

## Study of Pollution in Rawal Lake

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(Received 10th December, 1997, revised 5th January, 1999)

**Summary:** It was intended to establish effect of pollution on quality of water of Rawal Lake, Islamabad. Six stations were located for collection of water. The data collected and analyzed so far indicated increasing pollution in the lake. Increase in growth of hydrophytes is quite evident, leading towards process of eutrophication of the lake.

### Introduction

The Rawal lake, situated in the North-East of Rawalpindi and East of Islamabad, serves as a source of drinking water after appropriate treatment by the authorities concerned. The lake is also used for recreational and fishery purposes. The lake is formed mainly from korang river and two main nullahs coming down from Nur-pur Shahan (Bari Imam) and Quaid-e-Azam University. These two nullahs originate from Margalla Hills. A survey of the lake was under-taken to locate the possible sources of pollution of the lake.

As far the area surrounding the lake is concerned, it contains scattered localities/settlements. National Institute of Health is situated on the South of the lake, Lakhwal and Banigala on the East and village Malpur in the North Banigala and Lakhwal area close to the lake have no proper waste disposal system. Wastes originating from village activities are

disposed in the open. Rainfall run-off carries these pollutants into the lake. The two nullahs arising through Quaid-e-Azam University and Nur-pur-Shahan carry sewage and miscellaneous waste into the Rawal lake. This type of waste may cause Eutrophication of the lake [1]. During general survey of the lake it was noted that process of Eutrophication has already begun. Luxurious growth of hydrophytes and abundance of algal bloom on this end is a clear sign of the process of Eutrophication [1].

The purpose of this study is to find out potential pollutants dangerous to aquatic life and quality of water.

### Results and Discussion

Rawal lake has main inflow of water from Korang river. Water samples were collected from the

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river at Chattar picnic spot. Upon analysis of samples, results show sufficient dissolved oxygen. At this site the small river receives waste from restaurants, kiosks and huts, mainly due to visitors. Presence of nitrites is indicator of the process of incomplete oxidation/nitrification of organic matter present in the sewage. This makes the water suspicious for domestic use [2,3]. The river flows from Murree hills and carries all the waste generated as a result of human activities, down into the lake. The analysis of the samples from the other two nullahs near Nurpur Shahan and Quaid-e-Azam University show low dissolved oxygen, presence of nitrite (definite indicator of bacterial activity in the water body) [2,3], undesirable odour and higher contents of sulphates. This all is carried into the Rawal lake.

Water samples from main Rawal Lake were collected from Banigala and main visiting area. Analysis show (Table-1), dissolved oxygen sufficient for fish and aquatic fauna. Presence of nitrite indicates sewage contamination. Nitrates and phosphates were also detected. These can be attributed to sewage contamination [1,2,4].

Based on the chemical analysis of water this can be concluded that the lake is getting polluted. Some Eutrophication and growth of hydrophytes has already begun on the Western end. Eutrophication has been defined as the process of nutrient enrichment which accelerates growth of hydrophytes [1]. Nitrates and phosphates are mainly responsible [1]. Process of Eutrophication results in depletion of water and eventually the water body turns into swamps and marshes.

## Experimental

Standard methods for water and waste water analysis were used, as recommended by American Public Health Association 1971 [2].

### Details of experimental procedures

Surface water was collected in plastic bottles of 2.51 capacity

- i) pH was determined by Beckman pH meter.
- ii) Electrical conductivity was determined by Electrolytic conductivity meter Model-1, Mark-V, England.
- iii) Phenolphthalein and methyl orange alkalinities were determined by titrating samples against 0.02N H<sub>2</sub>SO<sub>4</sub> using phenolphthalein and methyl orange as indicators respectively, both above mentioned alkalinities were added to give total alkalinity. Alkalinities were expressed in terms of CaCO<sub>3</sub> mg/l.
- iv) Dissolved oxygen was determined by Winlder's method with Azide modification.
- v) Complexometric titration was performed for determination of Ca<sup>++</sup>, Mg<sup>++</sup>, Calcium hardness, Total hardness and SO<sub>4</sub><sup>-</sup>, by using 0.01M E.D.T.A. as titrant and murexide and Erio Chrome black T as indicator.
- vi) Chlorides were determined by Argentometric method.
- vii) Nitrate, Nitrite and Phosphates were determined by using spectronic 21 of Milton Roy Company.
- viii) Sodium and potassium were determined by using atomic absorption spectrometer.
- ix) Total dissolved solids were determined by gravimetric method.

S.No.	Parameter	Nurpur Shahan	Q.A. University	University Road	Chattar Park	Bani Gala	Rawal Lake
01.	pH at 25°C	7.11	7.43	7.15	7.40	6.90	7.20
02.	Electrical Conductivity(micro mhos)	630	500	495	410	370	350
03.	Total Dissolved Solids (mg/l)	414	322	340	260	268	216
04.	Dissolved Oxygen (mg/l)	4.3	8.2	7.5	8.3	8.0	8.9
05.	Total Hardness as CaCO <sub>3</sub> (mg/l)	324	258	284	216	186	164
06.	Calcium (Ca <sup>++</sup> ) (mg/l)	94	63	75	49	56	41
07.	Magnesium (Mg <sup>++</sup> ) (mg/l)	21.12	24.00	23.52	22.56	11.00	14.88
08.	Total Alkalinity as CaCO <sub>3</sub> (mg/l)	230	216	262	154	166	152
09.	Chlorides (mg/l)	30.0	8.8	15.2	8.0	8.0	8.0
10.	Sulphates (mg/l)	17.20	90.24	65.28	92.16	28.88	36.48
11.	Sodium (mg/l)	31.0	21.0	25.0	14.5	-	14.0
12.	Potassium (mg/l)	7.0	4.4	3.5	3.5	-	3.5
13.	Nitrites (mg/l)	0.09	0.10	0.06	0.10	0.10	Nil
14.	Nitrates (mg/l)	Nil	5.0	2.5	4.0	4.0	4.0
15.	Phosphates (mg/l)	1.5	1.5	1.2	1.00	1.3	1.25

**Conclusion**

This is suggested that the water courses carrying sewage load must not flow into the lake unless proper treatment as recommended by W.H.O. [5] or other public health authorities is applied.

**References**

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