

Eutrophication bioindicators of pollution in Chirebandi pond, Fulchur, Gondia, Maharashtra, India

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ABSTRACT

To study the eutrophication bioindicators of pollution, the water samples of Chirebandi Pond were collected and analysis was done monthly from June 2006 to May 2007. This study was based on only the zooplanktonic population and their role as eutrophication indicators in Chirebandi pond. Total zooplanktons were recorded as 3837 ind./lit. The zooplankton which was recorded. They are Rotifera, Copepoda, Cladocera, and Ostracoda in the pond. The investigation shown that this water body is very much polluted which results to the eutrophic condition because of the anthropogenic activities by the people.

Keywords: Eutrophication, Bioindicators, Pollution, Chirebandi Pond.

Introduction

Zooplanktons plays vital role as bioindicators in pond ecosystem as they indirectly convert the food energy due to their role as preys of economically important fishes. The zooplankton because of their short life period respond quickly, but also because of their small size and often their great numbers are also useful in determining the origin or recent history of given water mass. [1]. Bioindicators are microorganisms such as plants, planktons, animals and microbes which detect the quality of natural ecosystem. These responds rapidly to a change which occurs in the water and helps as biomarker to check the water quality and bioindicators of pollution. The physical and chemical factors play important role, which for the most part are responsible for the distribution of the animal life in fresh water habitat. The seasonal cycle of zooplankton are affected by many factors such as size, distribution of algae, bacterial prey and pressure of predatory fishes. [2-3].

Water bodies show very close relation of phytoplankton with zooplankton diversity and density. Zooplanktons play key role in converting plant food into animal food and also vital food source for other higher animals such as fish. The Zooplankton is classified into Rotifera, Cladocera, Copepoda and Ostracoda which were recorded in this pond. These planktons serve as an intermediate hosts of some parasites may have impact on human health [4]. These transfer energy from in all tropic levels in pond ecosystem [5]. Thus these planktons act as both an indicator of water quality and as the vital food source for many fishes [6].

Methodology

The analysis on biological parameters was carried out during June 2006 to May 2007. Water samples were collected monthly and analyzed in the laboratory. The collection of plankton samples was done by using standard nylon plankton net which is made of bolting

silk no. 25. Zooplanktons were preserved in 4% formaldehyde and identified by using [7] and other standard manuals.

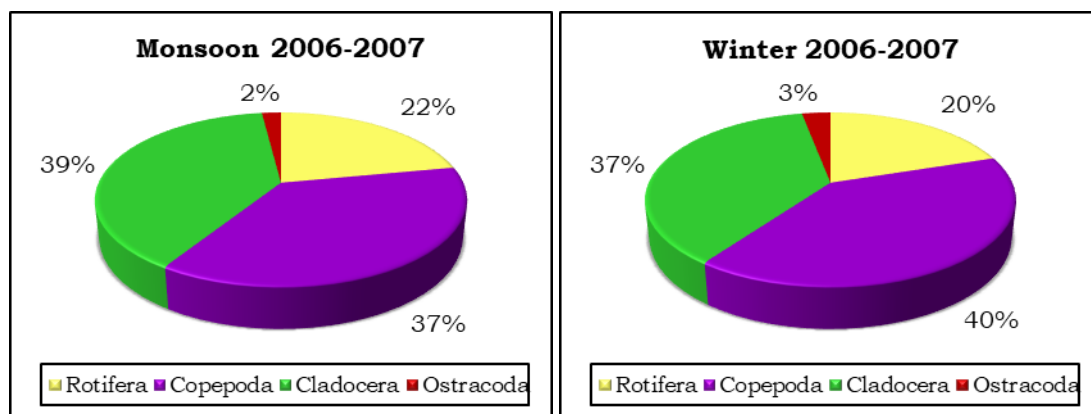
Results and Discussion

Total Zooplanktons were recorded as 3837 ind/lit during the study period. The quantitative relationship of zooplankton groups in pond was Copepoda > Rotifera > Cladocera > Ostracoda during the analysis. Total 24 species of zooplankton were recorded and consists of Rotifera 14 species belongs to 5 families and 6 genera; Cladocera 4 belongs to 4 families; Ostracoda 1 and Copepoda 5 as shown in Table No.1.

The Rotifera was represented by *Brachionus spp.*, *Keratella spp.*, *Lecane spp.*, *Trichocerca spp.*, *Asplanchna spp.* and *Filinia spp.*. The total number of Rotifers 1196 ind/lit about 44% of the total population are recorded. The Cladocera was represented by *Diaphanosoma spp.*, *Ceriodaphnia spp.*, *Moina spp.*

Table 1: Quantitative Analysis of Zooplanktons from Chirebandi Pond (2006-2007)

2006-07	Monthly												Seasonal		
	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Mon	Win	Sum
Zooplankton															
Rotifera	54	40	13	46	67	75	79	90	138	177	163	238	153	311	716
Copepoda	44	58	55	100	128	162	172	150	144	106	80	98	257	612	428
Cladocera	49	66	70	81	113	139	165	140	131	100	79	81	266	557	391
Ostracod	1	5	3	6	9	10	12	10	14	16	19	25	15	41	74
Total	148	169	141	233	317	386	428	390	427	399	341	442	691	1521	1609



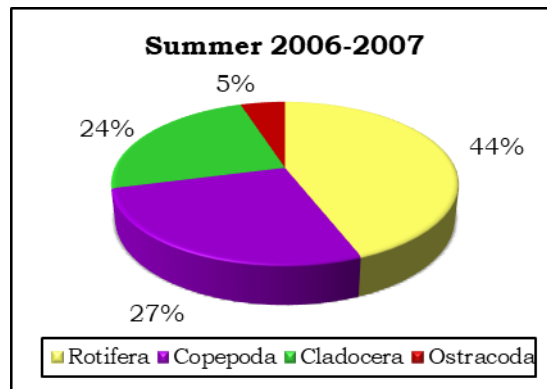


Fig.1: Seasonal Abundance of Zooplanktons in Chirebandi Pond during 2006-2007.

The total number of cladocerans 1214 ind/lit about 39% of the total population were found. The Copepoda was represented by *Mesocyclops spp.*, *Eucyclop spp.*, *Cyclop spp.* and *Diaptomus spp.* The total number of copepods 1297 ind/lit about 40 % of the total population are recorded. Only one Ostracoda species i.e. *Cypris spp.* and very least number 130 ind /lit about 3% of the total population are recorded. Fig.1.

Discussion

Zooplanktons are important eutrophication bioindicators in fresh water ecosystem as they indirectly convert the food energy due to their role as preys of economically important fishes. The zooplankton because of their short life period respond quickly, but also because of their small size and often their great numbers are also useful in determining the origin or recent history of given water mass [1]. Khare [8] in Jagat Sagar pond, Chhatarpur, the total zooplankton recorded peak in the month of April while lowest during monsoon. In present investigation, the biodiversity of zooplankton collected from the pond are presented in the table no. 1.

Peak of Rotifers during summer might be due to high temperature which is favorable for their growth, reproduction and development and availability of nutrients. Low number of Rotifers during monsoon season may be due to more dilution, cloudy weather and low temperature. Sukund et al. [9] reported Rotifer richness and diversity in fort lake, Belgaum, North Karnataka and recorded maximum density

during summer season and attributed to the influence of temperature. Jorge et al [10] reported peak of Rotifers during summer months in Valle de Bravo reservoir, Mexico, due to high temperature.

Thus from table no.1, it is clear that during the study year Copepoda dominated total zooplanktons in winter, while others were recorded with the moderate density. Copepoda diversity was represented by four species and found peak during winter and minimum during monsoon season under study. Sharma et al. [11] in urban lake, Udaipur has recorded the peak of crustaceans quantitatively

Cladocerans showed the peak in population during monsoon season shows the impact of physico-chemical parameters, while lower population was reported during summer and winter. Similar findings also reported by Krishnamurthy [12]. K. Siva Kumar [13] has recorded peak of Copepodes and Cladocerans during winter than summer.

This pond ecosystem has recorded the lowest number of Ostracodes during the monsoon and highest in summer than winter. These results are supported by Ansari et al [14] has reported least number of total zooplankton. Fluctuations in the zooplanktons population leads into harmful changes in the ecosystem [15]. The presence of cladocerans shows that this water body is polluted.

Conclusion

Zooplanktons play the key role as eutrophication bioindicators for detecting the pollution level of

Chirebandi Pond. These bio indicator species at peak level indicates the mesosaprobicity of this pond.

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

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