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Research Article

EFFECT OF COPEPODS DIVERSITY ON POLLUTION LEVEL OF CHIREBANDI POND, GONDIA, DISTT. GONDIA, (M.S.)

Wasudha J. Meshram

Department of Zoology Jagat Arts, Commerce and I.H.P. Science College, Goregaon, Distt. Gondia, Maharashtra, India

**Corresponding author: wasudhagajbhiye@gmail.com*

ABSTRACT

In the present study, the Chirebandi pond, Fulchur at Gondia (M.S.) was selected to study the effect of copepods diversity on pollution level of Chirebandi pond, Gondia, Maharashtra. It is situated at about 3 km from the Gondia town at Fulchur village on Gondia-Nagpur State highway No.249. It is a medium sized water body, surrounded by sparsely populated area and the water of which is used for washing, bathing and for other socio-cultural practices by the nearby people.

To study the effect of copepods diversity on pollution level of Chirebandi pond. The physico-chemical parameters related with the quantitative analysis of copepods were analyzed seasonally from June 2006 to May 2007. Studies showed the seasonal fluctuations in water temperature (25°C-35°),Transparency (13-20 cm), pH (7.1-8.3), Dissolved Oxygen (3.4-10.5 mg/l), Free Carbon Dioxide (6.0-17.5 mg/l), Total alkalinity (103-309mg/l), Chlorides (15.6-72.0 mg/l), Total Hardness (475-830 mg/l), Phosphate (2.07-7.15 mg/l), Nitrates (2.09-4.06 mg/l), Copepods were recorded as 1297 individual/litres in this study. The study has shown that there is an indication of pollution in this pond due to rapid encroachments of the pond area, domestic sewage. However, there is an urgent need of an action for conservation and to decrease pollution level before it becomes highly polluted.

Keywords: Copepods, Pollution, Chirebandi Pond.

1. INTRODUCTION

Water pollution has greatly threatened to all the living things and ecosystem. Such pollution is causing very harmful effects on environment worldwide. Zooplanktons are one of the bioindicators which are utilized to check the status of the natural ecosystem. Planktons are very important bioindicators which are responding rapidly the changes which are taking place in the surrounding environment as well as for assessing the quality of water. Zooplanktons are the major route for energy source in the plankton based food web proves them an important factor in quality of pond ecosystems.

Copepoda is one of the important element of zooplankton in a pond ecosystem. Copepods occur almost universally in the freshwater habitat. They are highly important food source for fishes in fresh water ponds, lakes and play a vital role in fish growth and their production. Copepods diversity and density are very much sensitive to any changes in physicochemical factors, thus providing information about the quality of an aquatic ecosystem and of any damage results into the threat of the ecosystem [1].

Seasonal variations with reference to physico-chemical factors were studied in the present research. The investigation was carried out to study the pond ecosystem with seasonal changes in response to physico-chemical and biological factors during different seasons of the year.

2. MATERIAL AND METHODS

The Chirebandi pond located at 21° 25′ and 48.97"N, 80° 11′ and 43.41" E about 1041 ft. above the mean sea level (MSL), with net area of 0.09 sq. km. This pond is an oligosaprobic in nature, but the present trend in expansion of urbanization on all sides of town may engulf this water body in future.

The physico-chemical and biological parameters analysis were carried out during June 2006 to May 2007. Water samples were collected monthly and brought to the laboratory for analysis. Physico-chemical parameters like temperature, transparency, pH, dissolved oxygen, free carbon dioxide, chloride, hardness and nutrients like phosphates and nitrates [2]. The plankton samples were collected at the same time by using standard nylon

plankton net made by bolting silk no. 25 planktons were preserved in 4% and identified using [3] and other standard manuals.

3. OBSERVATIONS AND RESULTS

During the present investigation the physical parameters such as temperature, transparency and chemical parameters namely pH, dissolved oxygen, free carbon dioxide, chlorine, total hardness, total alkalinity, phosphate and nitrates. The quantitative analysis of copepods was studied from June 2006 to May 2007. The seasonal variations of various physico-chemical parameters of Chirebandi pond during the study period (Table No.1).

Table 1: Annual range, Seasonal variations in physico-chemical parameters of Chirebandi Pond during 2006-2007

Parameters	Range	Monsoon	Winter	Summer
Water Temperature (°C)	23-33	28.5±1.118	23.75±0.829	30.25±2.384
Transparency (cm)	15-24.5	17±2.031	23.63±0.739	16.7±1.479
pH	7.2-8.2	7.85±0.111	7.85±0.111	7.67±0.311
Dissolved oxygen (mg/l)	4-14.9	11.38±2.211	12.05±2.433	5.7±1.374
Free Carbon dioxide(mg/l)	3.3-7.5	5.13±0.954	3.33±0.268	6.5±0.845
Total Alkalinity (mg/l)	64-177	89.5±23.921	108.5±16.620	165±12.38
Total Hardness (mg/l)	318-710	678.28±146.649	557.25±53.476	403.5±55.554
Chloride (mg/l)	7.92-72.0	46.97±11.064	32.3±7.589	13. 91±4.636
Nitrate (mg/l)	1.70-3.92	2.77±0.507	1.84±0.1	2.88±0.616
Phosphate (mg/l)	1.28-6.05	3.19±1.555	1.78±0.343	4.99±0.889

Parameters like water temperature (30.25°C), free carbon dioxide (6.5 mg/l), total alkalinity (165 mg/l), nitrates (2.88 mg/l) and phosphates (4.99 mg/l) were maximum during summer while transparency (23.63 cm), pH (7.85), dissolved oxygen (12.05 mg/l) showed its peak in winter and total hardness (557.25 mg/l) and chloride (46.97 mg/l) were recorded maximum during monsoon season.

During the study, total 5 species of copepods were recorded. The most diversified species was Cyclops (355 individual/lit.), Diaptomus spp. (271 individual/ lit.), Macrocyclops (231 individual/lit.), Mesocyclops (208 individual/lit.) and Eucyclops (232 individual/ lit.). Total population of copepods was recorded as 1297 individual/lit.). Seasonal population density of copepods recorded its peak during winter (612 individual/lit. i.e 47%), during summer (372 individual /lit., i.e 33%) while least during monsoon (257 individual/lit. i.e 20%). Fig.1 and Fig.3.

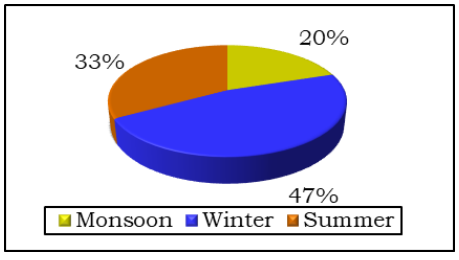

Fig. 1: Seasonal distribution of Copepoda In Chirebandi Pond during year 2006-2007

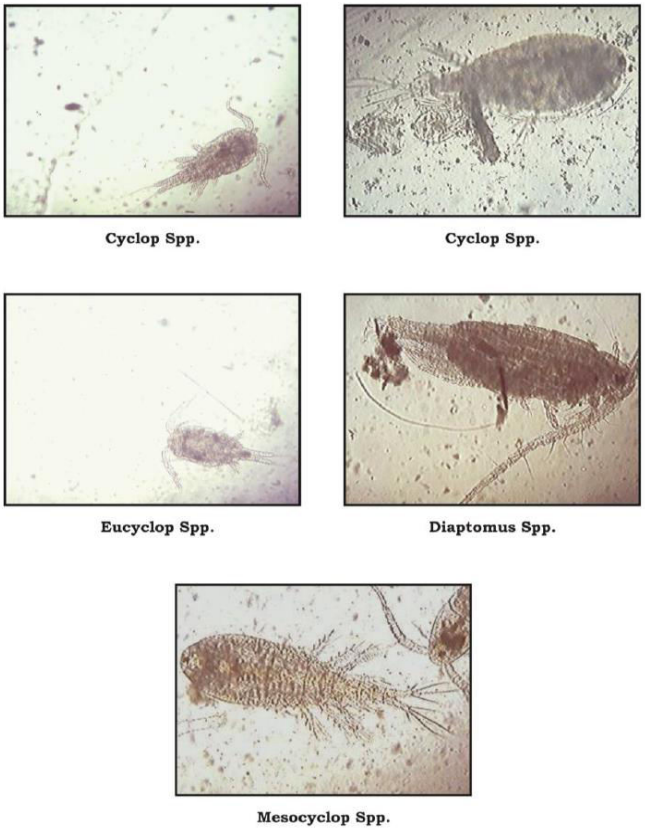

Fig. 2: Copepodes in Chirebandi Pond during year 2006-2007

4. DISCUSSION

Copepodes population increases slower than rotifers and other zooplanktons. As they become dominant, they

dominate the ecosystem till the water quality of the pond favor their existence [4]. The seasonal study of copepods biodiversity of Chirebandi pond recorded maximum density and diversity in winter season indicating the effect of various physico-chemical parameters.

During the study period, the nutrients such as nitrates, phosphates etc. were recorded in lower concentration while higher concentration of pH and dissolved oxygen were recorded during winter season which may result into the increased density of copepods while lower population was reported during summer and monsoon season. Similar results recorded [5] which have reported the increased population of pollution indicator species like Cyclops during the winter. It might be due to the abundance of diatoms and blue green algae [6]. This may be due to the interaction of biotic and abiotic components of water. Increased population of copepod was recorded during October [7].

Water temperature and availability of food organisms affect the copepod concentration. Scientist [8] reported maximum total number zooplankton during summer season and among this Copepodes are recorded maximum during winter season and minimum during monsoon season. Scientist [9] also reported increased population of Copepodes during winter than summer. The lower population of these species during summer might be due to the higher ranges of temperature, evaporation of water might be reason of the depletion of the Dissolved oxygen. The lower population of these species may also be due to predation.

Quantitatively less plankton in tropical inland waters also reported by [10]. Similar results [11] in urban lake, Udaipur has reported the dominance of crustacean zooplanktons quantitatively. This is also supported by Scientists [12-14], who also found dominance of copepods in stagnant waters.

5. CONCLUSION

Copepods composition as a bioindicator that may reflect on pollution level in this pond ecosystem. With the above observations on physico-chemical parameters, such as temperature, transparency, p^H, dissolved oxygen, free carbon dioxide, total alkalinity, total hardness, nitrates and phosphates have the direct impact on occurrence, density and diversity of copepods in Chirebandi pond. Increased population of these bio indicator species indicates the mesosaprobic nature of this water body.

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