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Seasonal Zooplankton diversity aspects of lower Dyanganga Dam, Near Khamgaon

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ABSTRACT

Planktonic life plays very important role in aquatic ecosystem. The utility of zooplankton for ecological bio-monitoring of water bodies also helps in the analysis of water quality parameters and sufficiency of water quality for various uses. This study is evaluates the seasonal zooplankton diversity of Lower Dnyanganga Dam at Nimkawala, Tahasil Khamgaon located at Buldana District of Maharashtra. This dam is an outflow of Upper Dnyanganga Dam and surface runoff from surrounding areas. The zooplankton diversity was assessed monthly from December 2020 to May 2021. Water samples were collected from four sites of the dam with the help of local fishermen. Standard method was used for qualitative analysis of zooplankton. About, 13 species of zooplankton were recorded belonging to 5 orders viz. Cladocera, Calanoida, Cyclopoida, Ploima and Podocopida and it was noted that the Arthropods were the most dominant.

Keywords: Limnological, Biodiversity, Lower Dnyanganga, Zooplankton, Biomonitoring, Khamgaon

INTRODUCTION

Limnology is the combinations the sciences of chemistry, biology, physics, and geology related to Planktons. It is the study of the structural and functional interrelationships of organisms of inland waters as they are affecting by their physical, chemical, and biotic environments. The word limnology comes from the Greek words *limne*, meaning "marsh or pond," and *ology*, meaning "the study of. Inland waters includes: lakes, rivers, streams, wetlands, reservoirs, ground water, ponds, marshes, and more. The majority of limnology is based on freshwater ecosystems, but there are a few salt lakes that also including. Zooplanktons are small animals that typically graze algae and other small bits and pieces in the

water column. They in turn are food for larger organisms such as fish. The biological productivity with species composition, and describes and evaluates how physical, chemical, and biological environments regulate these relationships.

The zooplanktons are the pollution indicators. They fix carbon dioxide, produce oxygen and are an important element in the food chain as they are food for larval stages of fish shrimp, molluscs. These are the grazers of the phytoplankton and they are referred to as living machines responsible for transforming plant material into animal tissue. They have large density, shorter life span, drifting nature, high species diversity they are with high extreme tolerance; they are the indicator for the physical, chemical and biological processes in the aquatic ecosystem. Recently, the involvement of marine organisms in biotechnological applications has been discovered and become useful for the development of alternative and healthy food, natural medicine and cosmetics. (Silvia Lomartire 2021). So need to study Zooplankton for detecting the condition of water body, help for further future alert or use of water body for agriculture, pisciculture or any water related aspects.

In Present research study was carried out on 'Lower Dnyanganga Project Phase-II, this project is supported by Government of India under *'Baliraja Jal Sanjivani Yojna'* and comes under the Vidarbha Irrigation Development Corporation, Nagpur. The project is situated on Dnyanganga River in Buldana district on Khamgaon-Buldana District State Highway.

MATERIAL AND METHOD

Study Area:

The Dnyanganga River rises in the Northern scarps of Buldana Plateau near Geru-Matargaon village in Ajanta Ranges of Botha forest in Maharashtra. It is a minor river in Buldana district and passes through Nimkawala village and meets to river Purna on South bank near Yerli, Ta. Nandura. Total length of the river is 50.5 miles (Buldhana Gazetteer).

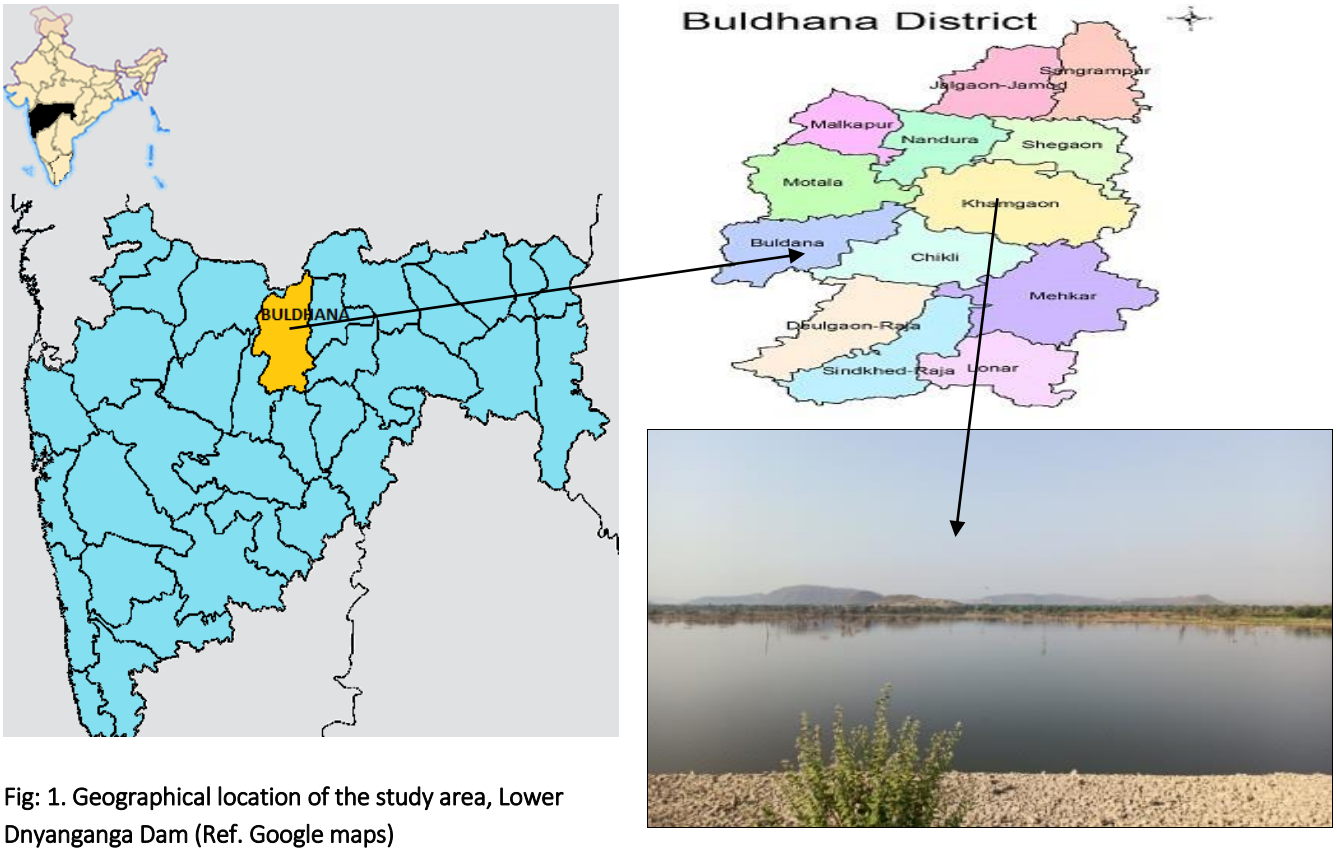

Fig: 1. Geographical location of the study area, Lower Dnyanganga Dam (Ref. Google maps)

The Nimkawala village is located in Khamgaon Taluka of Buldana District. Government of Maharashtra have completed the construction of this dam near Nimkawala village during 2018-19 and started storing of water and due to which this dam is a new water body, it coordinates between 20º 37'59 ºN ,76 º and is located 15 km towards West of Khamgaon on Buldana state highway and 35 km from district head quarter, Buldana. It is located at the altitude 306 meters above sea level.

Methods:

During the study, water samples were collected monthly from December-2020 to May-2021, in the early morning about 9 to 11 am at the five locations marked as East, West, North, South and Centre core. Sampling sterile bottles 1 to 2 litre capacity were used. (APHA, AWWA, 2005). Colour, temperature, pH, TDS etc. were recorded on the spot with the help of Hanna digital pH and TDS meter . The collected samples were allowed to settle. After centrifuging and filtration further study was carried out The high pH range in summer and low range in winter. pH of water is important for the biotic compound because most of the plant and animal species can survive a narrow range of pH. (Jadhav, 2010) Dissolved oxygen was estimated by Winkler's method. Acidity, alkalinity and hardness were estimated by the method given by Maithei and Sachhi. For collecting zooplankton a net with mesh size 40µm was used. Two hundred litres of water was filtered through the net and filtrate was taken in another tube. This filtrate contains phytoplanktons, algae, and zooplanktons along with some debris. Further the filtrate was fixed in 5% formaldehyde solution and was taken to the lab for further analysis. At a time a drop of this solution was observed under binocular microscope on Sedgwick-Rafter cell. The identification of zooplanktons was done by using standard keys of Dhanapathi (2000) and Altaff (2004).

RESULTS AND DISCUSSION

This study reveals the occurrence of total 13 species of belonging to 5 orders of the Phylum Arthropoda viz. 1,2,2,4,4 species of Calanoida, Cladocera,Cyclopoida, Ploima, Podocopida respectively. Here we found, water body is not much more polluted. But agricultural waste coming from the surrounding areass has its effect on gradually increasing algal growth. It may cause eutrofication of water body in future, ultimate effect on primary consumer zooplankton and other aquatic life. Same observations were pointed out during study of Lonar Lake in Buldhana District. It is due to cultural eutrophication, farmers downing farming and hence the use of inorganic fertilizers, insecticides and pesticides like toxic compounds. (Yannawar, 2013). algae as biomonitors of eutrophication (Jain, 2017).

Table 1: The Occurrence of Zooplankton in Lower Dnyanganga Phase-II (Dam) at Nimkawala village, in Khamgaon tahsil.

Sr.No	Order	Number
Calanoida		
1	*Diaptomus*	38
Cladocera		
2	*Bosmina*	15
3	*Monia*	25
Cyclopoida		
4	*Nauplius*	49
5	*Mesocyclops*	19
Ploima		
6	*Branchionus rubens*	26
7	*Branchionus cadatus*	05
8	*Anuropsis*	18
9	*Keratells tropica*	21
Podocopida		
10	*Cypris*	34
11	*Strandesia*	06
12	*Cyprinotus*	09
13	*Cypricercus*	06

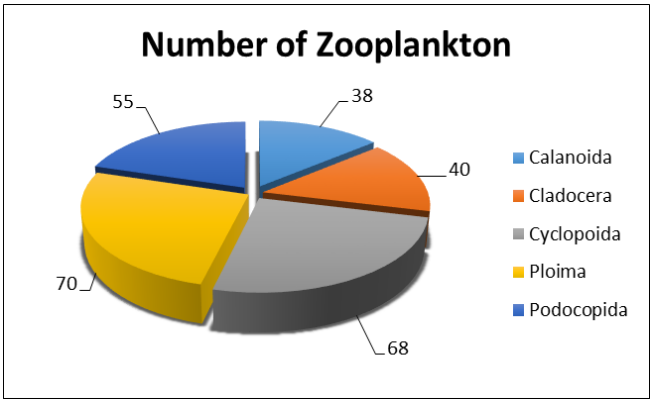

Fig 2: Diversity of Zooplankton (Orders and theirss Numbers) in Lower Dyanganga Dam Nimkawala.

Diaptomous

Bosmina

Monia

Nauplius

Mesocyclops

Branchionus.rubens

Branchionus. cadatus

Anuropsis

Keratellus.tropica

Cypricercus

Fig:3 Few photographs recorded during in the study.

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Conflicts of interest: The authors stated that no conflicts of interest.

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