

LIMNOLOGICAL INVESTIGATION IN INDIA

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ABSTRACT:

Limnology is the study of inland water bodies particularly rivers, ponds and lakes, including their biological, physical, chemical and hydrobiological aspects. From the time of Forel (1841-1912), who is known as founder and Father of limnology, the biogenic material balance of natural waters was observed and recorded. The pioneer investigations of Forel (1901) were focused on Le Lemane (Lake Geneva) where he exposed the preliminary facts concerning the fauna of freshwater. Then limnology was studied with reference to organisms, especially plankton (Welch, 1952). The discovery of plankton by Victor Hansen in 1887 and Fritsch in 1907 was an outstanding event in the field of limnology. In India, the first limnological investigation done by Prasad on the seasonal variation of pond organisms (V.P.Singh, 1960).

INTRODUCTION:

Fresh water ecosystems perform important ecological functions and essential for sustenance of human civilization. The fresh water bodies are home to many aquatic flora and fauna and also provide suitable habitat for terrestrial species in arid and semi arid areas. Fresh water bodies occur substantially all through the world in all climatic zones. In India the massive seasonal and spatial variability within the rainfall complements the range of fresh water bodies ranging from flood simple

to coastal area, natural to man made fresh water bodies in Himalayas and arid and semiarid area of the country. Rajasthan state have a lot of man made fresh water bodies than natural ones in India because these are created for fulfilling the needs of drinking, domestic and agricultural uses.

MATERIALS AND METHODS:

The freshwater environment helps to control two of the main human problems related to climate change, i.e. floods and droughts. The freshwater ecosystems temporarily store floodwaters which can significantly reduce downstream damage and recharge groundwater aquifers, which can be a critically important source of water during droughts.

Water is an important contribution to humanity's daily needs and indeed a valuable natural resource. Safe water supply and appropriate sanitation are the most essential components for a healthy and prosperous life. Better water quality is necessary for living beings to live. Therefore, the quality of drinking water should be tested at frequent intervals, as the excessive use of polluted drinking water causes numerous waterborne diseases the human population. Owing to the large population, stupidity and negligence of human being and industrialization, the natural quality of water deteriorates every day (Welch, 1952). Although water is abundant, covering nearly

three quarters of the earth; yet is a scarce resource. The average annual per capita water availability in the years 2001 and 2011 was assessed as 1820 cubic meters and 1545 cubic meters respectively in India which may reduce further to 1341 and 1140 in the years 2025 and 2050 respectively. (Press Information Bureau, Government of India Ministry of Water Resources, 2017).

Water is considered one of the most essential and necessary ingredient for all living beings. Owing to the increasing world population growth and economic progress, our reliance on fresh water supplies has increased in the last century. As a result, fresh water supplies in many parts of the world have declined in terms of both quantity and quality.

Water is life. Without water there can be no life. Water supplies are important both for the natural environment and for human growth. It is completely necessary for domestic purposes to clean, cook, bathe and bear waste and for agriculture, power generation, manufacturing, fishing, wildlife breeding, fisheries, tourism, aesthetics etc. Due to manifold increase in population and industrialization has resulted in a rapid decline in water ecosystem (Simpf et al., 2011, Mohammad, M.J. et al., 2015). The health of water ecosystem and their biological diversity are directly related to health of almost every component of the ecosystem (Ramesh et al., 2007). The healthy aquatic ecosystem is depended on the physicochemical and biological characteristics (Venkatesharaju et al., 2010). Life in aquatic environment is largely governed by physico-chemical characteristics and their stability. These characteristics have enabled biota to develop many adaptations that improve sustained productivity and regulate ecosystem metabolism (Sharma, Riddhi et al., 2011). Regular inspection of water quality is the first step that can lead to management and conservation of aquatic

ecosystems. It is also true that the management of any aquatic ecosystem is aimed to the conservation of its habitat by suitably maintaining the physico- chemical quality of water within acceptable levels (Garg et al., 2010).

Lakes, rivers, ponds and other fresh water bodies have poorly withstood the blessings of human civilization. Almost everywhere man has leaned upon these waters not only as the great life givers, but also as cleansers. They have served as recipients for a major part of human wastes both directly and indirectly, wastes which frequently became excessive wherever people concentrated in cities and densely populated areas. Water of varying degrees of purity is required by every form of life. This distinctive characteristic of water has been a boon to modern man.

In any aquatic ecosystem limnological characteristic can affect both fauna and flora. The changes in physical characteristics like temperature, transparency and chemical elements of water such as dissolved oxygen, nitrate and orthophosphate provide valuable information on the quality of the water, the source of the variations and their impact on the functions and biodiversity of the reservoir. (Djukic et al., 1994). The physical and chemical characteristics of water are important parameters as they may directly or indirectly affect its quality and consequently its suitability for the distribution and production of fish aquatic animals (Moses, 1983). Therefore, the Knowledge of the qualitative and quantitative composition of this system is the first approach towards revealing the nature of the particular environmental problem.

The healthy water ecosystems have a key role in all the developmental programmes of the country. Because fresh water resources not only serve the purpose of water supply for domestic and industrial use, but also for the development of agriculture, fisheries, power

etc.

In the natural fresh water bodies, nutrients of the catchment area get transported through run-off water. These nutrients are used by the inhabiting biota for their growth and reproduction. Some nutrients get trapped in the sediment; the rest remains in solution in water. This nutrient input-utilization activity continues in a regular manner in nature, subject to noninterference by man. In manmade reservoirs, some nutrients may get drained out through waste weirs, sluices or such other means.

Rajasthan State is located within latitude 23°30' N-30°120' N and longitude 69°300' E-78°170' E in the western part of the Indian subcontinent. Rajasthan State encompasses an area of about 343×103 km², the largest state by geographical area in the country. There are 15 river basins and 33 administrative districts in the state. Total water resources available for fisheries in the State are 15838 no. of water bodies covering an area of 4,23,765 hectare excluding rivers and canals (30,000 ha.) and water logged area (80,000 ha.) at Full Tank Level (FTL). In addition to its 1,80,000 hectare salt affected area is also available (R.K.Patel et al.,2018).

Rajasthan which is well known as the desert and xerophytic environment, the quantity of water flowing in the rivers in the state totally depends on the quantum of precipitation in the rainy season. This limits the surface water availability in the state. The construction of water reservoirs like dams, tanks and ponds becomes a necessity due to the distinct variability and seasonality of rainfall to store some part of rainfall water to meet irrigation and drinking water requirement throughout the year and these resource may enrich our ground water resources and form the basis for supporting appropriate aquaculture. Probably because of erratic monsoon in Rajasthan there has been a

rich tradition to conserve water especially in the arid area.

Rajasthan is predominantly rain-fed agrarian state, with its two-thirds population depending on agriculture and related activities. The state shares only 1.15 percent of the total water resources of India. Hence the State suffers from a disproportionately poor availability of water when compared to its potential large users, people, animals and agriculture. But vast number of small pond and tanks existing in the state which receive rain water during monsoon period and this water is retained for about 6 to 10 months. These water bodies are known as seasonal or temporary ponds.

The Temporary ponds or Johra are very important water resources in arid Rajasthan. These are filled up with rainwater in rainy season and get dry in dry period of year. Therefore, the study of Ajeet Sagar pond is an interesting approach of wet and dry cycle.

The Pond Ecosystem consists of phytoplanktons, zooplanktons and secondary and tertiary consumers, but a pond's tropical composition is proportional to its primary productivity. Consequently, the present investigation attempted to research the Limnological parameter, their relationship, zooplankton status in Ajeet Sagar pond, Khetri may help improve the usage and protection of the Pond ecosystem

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