



RESEARCH ARTICLE

ANALYTICAL CHEMISTRY

**ASSESSMENT OF CHEMICAL FERTILIZERS ON THE QUALITY OF WATER
AT HATHAIKHEDA RESERVOIR IN BHOPAL (M.P.)****GANESH RAM NAMDEV*, AVINASH BAJPAI¹ AND SUMAN MALIK²**Dept. of chemistry Sadhu Vaswani college Bhopal, ¹Makhanlal University Bhopal .²Head of Dept. of chemistry Sadhu Vaswani college Bhopal,**GANESH RAM NAMDEV**Dept. of chemistry Sadhu Vaswani college Bhopal, ¹Makhanlal University Bhopal

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ABSTRACT

The use of chemical fertilizers in the catchment area of the Hathaikheda Reservoir has increased manifold. The residual impact of the chemical fertilizer as well as agriculture waste inflow in the lake considerably increased the water pollution problem. The residues of the chemical fertilizer reaching to the Hathaikheda Reservoir with storm water enriched the reservoir water with the loading of nutrients. The extra loading of the nutrient caused eutrophication that supports luxuriant growth of macrophytes. Several physicochemical parameters such as pH, conductivity, Dissolved Oxygen (DO), Biological Oxygen demand (BOD), Chemical Oxygen demand (COD), Nitrates, Phosphates and Potassium were analyzed. Comparison of water quality of Hathaikheda Reservoir Bhopal was carried out in the slight of assessment of impact of use of fertilizers in different areas. During the study high concentration of nutrients were observed in the areas where chemical fertilizer is being used in comparison to other sampling station.



KEYWORDS

Eutrophication, Chemical Fertilizers, Organic Fertilizers, Water Quality.

INTRODUCTION

Hathaikheda Reservoir like many others in the state was constructed for irrigation purpose but now it is an important source of water supply to the industrial area of Govindpura and also being used for fish culture. The dam was constructed in the year 1964 by damming a low-lying area. It has maximum length of 4225 meters. and maximum breadth of 2012 meters. The water spread area of the dam is 179.9 ha. at L.T.L. and 11368.76 ha. at F.T.L. The catchment area of the reservoir is 36.90 Km². The shallow part of the reservoir gets exposed during summer session and exposed land is used for agriculture purpose where in the farmers also use huge amount of chemical fertilizers and pesticides. For the purpose of this study, two sampling stations were identified. The first station was near Anand Nagar where Chemical Fertilizers were used and the other station was at Reference Sample station i.e. Centre of the Reservoir.

MATERIAL AND METHODS

Water samples were collected in fresh 2.5 L plastic containers previously washed with 1:3 HNO₃ during the post monsoon months i.e. September-2010 from surface and bottom water.

pH was determined using digital pH meter. Conductivity was measured using digital conductivity meter. Dissolved Oxygen was determined by the Winkler's method with Azide modification. Biological Oxygen Demand was determined by five days method. Chemical Oxygen Demand determined by Potassium Dichromate Pen Reflux method. Nitrate & phosphate were estimated by UV-visible Spectrophotometer. Potassium was determined by using Flame Photometer.

RESULTS AND DISCUSSION

Water quality standards and guidelines corresponding to the ISI, WHO and CPCB, have been compared with the results under the given tables and graphs.

pH and Conductivity :- pH is largely depend on carbonates, bicarbonates and CO₂. The results of pH ranged in between 7.1-7.6 indicated that the lake water is slightly alkaline. Desirable pH range is 7.0-8.5 as per WHO, ISI. **Conductivity** is dependent upon SO₄, Cl, PO₄ and heavy metals and total concentration of dissolved ions. The conductivity values ranges between 79-584 micro-ohms/cm. The conductivity standard value is 50-1500 micro-ohms/cm.

Dissolved Oxygen(DO):- DO in water is of great importance to all aquatic organism and is considered to be the factor that reflects the biological activity taking place in a water body and influences the biological changes. In the present study DO values were found in between 1.2-7.6 mg/L against the standard value of 6.0 mg/L.

Biological Oxygen demand (BOD):- BOD is directly linked with decomposition of dead organic matter present in the lake and hence the higher values of BOD can be directly correlated with pollution status and has an inverse relation with DO concentration. The BOD values were observed in between 0.0 - 4.0 mg/L. The permissible limit is 3-6 mg/L.

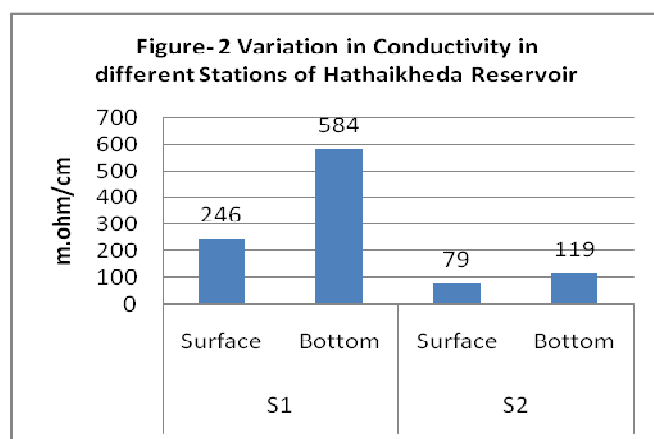
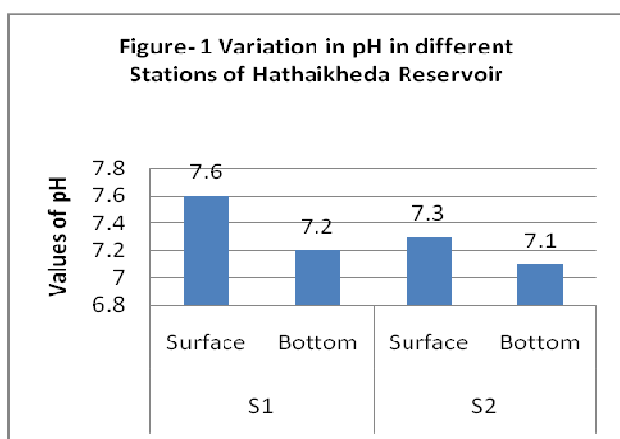
Chemical Oxygen demand (COD):-The range of COD was observed in between 42.0-58.0 mg/L, while the permissible limit is 10.0 mg/L.

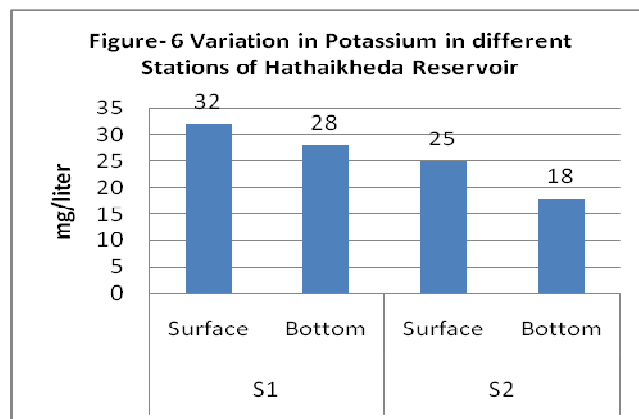
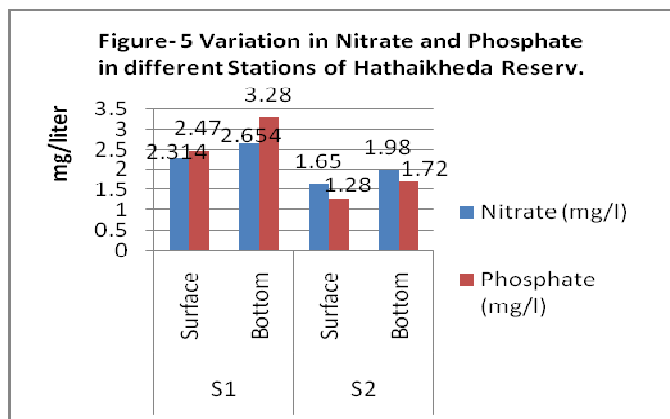
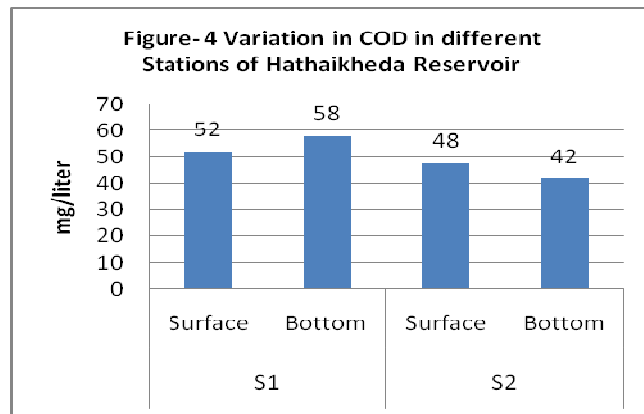
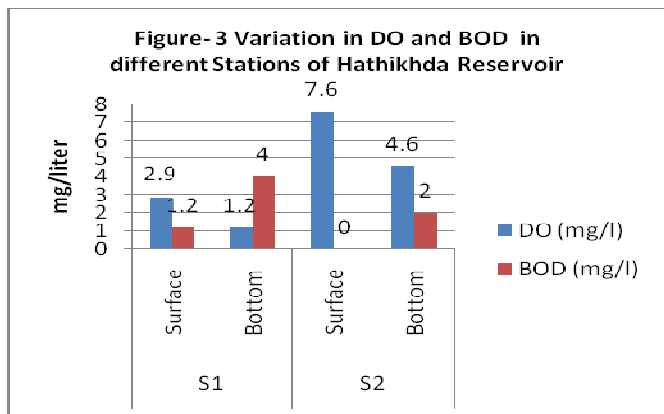
Nitrate(NO₃) , phosphate(PO₄) and Potassium(K) :- Nitrate and phosphate are two important nutrients in the lake for eutrophication process . These nutrients support the fast growth of aquatic plant. In the present study, the result of nitrate was in between 1.657-2.314 mg/L and

the result of Phosphates was in between 1.28-3.28 mg/L . This range exceeds the permissible limit. Potassium ranged in between 14.0-32.0 mg/L. The values were observed beyond the permissible limit because excessive use of chemical fertilizers.

Concentration of physicochemical parameters of different Sampling stations of Hathaikheda reservoir in the given table and graphs

Sampling Station (Hathaikheda Reservoir)	Water Type	PHYSICO-CHEMICAL PARAMETERS							
		pH	Conductivity (m.ohm/cm)	DO (mg/L)	BOD (mg/L)	COD (mg/L)	Nitrate (mg/L)	Phosphate (mg/L)	Potassium (mg/L)
S1-Near Anand Nagar	Surface	7.6	246	2.9	1.2	52	2.314	2.47	32
	Bottom	7.2	584	1.2	4	58	2.654	3.28	28
S2-Reference Sample i.e. Center of The Reservoir	Surface	7.3	79	7.6	0	48	1.65	1.28	25
	Bottom	7.1	119	4.6	2	42	1.98	1.72	18





CONCLUSION

The comparative (chemical vs. organic Fertilizer) study depicts, higher availability of nutrients, both nitrate as well as phosphate in the water samples, collected from near Anand nagar which is predominantly being cultivated with chemical fertilizers such as Urea, DAP, Super Phosphate etc. The availability of the higher concentration of nutrients in the low water due to intensive use of chemical fertilizer in the catchment area of the Lake may accelerate on process of eutrophication. The water samples collected from reference sample i.e. center of the reservoir, have comparatively

lower concentration of nutrients, which may be due to less availability of nutrients from the organic compost. Thus the present study recommends the use of organic fertilizer in place of chemical fertilizer which would not only improve the soil fertility but also help in reducing the enrichment of lake water caused of chemical fertilizer.

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