# Comparative Account on Pollution Levels of Dal, Manasbal and Wular Lakes of Kashmir Valley

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**Abstract -** Quality of water is actually a cue alarm to environmental health.in the present study different efforts has been made to check the torrid situation of the three lakes viz dal lake, manasbal lake and walur lake. Unfortunately, these lakes have suffered extensively over the past decades due to increasing, encroachment, human interference, pollution and a failure of successive governments to implement remedies. In this study samples were taken on monthly bases from these three lakes at different locations. Mean value of water quality parameters were bought over a period of one year. Seasonal changes in numerous physical and chemical parameters were compiled. The result shows pollutant level in dal lake is very high after comparing the three lakes with one another, fallowed by walur lake and then manasbal lake.

## I. INTRODUCTION

Water is very vital to all living things. A life without water cannot be imagined. Now a day's pollution of fresh water bodies has been international problem. Various human activities makes water unfit for drinking, domestic purposes. Many dangerous diseases are caused by using polluted water. The diseases associated with water causes serious public health problems particularly in India. One of the major problem of humanity today is the pollution it is obvious that natural environment is deteriorated gradually and ecological system cannot adopt to the pressure of human activities, the self-regulating of ecosphere becoming increasingly difficult. Due to increase in pressure on water resources more than 700 species of fishes have been recognised by international organisation as a threatened or endangered

The Kashmir valley, in India is famous for its high mountains reaching to a height of 6000 meters, there elevation and depression have created numerous high altitude fresh water lakes which are the bed rocks of both its ecology and its economy. Unfortunately, these lakes have suffered extensively over the past decades due to increasing encroachment, human interference, pollution and a failure of successive governments to implement remedies.

## II. STUDY AREAS

The present study deals with the lakes located in the Kashmir valley (Dal Lake, Manasbal Lake and Wallur Lake)

Dal lake is situated at an altitude of 1583 meters above the sea level between 34 degree 6 minutes – 34 degree 10 minutes latitude and 74 degree 8 minutes –74 degree 9 minutes longitude in the heart of the Kashmir valley summer capital Srinagar.

Manasbal lake is situated at an altitude of 1583 meters above the sea level between 34 degree 14 minutes – 34 degree 16 minutes latitude and 74 degree 40 minutes – 74 degree 43 minutes. Longitude in the central Kashmir of district Ganderbal

Wullar Lake is one of the largest fresh water lake in Asia. It is situated at an altitude of 1580 meters above the sea level between 34 degree 20 minute longitude and 70 degree 36 minutes latitude in the north Kashmir of district Bandipora.

## III. MATERIALS AND METHODS

The study of these lakes was carried during the year Dec 2018- Dec 2019. Sampling was done on monthly basis and four randomly selected sites were chosen for sampling from every lake. Sample was collected in the morning in a one litre plastic bottle before collecting the sample the bottle was completely risen with distilled water. The sample was then immediately taken to the laboratory for analysis.

| S.no | Parameters | Abbreviation | Units | Method | |
|---|---|---|---|---|---|
| 1 | Taste | | | | |
| 2 | Odour | | | | |
| 3 | Colour | Colour | Hazen | Visually | |
| 4 | Air temperature | A. Temp | C | Digital thermometer | |
| 5 | Water temperature | W. Temp | C | Digital thermometer | |
| 6 | PH. | PH | PH unit | Digital PH meter | |
| 7 | Turbidity | | NTU | Secchi disk | |
| 8 | TDS | | | | |
| 9 | Electrical conductivity | | | | |
| 10 | Chloride | Cl | mg/l | Volumetric | |
| 11 | Total hardness | T. Hard | mg/l | Volumetric | |
| 12 | Fluoride | F | mg/l | Kit method | |
| 13 | Nitrate | $No_3$ | mg/l | Spectrophotometer | |
| 14 | Ammonia | $NH_3$ | mg/l | Kit method | |
| 15 | Iron | Fe | mg/l | Spectrophotometer | |
| 16 | Phosphate | $PO_4$ | mg/l | Kit method | |
| 17 | Sulphate | $SO_4$ | mg/l | Kit method | |
| 18 | Free residual chlorine | F.R. Chlorine | mg/l | Kit method | |
| 19 | Calcium hardness | | mg/l | Volumetric method | |
| 20 | Magnesium hardness | | mg/l | Volumetric method | |
| 21 | Acidity | | mg/l | Volumetric method | |
| 22 | Free $CO_2$ | | mg/l | Volumetric method | |
| 23 | Alkalinity | | mg/l | Volumetric method | |

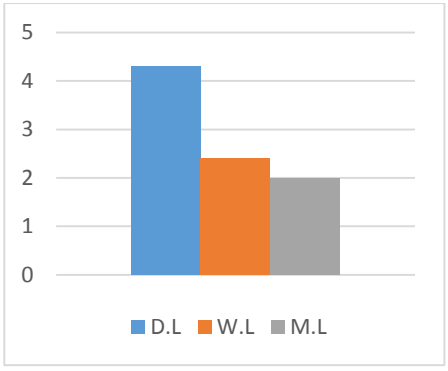
Table 1

## IV. RESULT AND DISCUSSION

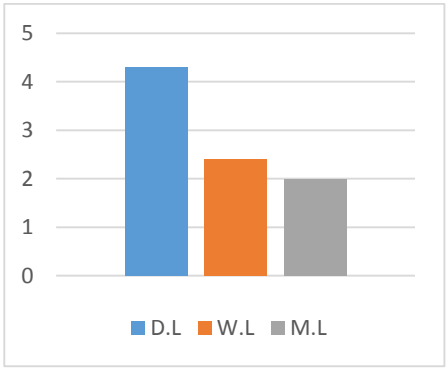
The physco chemical features of lake water are summarised in table 2 below.

| Parameters | Dal lake | Wallur lake | Manasbal lake |
|---|---|---|---|
| Odour | Musty, Rotten egg and fish smell | Musty, Rotten egg and fish smell | Fish smell |
| Taste | Salty | Salty | Salty |
| Colour | 05-50 | 10-60 | 05-40 |
| Air temp. | 03-32.1 | 01-29.2 | 02-30.6 |
| Water temp. | 0-30.1 | 1-28.9 | 05-29.1 |
| PH | 7.6-9.4 | 7.1-9.5 | 7.3-9.3 |
| Chloride | 10-50 | 05-45 | 10-40 |
| T. Hardness | 240-400 | 200-370 | 220-330 |
| F.R. Chlorine | RW | RW | RW |
| Iron | 0.01-2.4 | 0.1-2.1 | 0.01-1.6 |
| Phosphate | 0.01-4.6 | 0.01-1.9 | 0.00-1.2 |
| Ammonia | 0.01-6.0 | .01-6.0 | 0.0-5.0 |
| Fluoride | 0.0-1.9 | 0.0-2.4 | 0.01-1.3 |
| Nitrate | 0.1-4.5 | 0.1-5.0 | 0.1-3.5 |
| Turbidity | 5-30 | 5-20 | 1-20 |
| Sulphate | 0.1-15 | 0.0-10 | 0.0-1.0 |

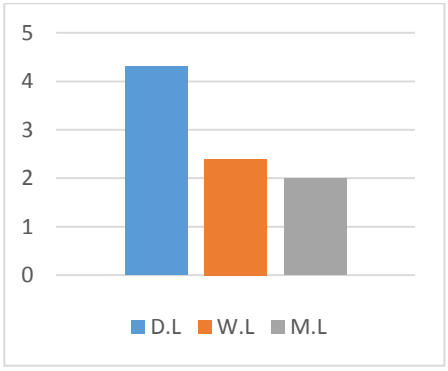
**Air temperature:** air temperature ranges from 2 degree- 33 degree of the three lakes with maximum temperature measured in Dal lake and also minimum temperature measured at Wallur Lake.



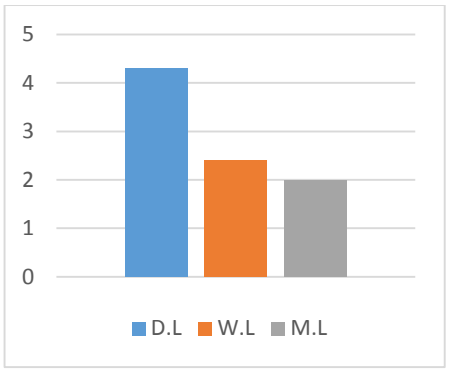

**Water temperature:** water temperature ranges from 0 degee to 30 degree of the three lakes with both minimum and maximum temperature measured at Dal lake.




**PH:** The PH ranges from 7.2-9.5 of the three lakes, indicating all the lakes are alkaline. The higher value of PH may be due to low carbon dioxide dissolve in water, which in turn may be due to higher temperature.



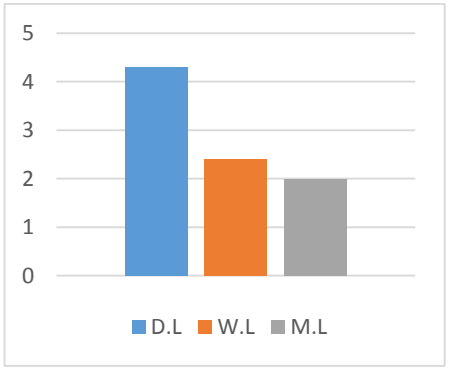

**Chloride:** the chlorides ranges from 5-40 of the three lakes. Higher concentration of chlorides is due to eutrophication and also due to pollution caused by sewage, drainage, organic matter and solid wastes which are directly thrown into these lakes.



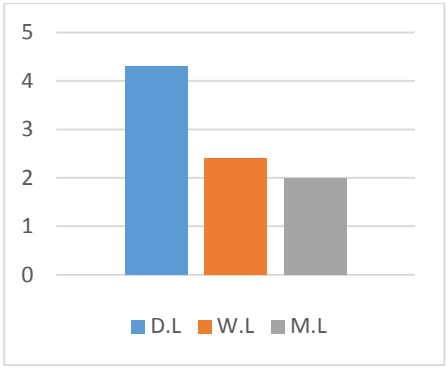

**Total hardness:** the total hardness ranges from 220-410 of these three lakes. Water with hardness below 60 mg/ltr is soft, between 61-120 mg/ltr is moderately hard, 121-180 mg/ltr is hard and more than 181/ltr is very hard.


**Free residual chlorine:** free residual chlorine is not detected in these lakes because of raw water.

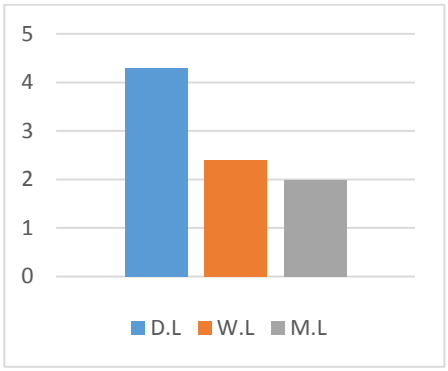
**Phosphate:** the value of phosphate fluctuates from 2-4. Phosphate can speed up eutrophication (reduction in dissolved oxygen in water bodies caused by an increase of minerals and organic nutrients ) of lakes. Increase in phosphate can cause increased growth of algae and large aquatic plants, which can result in decrease of dissolved oxygen- a process called eutrophication.



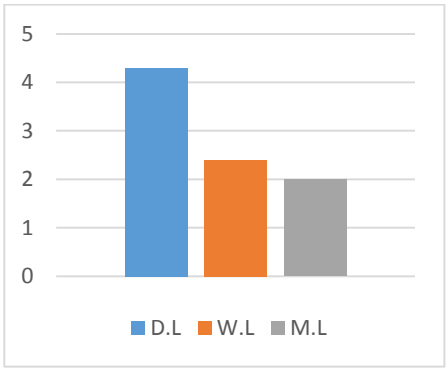

**Iron:** the value of iron fluctuates from 1-5 of the three lakes. Iron may be released from natural deposits, industrial wastes and corrosion of iron containing metal wastes.



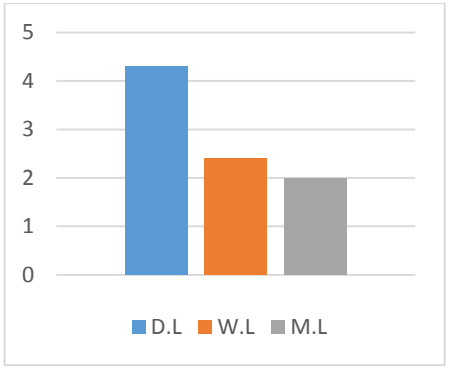

**Ammonia:** The value of ammonia fluctuates from 1-6 of these three lakes. Increase in concentration of ammonia is due to decomposition or breakdown of organic waste matter, animal and human wastes, nitrogen fixation process and run off from agriculture lands. It is difficult for aquatic organisms to sufficiently excrete the toxicant leading to toxic build up in the internal tissue and blood and potentially death.



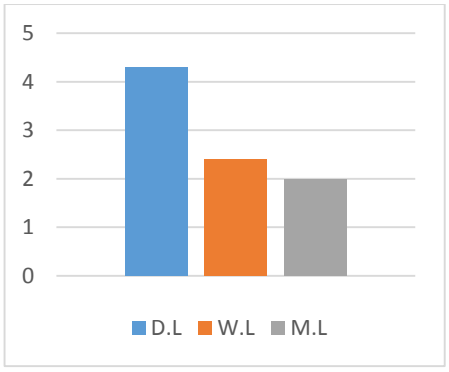

**Nitrate:** the value of nitrate fluctuates from 0.1-5 of these three lakes. Together with phosphorus, nitrate in excess amount can accelerate eutrophication, causing increase in aquatic plant growth. Excess nitrate can cause hypoxia (low level of dissolved oxygen) and can become toxic to warm blooded animals at higher concentration. Increase in concentration of nitrate is due to run off from agriculture fields, run off from animal manure storage areas and industrial discharges.




**Sulphate:** the value of sulphate fluctuates from 1-4 of these three lakes. Increase in concentration of sulphate is due to run off from fertilized agricultural land, sewage treatment plants and industrial discharges. Sulphur is an essential plant nutrient. Aquatic organisms utilize sulphur and concentration have a detrimental effect on algae growth.




**Turbidity:** the value of turbidity fluctuates from 5-50 of these three lakes. Turbidity effects the growth rate of algae and other aquatic plants because increased turbidity cause decrease in the amount of light for photosynthesis. Turbidity can also increase water temperature because suspended particles absorb more heat.




## V. CONCLUSION

In this study, different water quality parameter of the Dal, Manasbal and wular Lake were evaluated. At the outset the study clearly indicates that these lake water is not fit for drinking consumption. It shall undergo treatment for it to be used for drinking purpose. There is a clear indication of decay in Lake Environment. The lake area is shrinking, quality of water is deteriorating. It is unfortunate that the Government is silent on the deteriorating condition of these lakes. There should be complete ban on construction activities in and around these lakes. There must be sincere effort to restrict this. The present study urges the need for immediate remedial measures for protection and construction of these lakes in order to save it from further deterioration.

The main cause of the deterioration of the lake is the discharge of agricultural waste, untreated sewage water from and solid wastes are directed thrown into these lakes by the local population and also by tourists.