

Hydro-chemical monitoring of Sakkardara lake at Nagpur (M.S.)

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ABSTRACT : The present paper includes an assessment of the quality of water reservoir situated near Chota Taj Bagh, Sakkardara Square, Nagpur, dist. Nagpur (M.S.). Since 'good' water quality will produce healthier humans than one with poor water quality, an analysis on the hydro-chemical parameters of Sakkardara lake water was made. The lake is situated near Raghuji Nagar in old city area and is beneficial to recreation in present days and fulfill scarcity of water in future. The use of water is mostly for recreation, idol immersion and fishing purpose. The findings of the analysis will prove to be quite informative, to the daily consumers of the water. The water samples were analyzed from June, 2008 to May, 2009. Water samples from this site were analyzed for pH, Conductivity, TDS, Chloride, Alkalinity, Hardness, DO and Sulphate. The results revealed the range of variation in different parameters viz., pH 8.0 to 8.2, TDS 789 to 992mg/l, hardness 210 to 299 mg/l, DO 5.7 to 7.2 mg/l, alkalinity 123 to 148 ppm, chloride 136 to 193 mg/l and sulphate 82 to 130 mg/l. All the hydro-chemical parameters of Sakkardara lake water are within the highest desirable limit or maximum permissible limit set by WHO.

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Urbanization created serious problems of water pollution of our rivers and lakes. Water has unique property of dissolving and carrying suspension, a huge variety of chemicals, has the undesirable consequence that water can easily become contaminated (Choudhari, 1995). Before water can be described as potable, it has to comply with certain physical, chemical and microbiological standards, which are designed to ensure that the water is palatable and safe for drinking (Tebutt, 1983). Therefore, an immediate and most critical environmental problems faced by almost all cities in India is lack of safe drinking water, a comprised quality of vital life resources, grossly insufficient waste management practices and apathy towards pollution control.

Sakkardara lake which was built in the 18th century, during the Bhonsla rule in eastern Nagpur is about 5 km south-east of Nagpur near Ayodhya Nagar. The beautiful Sakkardara garden on the shore of Sakkardara lake is the favourite weekend spot of the locals. The picturesque surrounding of the garden with vast playing area, the breath taking view of sunrise and sunset all make Sakkardara lake garden an amazing picnic spot. It covers an area about 21 acres and lies between 21° 7'8"N and 79° 6'55"E. Currently, the lake bears a dirty look with nirmalya and other waste floating around. This is posing a serious threat to the lake.

EXPERIMENTAL METHODOLOGY

Sampling programme for present study

commenced from June, 2008 and completed in the month of May, 2009. Water samples for hydro-chemical analysis were collected from site of water bodies in five lit plastic cans during 10.00 am to 12.00 pm. Samples for dissolved oxygen determination was collected in 300 ml capacity BOD bottle from just below the surface slowing to avoid any air bubble entering into the bottle and fixed by Winkler A and Winkler B solution at the site. The parameters like pH, conductivity were analyzed with the help of digital pH meter and conductivity meter for the analysis of chemical parameter. The samples were collected in plastic cans and immediately transported to the laboratory, hydro-chemical parameters were analyzed with the help of the procedures given by Kodarkar (1992); APHA (1998); Bhalerao (1998); Khanna *et al.* (2005); Sharma (1998); Day (1985) and Neeri (1988).

EXPERIMENTAL FINDINGS AND DISCUSSION

Results of various hydro-chemical parameters of Sakkardara lake water have been presented in Table 1.

pH :

Hydrogen ion concentration plays an important role in the biological process of almost all aquatic organisms. In the fluctuation of pH was recorded 8.0 to 8.2. The pH value was maximum in the winter season and minimum in summer season (Nagraj and Patil, 2008).

Conductivity :

Conductivity is directly related to the concentration of ionized substances in water. Conductivity of water fluctuated within the range of 0.271 to 0.381. Maximum in summer and minimum in winter season (Deshmukh and Tarar, 2012).

Total dissolved solids :

T.D.S. values were within the permissible limit of drinking water standards (500 to 1500 mg/lit) as suggested by WHO. The minimum value found was 789 mg/l and maximum value found was 992 mg/l.

Chloride :

The desirable limit for chloride is 250 mg/l and in present study it ranged from 136 to 193 mg/l. The concentration of chloride is directly correlated to the pollution level (Munnavar, 1970). In Sakkardara lake water it was within the permissible limit.

Alkalinity :

In the present study total alkalinity ranged between 123 to 148 ppm. That was also within the permissible limits as suggested by WHO (1984) and (Dhonde, 2012).

Hardness :

Total hardness which is very important parameter determining usefulness of water in different sectors was also very much below the permissible limit *i.e.*, 210 to 299 mg/lit. This denoted that water was soft and good for drinking purpose.

Dissolved oxygen :

The DO is one of the most important factors in any aquatic ecosystem. The main source of DO is from dissolution from atmosphere and the photosynthesis. The DO varied from 5.7 to 7.2 mg/l. DO was maximum in summer and minimum in monsoon season.

Sulphate :

The maximum permissible limit for sulphate is 200 mg/l and in present study, it ranged from 82 to 130 mg/l,

Table 1 : Comparison of different hydro-chemical parameters with suggested surface water standards for source suggested by WHO for drinking water supply

Parameters	Desirable standard WHO	Range		
		Monsoon	Winter	Summer
pH	6.5 to 8.5	8.1	8.2	8.0
Conductivity	500 to 1500 μ s/cm	329	271	381
TDS	500 to 1500 mg/l	992	789	812
Chloride	250 mg/l	136	166	193
Alkalinity	30 to 500 mg/l	148	128	123
Hardness	300 mg/l	286	210	299
DO	4 to 6 mg/l	5.7	7.1	7.2
Sulphate	200 mg/l	129	82	130

which was quite below the desirable limit for drinking water standards. Sulphate was maximum in summer and minimum in winter season.

Conclusion :

The overall result of the present study indicated that the water quality of Sakkardara lake was not so good in some season and major cause was obviously discharge of domestic waste from the local man made activities as well as from adjacent areas. So, the normal treatment, filtration and proper monitoring make the lake water potable for drinking.

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