72mg/l. The hardness of water is an indicator of water quality. From the result obtained it can be concluded that both lakes are polluted fresh water bodies due to the continuous discharge of domestic sewage and run of high amount of nutrients lead to eutrophication. The result also indicates the Malap lake is more comparatively more polluted due to greater biotic stress. Different views of both lakes indicate in plate 1 (fig1-4) and plate 2 (fig1-4). Table 1 is shown different parameters of Malap lake and Table 2 is shown different parameters of Mindhal lake.

REFERENCES:

- Misra, G. P. and A. K. YADAV (1978). A comparative study of physico-chemical characteristics of river and lake water in central India. *Hydrobiol.* 59(3):275-278.
- Regina, B. and B. Nabi (2003). Physico-chemical spectrum of the Bhavani river water collected from the Kalingaryan dam, Tamilnadu. *Indian J. Environ. & Ecoplan.* 7(3):633-636
- APHA and AWWA (1985). *Standard Methods for Examination of Water and Wastewater*. 16th American Public Health Association, Washington, DC.
- Ara, S., M. A. Khan and M. Y. Zagar (2003). Physico-chemical characteristics of Dal lake water. In: Kumar (Ed.) *Aqu. Env. Toxicol.*, Daya Publishing House, Delhi, 128-134
- Banejee, D. and S. Mandal (2009). Water quality aspects of some ponds in Asansol. *Ecol. Env. & Cons.*, 15(1) : 145-152.
- Gupta, S. K., N. P. Tiwari and Mohd. Noor Alam (2008). Studies on Physico-Chemical status of two ponds at Patan in relation to growth of fishes. *Nat. Env. & Poll. Tech.*, 7(4) : 729-732.
- Kangugo, V. K., J. N. Verma and D. K. Patel (2006). Physico-Chemical Characteristics of Doodhadahri pond of Rainpur, Chattisgarh. *Eco. Env. & Cons.*, 12(2) : 207-209
- Khare, S. L., S. R. Paul and Anita Dubey (2007). A Study of water quality of Khomph-Niwari lake at Chhatarpur, M. P. *Nat. Env. & Poll. Tech.*, 6(3) : 539-540.
- Mahananda, H. B., M. R. Mahananda B. P. Mohanty (2005). Studies on the physico-chemical and biological parameters of a fresh water pond ecosystem as an indicator of water pollution. *Eco. Env. & Cons.*, 11(3-4) : 537-541.
- Munawar, M. (1970). Limnological studies of freshwater ponds of Hyderabad, India. I – Biotope. *Hydrobiol.*, 35 : 127-162.

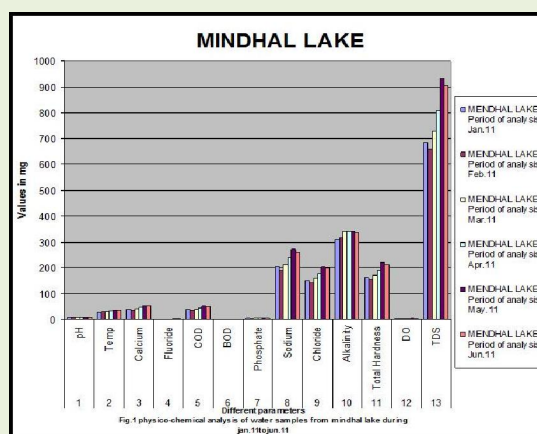
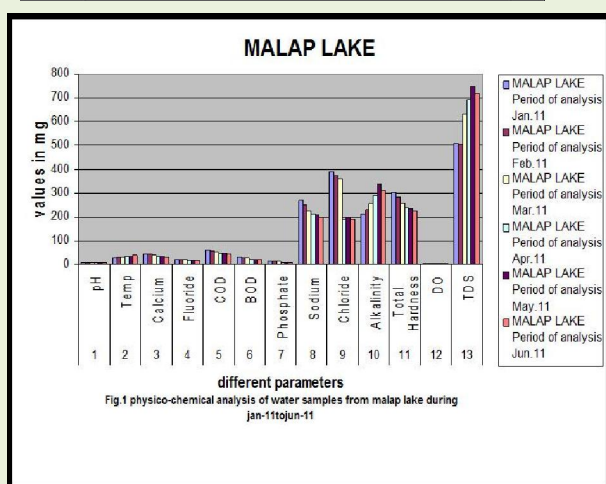
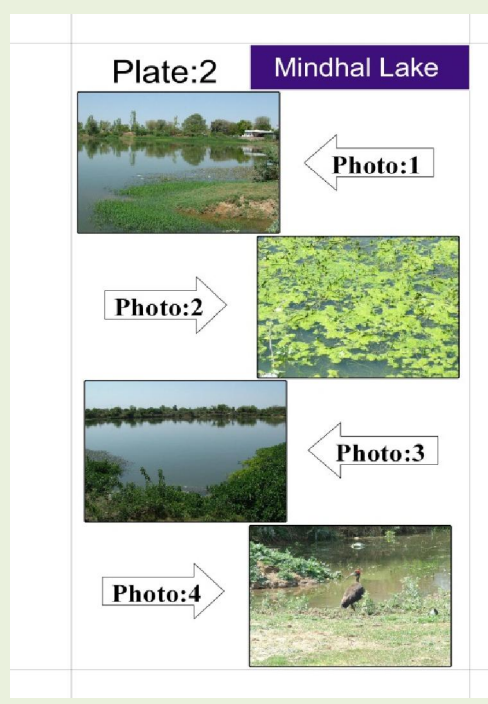
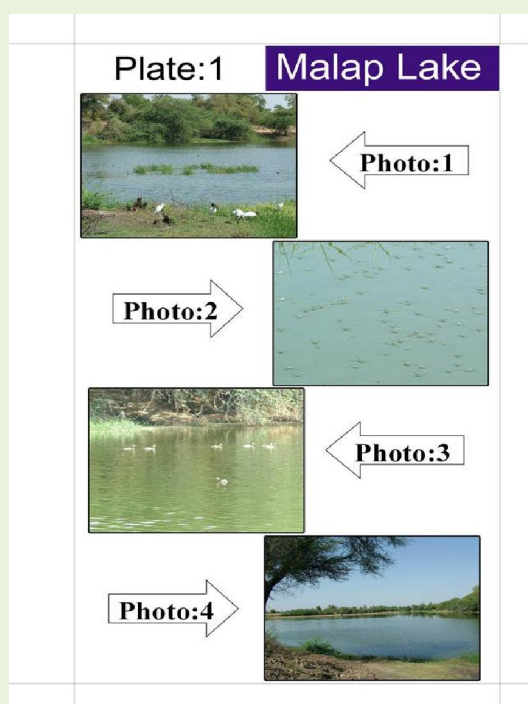
Sharma, G. and R.V. John (2009). Study of Physico-Chemical Parameters of waste water from dyeing units in Agra city. *Poll, Res.*, 28(3) : 439-442.

Solanki, V.R., S.Murthy, S.Samba, A.Kaur and S.S.Raya(2007). Variations in dissolved oxygen and biochemical oxygen demand in two fresh water lakes of Bonhan, A.P., India. *Nat.Env. & Poll. Tech.*, 6(4) : 623-628.

Thilaga, A.,Subhashini, S.Sobhana and K.L.Kumar (2005). Studies on nutrient content of the Ooty lake with reference to pollution. *Nat.Env. & Poll. Tech.*,4(2) : 299-302.

Bhatt,S.D.and Pathak,J.K.Aseessment of water quality and aspect of pollution in stretch of river gomti(kumaun: lesser Himalaya),*j.env.boil*13(2):pp.113-126,1992.

Agarkar,S.V.- Physico chemical aspect of ground water quality in chikhli town of buldana district *poll.res.*17(3):pp291-292.1998.



MALAP LAKE							
Sr.No.	parameters	Period of analysis					
		Jan.11	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

MINDHAL LAKE							
Sr.No.	parameters	Period of analysis					
		Jan.11	Feb.11	Mar.11	Apr.11	May.11	Jun.11
1	pH	7	7.1	7.2	7.2	7.3	8.8
2	Temp	27	29	32	34	37	37
3	Calcium	38.9	37.4	41.3	45.9	52.9	51.3
4	Fluoride	1	0.9	1	1.2	1.4	1.3
5	COD	38	36	40	45	51	49
6	BOD	0.6	0.6	0.7	0.8	0.9	0.8
7	Phosphate	3.83	3.63	4.03	4.54	5.15	4.94
8	Sodium	203	192	213	240	272	261
9	Chloride	149.7	144.4	159.3	177.2	204.5	197.8
10	Alkalinity	309	316	343	343	344	337
11	Total Hardness	162	155	172	192	220	213
12	DO	1.6	1.9	2.1	2.7	3.8	3.4
13	TDS	684	660	728	810	932	904

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