

## Comparative Limnology of Telbal Nallah and Hazratbal Basin of Dal Lake in Kashmir

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The Dal lake is situated in the heart of the Srinagar at an elevation of 1586 m a.s.l and has surface area of 11.5km<sup>2</sup>. It is multibasined lake with Nagin, Gagribal, Hazratbal and Boddal as its four basins. It is believed to be fed by a number of underground springs, but the main source is the Telbal Nallah that enters into the Hazratbal basin of the lake on the northern side at a place called Hanzheeul. (Fig. 1). Telbal catchment area lies at 34°4' to 34° 14' N latitude and between 74° 48' to 75° 8'E longitude, covering an altitude range between 1600-4250m (a.m.s.l).



**Fig 1. Location map showing Telbal Nallah and Hazratbal basin of Dal lake**

In this communication an attempt is made to compare the physico-chemical features of Telbal Nallah with the Dal Lake (Hazratbal basin). The sampling was carried out during summer (June-August 2004) from the Telbal Nallah and Hazratbal basin of the Dal lake. For this purpose, dipping one liter polyethylene bottle just below the surface of water collected the water samples. Temperature, depth, transparency were recorded on the spot, while other parameters were analyzed in the laboratory within 24 hours in accordance with APHA, 1998; CSIR, 1974; and Mackereth (1963).

Data regarding various physico-chemical parameters of water is given in Table 1.

**Table I. Physico-chemical characteristics of water in Telbal Nallah and Hazratbal basin of Dal lake during June - August 2004**

Parameter	Telbal Nallah			Dal Lake (Hazratbal Basin)		
	June	July	August	June	July	August
Depth(m)	1.7	1.5	1.2	2.40	2.41	2.42
Transparency (m)	0.42	0.72	0.41	1.54	1.57	1.56
Air temperature(°C)	27.0	27.0	26.0	28.0	26.0	27.0
Water temperature(°C)	23.0	24.0	24.0	26.0	24.0	25.0
pH	6.84	7.95	7.20	8.1	8.0	7.9
Conductivity (µS/cm)	217	255	212	316	320	319
Dissolved oxygen(mg/L)	5.4	5.7	5.6	6.0	5.9	6.4
Free/CO <sub>2</sub> (mg/L)	11.0	16.0	16.0	2.5	2.7	2.4
Chlorine(mg/L)	9.5	9.0	8.0	29.0	31.0	28.0
Total alkalinity	90.0	92.0	90.0	129	130	132
Total phosphate phosphorus(mg/L)	85	50.0	64.0	382	385	384
Nitrate-N (mg/L)	996	492	523	328	329	323
Ammonia-N(mg/L)	45.0	83.0	52.0	187	192	189

Water level of water body plays an important role in governing its water quality. The average lowest depth was found in Telbal Nallah against the highest in Dal lake. Further, the low transparency was found for Dal lake which may be attributed to: (i) entry of silt-laden water, (ii) rich concentration of nutrients, (iii) development of plankton blooms and (iv) macrophyte growth besides many exogenous and endogenous materials. The temperature of air affects the surface temperature and the two go hand in hand. Conductivity values were high in case of Dal lake. The specific conductivity is an indicator of the total nutrient level of a waterbody and is, therefore, used to indicate the trophic status. Using specific conductivity as an index of values more than 200µS/cm show higher enrichment level enrichment (Rawson, 1960). The conductivity values in both the water bodies reflect high ionic concentration. D.O values were comparatively high for Dal lake than Telbal Nallah. This is possibly due to the fact that in this season the longer hours of sunshine result in the prolonged photosynthetic activity of phytoplankton and macrophytes liberating oxygen (Qadri and Yousuf, 1978). The pH values were higher in lake water than Telbal Nallah. The increased alkalinity of lake water during summer is obviously related to the metabolic

activities of the autotrophs which by utilizing carbon dioxide and liberation of oxygen during photosynthesis reduce the H<sup>+</sup> ion concentration greatly (Kaul and Handoo, 1980). The alkalinity was high in case of lake water. As per the classification of Moyle (1945), both the types of waterbodies are under hard water type. Sites rich in CO<sub>2</sub> were comparatively less alkaline and decrease in its concentration result in an increase in pH. The high chloride concentration in lake water may be attributed to the presence of large amounts of organic matter of both allocthanous and autocthanous organism (Pandit, 1999). The relatively low content of nitrate nitrogen in the Hazratbal basin may be attributed to profuse and luxuriant growth of macrophytes which utilize it during photosynthesis while the comparatively high content of ammonical nitrogen may be due to excessive use of nitrogen fertilizers in floating vegetable gardens and heavy anthropogenic pressure in the catchment area resulting in organic pollution. The high total phosphorus in lake water may be related to agricultural practice.

In conclusion, it was noted that lake water contains higher doses of nutrients as compared to Tebal Nallah which may be related to heavy anthropogenic pressures in catchment area resulting in discharge of human and agricultural wastes, stagnation of water and greater biological activities as a result of increased water temperature and availability of plant nutrients.

#### REFERENCES

- A.P.H.A. 1998. *Standard Methods for the Examination of Water and Waste Water*. American Public Health Association, Washington, D.C.
- CSIR. 1974. *Analytical Guide (Laboratory Techniques)* CSIR, Pretoria, South Africa. Golterman, HJ. and Clymo, R.S. 1969. *Methods for Physical and Chemical Analysis of Freshwater*. IBP Handbook No.8. Blackwell Scientific Publication, Oxford, Edinburgh.
- Hutchinson, G.E. 1933. Limnological Studies at high altitude in Ladakh. *Nature*. 132-136.
- Hutchinson, G.E. 1957. *A Treatise on Limnology-I: Geography, Physics and Chemistry*. John Wiley and Sons, New York.
- Kaul, V. and Handoo, J.K. 1980. Water characteristics of some fresh waterbodies of Kashmir. *Current trends in Life Sciences*, **9**: 221-246.
- Mackereth, F.J.H. 1963. *Some Methods for Water Analysis for Limnologists*. Freshwater Biol. Assoc. Sci. Public No. 21, London.

- Moyle, J.B. 1945. Some chemical factors influencing the distribution of aquatic plants in Minnesota. *Amer. Midland Nat.*, **34**: 1-34.
- Pandit, A.K.I 1999. *Freshwater Ecosystems of the Himalaya*. Parthenon Publications, New York, London.
- Qadri, M.Y. and Yousuf, A.R. 1978. Seasonal variations in the physico-chemical factors of a sub-tropical lake of Kashmir. *J. Inland. Fish, Soc. India*, **10**: 89-96.
- Rawson, D.S. 1960. Limnological comparison of twelve large lakes in Northern Saskatchewan. *Limnol. Oceanogr.*, **5**: 195-211 .