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**REVIEW OF
LITERATURE**

There are innumerable natural and manmade lakes and reservoirs in India. Various aspects of water quality have been discussed from time to time by different workers both from India and abroad. But it is hard to quote the names of all the scientists, who have worked on the lakes water quality. Hence certain brief references are being quoted here.

In the first 40 years of 19th century, E. A. Birge and C. Juday worked on Wisconsin lake to become the first American limnologists. The international Association of Limnology was formed in 1922 by Thienemann and Naumann. Some important literature appeared in many languages such as Macan and Worthington (1951). Welch (1952) Treatise on limnology by Hutchinson (1957, 1967, 1975); Reid (1962), on tropical limnology by Beadle (1974), Wetzel (1975) and Cole (1983).

Several research workers from abroad have made contributions on hydrobiology on large natural lakes and manmade reservoirs of North America, Canada and Europe in temperate climatic conditions. In India also the work has been done on water quality.

Kolkwitz and Marson (1909) studied the effect of sewage on lotic freshwater ecosystem. Juday (1932) did the limnological studies of Kurtak lake of Alaska, giving emphasis on organic pollution. Mishra (1938) studied the effect of edaphic factors such as water

temperature, dissolved Catt and Mg^{++} with growth and distribution of aquatics.

Ganapati (1940) studied the ecology of temple tanks and found permanent blooms of *Microcystis acculoginosa*. The studies conducted on chemical factors by Moyle (1945) highlighted on the influence the distribution of aquatic plants. The studies revealed that total solids, dissolved oxygen, pH, hardness and water temperature were the main parameters to influence the distribution of aquatics.

Nygaard (1949) studied the hydrobiology of some Danish ponds and lakes and described the quotient hypothesis and some new or little known phytoplankton organisms. Oldson (1950) studied aquatic plants and hydrospheric factors, of South-West, Juthland (Denmark).

Similar observations were reported by Lundh (1951). The observations revealed that physicochemical properties of water play an important role in the aquatic ecosystem which govern it.

Ellis (1955), revealed that distribution of aquatic plants were closely related to alkalinity, pH and conductivity of water. Ganapati (1956) studied the limnology of two minor irrigation reservoirs near Madras.

Swindale and Curtis (1957) carried out studies on water chemistry in relation to phytosociology of submerged aquatic plants.

The chemical and environmental factors such as pH, dissolved oxygen and water temperature affected the occurrence and distribution of submerged macrophytes.

The effect of season and quality of water on phytoplanktonic community and ecology of macrophytes in river Yamuna at Allahabad were carried out by Chakraborty et al. (1959). Their observations revealed that density and distribution of phytoplanktons and macrophytes are dependent upon season and quality of river water.

The research work carried out by Singh (1960) on the ecology of phytoplankton and aquatic macrophytes of inland water of Uttar Pradesh. The observations revealed that temperature of water bodies played an important role in the growth of aquatic species. The work highlighted that the flora of sewage water was much affected on account of change in the physico-chemical properties of river water.

Beeton (1963) studied the limnological survey of lake Eries. Huchinson (1967) studied and published treatise on limnology. The studies on the biological properties of vascular plant and physicochemical properties of water were carried out by Sculthorpe (1967). The physico-chemical properties of water were highly influenced by different anthropogenic activities which deteriorated the water quality. The work summarised the alternation of environmental factors such as temperature which affected the solubility of dissolved oxygen. Further the work has highlighted that high temperature in

summer favoured the rapid evaporation which lead to decrease in volumes and increase in nutrient concentration in water. Suspended particles through runoff enters into receiving water body and deteriorate the water quality and decrease the intensity of penetrating light, thus transparency values dropped down therefore, water pH greatly regulated the survival of aquatic plants.

Fish (1969) studied lakes to measure eutrophication and to indicate possible causes. Rodhe (1969) studied on causes and consequences of eutrophication of lakes of North America and suggested some corrective measures for it.

Munawar (1970) described the hydrobiology of freshwater ponds of Hyderabad and pointed out distribution of unicellular and colonial phytoplankton in polluted and unpolluted environment.

The studies on the effect of chemical substances in the water ecosystem were conducted by Goodmann (1974) and concluded that chemical substances particularly cadmium, chromium, chlorides and toxic elements of industrial effluents, dissolved in water and water body is polluted since the disturbances were increased, by decreasing pH of water, hardness and dissolved oxygen.

Kaul (1977) did limnological survey of Kashmir lakes with reference to trophic status and conservation. Samant (1978) studied on the hydrobiology of Kalamba reservoir of Kolhapur. The effect of

municipal sewage and human activities on the growth and distribution of submerged macrophytes was reported by Ozimek (1978). The observations highlighted the nutrient enrichment by human sources such as sewage inputs, agricultural runoff and abattoir waste in water body causes substantial changes in aquatic vegetation.

Kasturbai (1980) found seasonal trend in physical and chemical factors and in plankton of Madras YWLA ponds. Trivedi (1980) studied the primary production of hallow fresh water reservoirs around Jaipur, with reference to the effects of pollution from domestic sewage. Goel (1980) did the comparative study in the littoral zone of non-polluted and polluted freshwater reservoirs around Jaipur.

The studies were carried out on use of macrophyte vegetation as biological indicator for monitoring the water quality by Melzer (1981). The observations revealed that luxuriant growth of aquatics during summer season indicated the high pH, high dissolved oxygen and high biochemical oxygen demand.

Saron and Adoni (1982) studied seasonal variations in pH and dissolved oxygen contents in Sagar lake in Sagar city, Madhya Pradesh. Hydrobiology of the freshwater lentic habitats about it's physicochemical characteristics is well documented by Savant, Trivedi et al. (1983) and Angadi (1985).

The effect of detergent pollution on algal flora and aquatic macrophytes were reported by Singh et al. (1988). The effect of herbicidal formulation was found toxic and significantly disrupted the physiology of hydrophytes and ultimately resulted imbalance in natural ecosystem. Similarly they observed the phytotoxic effects on aquatic flora due to increased concentration of detergent in the aquatic environments.

Few records are also available on the nutrient composition (Phosphate and Nitrates) of the fresh water lakes and ecological influence on phosphate (Kanabur, 1986) and nitrate metabolism in sewage (Kanabur, 1990) of freshwater tank.

The knowledge of physico-chemical parameters alongwith biological characteristics can provide clear idea of the trophic status of any waterbody. Several workers like Mehrotra and Jhingran (1986), Shukla and Bais (1990), have studied the nature of reservoir and lakes.

The comparative study on species richness and occurrence of aquatic macrophytes in small lakes of southern Finland were reported by Toivonen and Huttunen (1995). The observations revealed that species show high richness in eutrophic and hypertrophic lakes than the trophic state.

Rajkumar et al. (1994) studied the relationship between various species and environmental factors in water bodies of Chennai city. Chaphorkar (1996) studied hydrobiology of "Ganesh lake" of Miraj (Maharashtra) and reported various physicochemical properties. Adagounda (1997) studied ecology of 'Kali Khan' of Sangli. Swaranlatha et al. (1998) studied ecology of Bajara lake with reference to water pollution.

Lewis (1999) reported studies on oxygen depletion of ponds. He emphasized the heavy rain and cloudy days caused oxygen depletion, the role of photosynthesis and oxygen production is dependent on light, as a result the aquatic ecosystem is disturbed. The studies on seasonal variations of water quality and percentage of macrophytes coverage in Barnager pond at Calcutta were conducted by Mukhopadhyay and Dewanji (2002). The observations concluded that physicochemical properties of water particularly dissolved oxygen is much useful for assessing the quality of water and thus providing a check on pollution.