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Cationic contamination in lake's water situated South area at Ahmedabad, Gujarat

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Abstract

Ahmedabad is unique in the whole of India in matter of environmental neatness and flourishing conditions and it is superior to other cites in the excellence of its monuments. Ahmedabad Urban Development Authority (AUDA) proposes to undertake work for revival, development of catchments areas and beatification of few lakes under the present project .of these Makarba and Sarkhej Lake's waters were analyzed for cationic contaminations. The results values of the metals estimated through 2 lakes during monthly Analysis of the January-2009 to December -2009. Their ranges of concentration were comparing to permissible limit of BIS. Calcium content of water samples from all localities were within the permissible limit of BIS except locality no.1 January-2009 and locality no.2 in November -2009. Magnesium content of water samples from all localities were within the permissible limit of BIS except locality no.1 in July-2009, locality no.2 April-2009, sulphate contents of water samples from locality no.1 and 2 July -2009. Ammonia Content of water samples from locality no.1April And locality no.2 May-2009, Phosphate content of water samples from all localities were within the permissible limit of BIS except locality no.1 in May and no.2 is December-2009. The results suggested that water was suitable for drinking purpose. Nitrite content of water samples from all localities were within the permissible limit of BIS except locality no, 1 and 2 in August-2009. The results suggested that water was suitable for drinking purpose.

Key-Words: Cation, AUDA, Calcium, magnesium, Sulphate, Ammonia, Phosphate, Nitrite, Lake.

Introduction

Limnology is a discipline that concerns the study of inland waters (both saline and Fresh) specifically lakes, ponds and river (both natural and man made) including their biological, physical, chemical and hydrological aspects. The term' limnology' stem from Greek' *limne* (lake)' and '*logos*'(study)'. In ecology the environment of a lake is referred to as *lacustrine*. The lakes are quiet large bodies of fresh water usually deep enough that their beds lie much beyond the photosynthetic zone[1] fluctuations in the lake level are because of climate conditions and human requirements of water. The rate of water replacement of a lake also depends upon the season. A lake may be occasionally created by digging a basin that intercepts the water table. Such a lake is in a sense nothing but a wide shallow well. Most man made lakes are created by damming a stream at a strategic point, so that the the water backed up the dam can be contained in a natural valley or basin[2-5].

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Many lakes are artificial and constructed for hydro-electric power supply, recreational purposes, industrial, agricultural use and domestic water supply. Ahmedabad is unique in the whole of India in matter of environmental neatness and flourishing conditions and it is superior to other cities in the excellence of its monuments. Ahmedabad Urban development Authority (AUDA) carried out a survey of 645 lakes and identified 22 lakes which have been severely degraded. AUDA proposes to undertake works for revival, development of catchments area and beautification of lakes under the present project. Of these, 4 lakes were studied which are located at Makarba and Sarkhej villages, Makarba lake is located at Makarba village near famous Sarkhej Rosa Mosque, Ahmedabad. Its total storage capacity is 26.5 Corer liters. Lake Desilting area is 1461 m^3 and peripheral development Works including landscaping ; Sarkhej Lake is located at Sarkhej Village near National Highway No.8, Ahmedabad its total storage capacity is 67.0 Corer liters. Lake Desilting Area is 4309 m^3 and peripheral development works including landscaping: recreation facilities are such as Amphi theatre, children park and Boating facilities and percolation wells to recharge

ground water table. AUDA has commenced work on this lake also through own resources.

Material and Methods

Water samples were collected from Tow lakes (Makarba, Sarkhej). Samples were collected in these month January-2009 to December -2009. Following cations were analyzed using standard methods given[6] Ca^{++} and Mg^{++} Titrimetrically by EDTA SO_4^{2-}, NH_3-N, PO_4 -P and NO_2^- N was determine by spectrophotometric method: Distilled water was used as control for comparison and their results were compared with the desirable limit and permissible limit[7-8].

Results and Conclusion

Comparison of the measured parameters and the cation concentration with the water quality shows in Table no.1 to 6. While the values of Ca^{++}, Mg^{++}, SO_4^{2-}, NH_3-N, PO_4 -P , NO_2^- N Biodegradable organic matter such as contributed by industries or domestic pet excreta and mixed with lake water . The used of fertilizer in agriculture and detergents including phosphate are supposed to increase phosphate concentration. The exceeding amounts of the ammonia nitrogen and nitrite are through to be mainly a result of the fertilizer and sewerage waste. Than Calcium continent of water samples from all localities were within the permissible limit of BIS Except locality No. 1,2 in January-2009 to December -2009. The highest concentration of calcium in water was record at locality no.1 in January-2009 (200mg/l). The lowest concentration of calcium in water was recorded at locality no.1 April -2009(40 mg/l), (Table -1).

Magnesium content of water samples from all localities were within the permissible limit of BIS except locality no1, 2 in January-2009 to December-2009. The highest concentration of magnesium in water was recorded at locality no.2 in April-2009(260 mg/l). The lowest concentration in water was recorded at locality no.2. August 2009. (40 mg/l) show on Table -2 .similar studies was conducted[3].

Sulphate (SO_4^{2-}) Content of water samples from all localities were within the permissible limit of BIS except locality no.1,2 in January-2009 to Decmber-2009. The highest concentration of Sulphate in water was recorded at locality no.1 July-2009 (8.5mg/l). The lowest concentration in water was recorded at locality no.2 March-2009, (0.001 mg/l); (Table-3)

Ammonia (NH_3-N) Content of water samples from all localities was within the permissible limit of BIS except locality no.1, 2 in January-2009 to December-2009. The highest concentration of Ammonia in water was recorded at locality no.1 April-2009; (15.0 mg/l). The lowest concentration in water was recorded at locality no.1 February -2009 (0.01 mg/l) , Shown in Table-4 clearly depicts that Ammonia Decreased .The progressive increase in water quality to Ammonia could be due to Heavy Growth of Aquatic weeds which efficiently utilize the Ammonia in the lake[9-11].

Phosphate (PO_4-P) Content of water samples from all localities was within the permissible limit of BIS except locality no.1, 2 in January-2009 to December-2009. The highest concentration of Phosphate in water was recorded at locality no.2 December-2009 (3.6mg/l). The lowest concentration in water was recorded at locality no.1 Jun and December-2009 (0.6mg/l), (Table-5).

Nitrite (NO_2-N) Content of water samples from all localities were within the permissible limit of BIS except locality no.1, 2 in January-2009 to December-2009. The highest concentration of Nitrate in water was recorded at locality no.1 August-2009 (32.0 mg/l) of 2009 (Table-6). The lowest concentration in water was recorded at locality no.1 July -2009 (0.2 mg/l) of 2009 (Table-6)

Nitrite is more toxic and nitrogen indicates the recent pollution from lake water. Maximum permissible limit of WHO for both is 1.0 mg/l. The nitrite nitrogen was also observed within the permissible limits of WHO[12] (Table-6).

Ahmedabad city is situated on the river bank of Sabarmati at Gujarat. The Water samples were collected from two lakes. The Cationic Contamination like Calcium, Magnesium, Ammonia, Sulphate, Phosphate and Nitrite were studied comparatively during January-2009 to December-2009. The results suggested that water was not suitable for Drinking Purpose.

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Table 1: Analysis of Ca^{++} (mg/l) in water of various lakes during the year 2009 for comparative study of pollution

No	Lake name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01	Makarba	200	70	50	40	70	50	50	50	50	80	100	70
02	Sarkhej	120	150	110	100	100	50	50	100	100	120	180	120

Table 2: Analysis of Mg^{++} (mg/l)in water of various lakes during the year 2009 for comparative study of pollution

No	Lake name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01	Makarba	130	130	160	80	110	100	190	90	80	80	130	90
02	Sarkhej	180	240	240	260	200	200	150	40	170	160	210	170

Table: 3 Analysis of SO_4^{2-} (mg/l)in water of various lakes during the year 2009 for comparative study of pollution

No	Lake name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01	Makarba	0	0	2.0	3.0	2.0	5.3	8.5	6.0	3.6	3.2	2.54	4.5
02	Sarkhej	0	0	0.001	2.0	1.2	4.1	6.3	6.5	3.7	1.3	4.37	2.8

Table 4: Analysis of NH_3 N (mg/l) in water of various lakes during the year 2009 for comparative study of pollution

No	Lake name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01	Makarba	0	0.01	0	15.0	9.0	2.54	4.4	0	1.3	1.1	1.81	2.5
02	Sarkhej	0	0	0	1.0	13.5	6.0	12.0	0.24	8.2	8.7	10.21	2.7

Table 5: Analysis of PO_4^{-}P (mg/l)in water of various lakes during the year 2009 for comparative study of pollution

No	Lake name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01	Makarba	0	0	0	1.0	2.6	0.6	1.1	0.7	1.9	0.98	0.34	0.6
02	Sarkhej	0	0	0	2.0	1.5	1.98	1.6	1.2	2.5	2.0	1.24	3.6

Table 6: Analysis of NO_2^{-} (mg/l)in water of various lakes during the year 2009 for comparative study of pollution

No	Lake name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
01	Makarba	0	0	0	0	0	0	1.2	32.0	5.5	11.22	18.33	1.5
02	Sarkhej	0	0	0	0	0	0	1.33	0	6.1	4.2	1.55	1.6