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AN ECOLOGICAL STUDY ON THE LENTIC WATER BODY OF BANIYAPUR WITH REFERENCE TO PLANKTONIC DIVERSITY

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INTRODUCTION

Ecology is the study of the relationship between living organism, including humans, and their physical environment, it seeks to understand vital connection between plants and animals and the world around them. Ecology is the multidisciplinary field extending across the physical, biological, and social sciences. Ecology was the practical interest early in human history.

In primitive society, all individuals needed to know their environment that is, to understand the forces of nature and the plants and animals around them- to survive. If we want to conserve and protect nature and prevent the extinction of species, we need to know how they all fit together, what their habitat requirement are, how they influence each other. Ecology derived from the Greek word Oikos meaning habitation, and logos meaning study, i.e. study of the habituation of organisms.

This is the study of ecosystem, which describes the relation between the organisms with habitats. The environment of an organism includes both biotic and abiotic factors. These two factors have to coordinate each other to share the resources that are present within the environmental ecosystem. To understand about this mutual relationship we study ecology. Human being is also the part of ecosystem. Environment describes the biotic and abiotic factors. The biotic components of the ecosystem consist of 3 group's producers, consumerand decomposers.

The producers are the organisms those are capable for photosynthesis i.e. plants. The consumers depend on the producers (all herbivores). The decomposers are the organisms that are rely on dead organisms for their existence (bacteria, virus and yeast). Abiotic factors includes the flow of energy necessary to maintain any organisms, the physical factor (climate, temperature, rain, snow, hills) that effect it and the supply of molecules required for its life functions (carbon, hydrogen, nitrogen, sulphur, phosphorus) A unit that includes all the organisms i.e. the communities in a given area interacts with the physical environment so that a flow of energy leads to clearly defined trophic structure, biotic diversity and material cycle .

The community ponds of Bniyapur are very extensively used for bathing, utensil and cloth washing, cattle cleaning and the banks are used for open-air latrins by people. The ponds now-a-days are also used for cleaning transport vehicles. Hence it is hypothesised that the water may not be safe for drinking purpose and possibly for any form of human use. Therefore it was believed that this work will provide quantitive informations on these aquatic systems so that remedial measures can be taken and ponds can be used for other purposes.non-living components) within the system, known as an ecosystem.

MATERIALS AND METHODS

Collection and identification of phytoplankton According to size, phytoplankton are classified as ultra-plankton 0.5 to 10 µm, nanno plankton 10 to 50 µm, micro plankton (net plankton) 50 to 500 µm and macroplankton 500 µm. larger phytoplankton collected by filtering a known amount of water through a plankton net made by bolting silk (no. 25 mesh size 55 µm).Take one litre of water sample in a wide mouth glass bottle. Add 10 ml of Lugol's iodine solution per litre of sample. Lugol's iodine solution speeds up the rate of sedimentation of phytoplankton, provides them stain, and preserves their flagella and cilia. For complete sedimentation sample were allowed to stand for a day. Through pippete clear sediment is removed and is examined and identified under a Nikon microscope, preferably an inverted plankton microscope using pertinent literature.

Collection and identification of zooplankton Zooplankton were collected by filtering a known volume of water through zooplankton made up of bolting silk (no.25; mesh size 55µ) the surface water was collected with the help of aplastic bucket or a jug of known volume. Zooplanktons were collect and identified under a Nikon binocular microscope, using pertinent literature

RESULTS

The term “Plankton” refers to those minute aquatic forms which are nonmotile or insufficiently motile to overcome the transport by currents and living suspended in the open or pelagic water. The planktonic plants are called phytoplankton and planktonic animals are called zooplankton (APHA 1985). Planktons are found throughout the oceans, seas, and lakes of the world. However the local abundance of plankton varies horizontally, vertically and seasonally. All plankton ecosystem are driven by the input of solar energy and to geographical region and seasons when light is abundant. A secondary source of variability is that of nutrient availability.

The present study highlights good plankton diversity in the Baniyapur pond, Saran, Bihar. Total fifty species of planktons belonging to phytoplanktons (21) and zooplanktons (29) were recorded. High densities of planktons were recorded in summer and beginning of monsoon.

Phytoplanktons are the base of aquatic food webs and energy production is linked to phytoplankton primary production. Excessive nutrient and organic inputs from human activities in lakes and their watersheds lead to eutrophication, characterized by increases in phytoplankton biomass, nuisance algal blooms, loss of water clarity from increased primary production and loss of oxygen in bottom waters. Phytoplankton is the base of food web which affects the food production. Diatoms have been used by ecologists to indicate pollution in water body and other variation of ecological conditions. Chlorophyta was dominating group and cyanophyta was second dominate group. In the pond the contribution of chlorophyta and cyanophyta to total biomass was higher than 90%. Phytoplankton biomass reached the value many times higher.

Zooplanktons are the central trophic link between primary producers and higher trophic levels. The freshwater zooplankton comprise of Protozoa, Rotifers, Cladocerans, Copepods and Ostracods. Most of them depend to a large extent, on various bacterioplankton and phytoplankton for food. Many of the larger forms feed on smaller zooplankton, forming secondary consumers. Some of them are detritivore feeders, browsing and feeding on the substrate attached organic matter, phytoplankton or concentrating on the freely suspended organic matter particles or those lying on the bottom sediment. Many of these organisms are also fish food organisms and are consumed by the other aquatic macrofauna. The present study highlights good zooplankton diversity in the Baniyapur pond. Twenty nine species of zooplanktons representing seven groups of namely- Rotifera, Cladocera, Copepoda,

Ciliata, 56 Ostracoda and Branchiopoda were reported. Rotifers included 8 species, Cladocera 4 species, Copepoda 7 species, Ciliata 6 species, Ostracoda 2 species and Branchiopoda 2 species.

Table 12 – Mean values of seasonal variation of Phytoplankton

1 Summer	172.90	172.47	172.14	172.44
2 Winter	262.06	261.44	264.54	263.77
3 Monsoon	371.42	372.23	371.59	371.66

Table 13 - Mean values of Seasonal variation of Zooplankton

1 Monsoon	192.90	190.47	182.14	188.44
2 Winter	252.05	251.44	254.54	253.77
3 Summer	371.42	372.23	371.59	371.55

Phytoplankton plays an important role as primary producers in the fresh water ecosystem. Phytoplankton represent more comprehensive index of the environmental conditions. During the present investigation 22 genera of phytoplankton were recorded from four divisions namely Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae. Chlorophyceae was the dominant group. Maximum phytoplankton was observed in the May, September and October. Gautam (1989) and Razzaque et al. (1995) also observed similar findings.. Kumawat and Jawle (2003) recorded 59 genera of phytoplankton from a fish pond at Anjale. Ranga et al. (2006) recorded 93 species of phytoplankton in Pushkar Srovar. Diversity of plankton population is fairly dependent on quality of water and climatic factors. Various 207hysic-chemical and biological characteristics are to be simultaneously taken into consideration for understanding the fluctuation of plankton population. Tripathy and Panday (1990) reported that high water temperature, phosphate, nitrate, low dissolved oxygen and free carbon dioxide supported the growth of Euglenophyceae.. However, Zafar (1964) relates the growth of Chlorophycean with increased organic matter supplied in rainy season and high dissolved content. During the present investigation maximum diversity of phytoplanktons were recorded in summer season. The chlorophyceae forms started increasing in summer and persisted up to the end of rainy season. Most of studies have reported similar behavior of chlorophyceae (Zafar, 1964). Hutchinson (1975) observed that blue green algae generally found in eutrophic water.Vyas (1968) recorded the lowest diversity of green algae during the rainy season in a lake of Udaipur. Sharan et al. (2004) observed seasonal variation of phytoplankton in tropical fresh water.

In aquatic ecosystem zooplanktons play a critical role only in converting plant food into animal food but also they themselves serve as source of food for higher organisms. Zooplanktons provide the main food for fishes and can be used as indicators of the trophic status of water bodies (Verma and Munshi, 1987). During the present investigation 30 genera of zooplanktons were recorded, which were represented by groups of Rotifers, Cladocerans, Copepods, Protozoans and Ostracods. Moitra and Bhowmik (1968) observed members of three main zooplnaktonic group, Rotifera, Cladocera and Copepoda, which dominant in fresh water fish pond in Kalyani, west Bengal. Agrarwal (1978) reported five genera amongst zooplankton population of Janaktal at Gwailor. In Ramaua Reservoir four genera of 207hysic207 and cladocera and two genera under 207hysic207 were observed by

Agarwal (1980). Maruthanayagam et al. (2003) studied the season specific zooplankton diversity in Thirukkulam pond, Mayiladuthurai, Tamilnadu, India. Jha and Barat (2003) carried out a qualitative analysis of zooplankton in Lake Mirik in Darjeeling, Himalayas. However, Pathak and Mudgal (2004) observed five genera of rotifers, three genera of cladocerans and otracodes and two genera each in respect of protozoans and copepods in Virla reservoir, Madhya Pradesh. Rotifers was found prominent group among the zooplanktons. These findings are in agreement with Jana and Sarkar (1971), Chakroborty ans Asthana (1989), Kohli et al. (1982) and Balkhi et al. (1987). High incidence of rotifers in summer season indicating the influence of temperature was noticed by Sinha and Sinha (1983), Kaushik and Sharma (1994). Takamura et al. (1989) reported growth of rotifers in lake and reservoir indicating eutrophic condition. Similar finding were finding were observed in the present investigation. Pathak and Mudgal (2004) noticed dominance of rotifers followed by copepods in Virla reservoir at Madhya Pradesh. In the present study larvae of copepods (Nauplius) were available round the year and adults were maximum in the summer season. These authors suggested that the high diversity of zooplankton in the pond is not due to the absence of organism of higher trophical level. During present study zooplanktons were abundant during summer season and lower during rainy season. This might be attributed to the high water temperature. Similar findings were observed by Singh (1990) and Srivastava et al. (1990).

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