



Study about Physico-Chemical Quality Of Dal Lake, Past & Present Scenario

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Abstract : Jammu and Kashmir is gifted with numerous water bodies, Dal Lake being the most famous among them. Conservation of these water bodies has been a serious challenge for the State Government due to large scale encroachments, non-availability of funds and improper management. Although some progress has been made in the scientific management of the Dal Lake, other lakes in the valley have remained largely ignored.

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Lakes are not only objects of beauty but also a source of livelihood, recreation and economic activity. As potential source of portable water, they are valuable national assets that need to be carefully conserved. Properly managed lakes can be a veritable blessing for the community living around them for all of the above reasons. The state of Jammu and Kashmir is gifted with 38 major water bodies that together cover 743sq. km of area. Many of these hold great ecological and socio-economic significance for the state. The lakes constitute the backbone of tourism which is the key revenue earner for the state, DAL LAKE being particularly notable in this regard.

Introduction: Right from the moment of its birth, the fertility and productivity of a lake system begin to increase under the impact of several natural forces. This leads to the aging of lakes, or what is commonly known as eutrophication. In recent years, activity due to alteration of the landscape through agricultural development, urbanization and waste discharge together with the accessibility of steep terrain for tourism, mountaineering and habitation, besides cattle grazing, has greatly heightened the eutrophication of freshwaters. Uncontrolled or partially controlled input of fertilizing compounds from natural and anthropogenic sources as well as a result of changes in the internal structure of aquatic systems have affected the water body.

Physico-Chemical Characteristics Of Dal Lake

The physico-chemical characteristics of Dal Lake have been investigated in detail since mid-sixties. Of various physico-chemical factors, the degree of penetration of light plays an important role in a whole series of biological phenomena in any aquatic system, and productivity is directly dependent on it.

The lake has all through been alkaline, although the pH varies a great deal during the course of year (range 7.3-9.8). The Dal Lake waters are well buffered. Seasonal variations are



attributed to photosynthetic activity, which being higher during summer, results in a greater utility of carbon sources and an associated decrease in hydrogen ion concentration

Conductivity is closely related to the trophic status of water body, being low in oligotrophic and high in eutrophic ones. Conductivity values in the lake during 1998-99 fluctuated between 122 and 759 μ S in different basins of Dal Lake. This clearly indicates that the content of total electrolytes have significantly increased in Dal Lake.

Carbonates and bicarbonates together determine the total alkalinity of an aquatic system and is used to differentiate the soft and hard water bodies. During the period 1998-99, alkalinity fluctuated between 37 and 249mg/l, thereby indicating an increase in the hardness of water over the last twenty years. Bicarbonates were reported throughout the year, while carbonates contributed mainly during the warm period when pH was high. The bottom water contained only bicarbonates.

Oxygen plays an important role in the regulation of metabolism process of communities and organisms, and also as an indicator of lake condition. Its content in natural waters depend upon several factors and varies greatly. Its distribution in deep waters depends upon the presence or absence of stratification. Dal Lake is a shallow water body and therefore shows only small variations in the oxygen values from surface to bottom. However, in deeper areas of the lake, consequent to the development of a temporary thermal gradient, an oxygen gradient is also developed.

Calcium and magnesium are the most abundant divalent cationic elements in the Dal Lake water, with usual cation progression being Ca>Mg>Na>K. As per the concentration of calcium, Dal water falls within the category of calcium rich waters of Ohle (1934). The concentration of calcium remains high during late autumn, winter and early spring. While sodium concentration has been reported to fluctuate in an irregular manner, potassium to record higher values during early spring and least values during summer, probably due to utilization by primary producers, mainly macrophytes. Kaul (1978) reported only low concentrations of PO₄-P(9-28 μ g/l) and total phosphorus (62-873 μ g/l) in the lake in spite of the entry of large quantities of domestic wastes.

A perusal of the data collected for the past three and a half decades reveals that Dal Lake has passed through several stages of trophic evolutions. Extensive data on different aspects of Dal Lake's ecology establishes the fact that the lake is undergoing far reaching changes in its physico-chemical environment due to the discharge of large quantities of wastes from human settlements, agricultural lands, hotels and houseboats. The ecological stress of the system is reflected in its deteriorating water quality. The ecological balance of Dal Lake was, inspite of some gradual changes in nutrient level, rather stable until mid eighties. However, from late eighties the scenario changed abruptly and in the nineties, the lake experienced far reaching changes in its limnological character.

Water Quality Standards



The quality of Dal Lake waters has been deteriorating and has severely affected its biodiversity. To try to provide water of the vintage of the 19th century is unrealistic, the continued reckless and wanton exploitation of water resources is suicidal. The vital question regarding water quality policy is, how clean should it be? And this decision pertains to the most difficult part of lake management not only because water quality requirements for various designated uses are different but also due to the vociferous and varied attitudes taken by various interested groups towards water quality levels. The water pollution control programme should, therefore, be undertaken with a sense of seriousness and urgency to ensure that disruptive and adverse effects on the ecosystem are minimized. Policy concerning water quality objectives should be a reflection of the need of various segments of the population. In order to achieve an equitable and workable system, some means for forming a correct judgment must be developed and at the same time a control and monitoring mechanism must be introduced. This approach inevitably involves the concept of criteria and standards.

Adequate knowledge concerning many of the quality characteristics upon which criteria should be based is, however, lacking. The management of water quality standards for Dal Lake should include the evaluation of costs and benefits with respect to health, aesthetics, recreation, and other productive uses in order to arrive at some optional set decisions. The task of setting water quality standards involves crucial decisions pertaining to various social, economical, scientific, judicial and even political issues.

Water quality standards are concerned with the physical appearance, odour, dissolved oxygen concentration, concentration of pathogens and potentially toxic or harmful chemicals in water. The absence of odour and unsightliness and the presence of a certain amount of dissolved oxygen are common minimum standards.

While framing the management policy, it must be ensured that:

- (i) there is no further loss in the open area of the lake.
- (ii) inflow of sewage and silt from the catchment is checked.
- (iii) macrophytes population is maintained properly, as large scale harvesting of macrophytes may lead to intense algal booms which will have a much more deleterious effect on the lake ecology.

References :

1. "Detailed Project Report for Conservation and Management Plan of Dal-Nagin Lake" prepared by Alternate Hydro Energy Centre, University of Roorkee.
2. "Irrigation, Water Power and Water Resources Engineering" by "Dr-K.R.Arora"-