

Research Article

## Cladoceran abundance in relation to water quality parameters of Chakki Talab, Bodhan, Telangana

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### Abstract

In the present study an attempt has been made to evaluate water quality and related density of Cladocerans for a period of one year, October 2015 to September 2016. Water quality parameters such as temperature,  $P^H$ , total dissolved solids, dissolved oxygen, biological oxygen demand, total alkalinity, total hardness, chlorides, phosphates, and nitrates are presented here to relate with the abundance of Cladocerans. The Cladoceran abundance reflects the eutrophic nature of the Chakki talab.

**Key words:** Zooplankton, Cladocera, Water quality, Chakki talab, Eutrophication, Bodhan

### Introduction

Zooplanktons are one of the most important biotic components influencing all the functional aspects of an aquatic ecosystem, such as food chains, food webs, energy flow and cycling of matter (Supritam pal *et al.*, 2015). The zooplankton inhabiting freshwater responds quickly to environmental changes and hence their species indices fluctuate (Avinash 2014). One of the most important zooplankton components in freshwater lake environment are Cladocera. Cladocera is an order of small crustaceans commonly called water fleas. They occupy a key position in the aquatic food chain as the intermediate link between primary and secondary productivity and they also serve as model species in environmental toxicology because of their high sensitivity to water quality (Siciliano *et al.*, 2015)

Cladocerans are important biological indicators for a wide range of environmental variables (Rumes *et al.*, 2011). Cladocera show a strong response to environmental factors, such as trophic state, total phosphorus concentration, water depth, temperature, etc. Cladocera species are especially responsive to changes in pH, reflecting their sensitivity to acidification (Edyta Zawisza *et al.*, 2016). Therefore the present investigation was done to determine the monthly variations of cladocerans in relation to the water quality parameters of Chakki talab, Bodhan to know its current status.

### Materials and methods

Bodhan town is spread 21.36 km<sup>2</sup>. The town Bodhan is located at latitude 18°39' 36" N and longitude 77°52'

47" E. The Chakkitalab is a lake located on the south side of Bodhan town near residential localities. Sampling and physicochemical investigation was carried out according to standard methods, APHA (1989). Zooplankton samples were obtained by passing 50 L water through plankton net in each depth. Zooplankton samples were preserved in 4% formalin. Identification of Cladocerans was done with the help of fresh water biology Edmondson (1965). Counting of Cladocerans was done using Sedgwick- Rafter counter and the dilution technique. The population density of Cladocerans is represented per liter of water.

### Results and discussion

The Cladocera were represented by two genera, Daphnia and Ceriodaphnia. These Cladocerans were found throughout the investigation period. Cladoceran density was maximum during February 2016 and minimum during the month of July 2016 (Graph 1). The density of Ceriodaphnia was more compared to Daphnia throughout the study period.

The surface water temperature of Chakki talab ranged from 21°C to 35°C. According to Patel (2013) temperature is the prime factor affecting the occurrence and abundance of Cladocerans. Cladocera exhibited negative correlation with temperature (Graph 2A). Density of Cladocera was abundant during winter months. Maximum population of Cladocerans in winter could be attributed to favorable temperature and availability of food. Our findings were in confirmity with Harish kumar and Kiran (2016). But maximum density of Cladocera was reported in summer in Thigra reservoir by Dushyantkumar Sharma (2012).

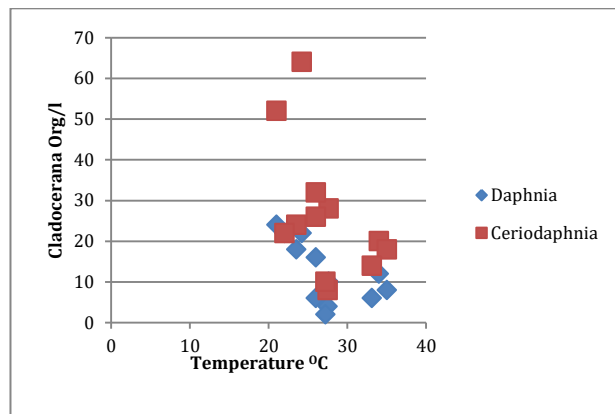
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The P<sup>H</sup> ranged between 7.8 to 8.6. Minimum P<sup>H</sup> was observed in the month of July while the maximum in April, 2016. Cladocerans exhibited slight positive correlation with P<sup>H</sup> (Graph 2B). Cladocerans exhibited positive correlation with P<sup>H</sup> in Varuna lake (Deepthi and Sadanand, 2014). Total dissolved solids ranged between 326 to 423mg/l. The Cladocera exhibited positive correlation with T.D.S. (Graph 2C).

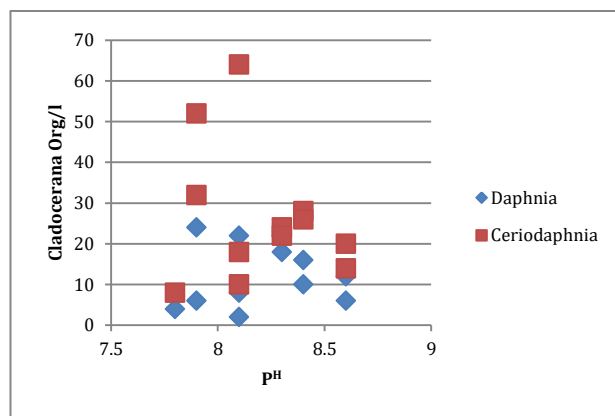
Dissolved oxygen ranged between 4.1 to 6.8 mg/l. The Cladocera showed negative correlation with DO (Graph 2D). Similar observation was noticed in Lake Vela (Antunes et al., 2003) Biological oxygen demand ranged between 24.3 to 42.4 mg/l. The Cladocerans showed Positive correlation with B.O.D. (Graph 2E).

Chlorides ranged between 141.8 to 198.5mg/l. The Cladocerans exhibited positive correlation (Graph 2F). Similar findings were observed in Pandu lake, Bodhan (Solanki et al., 2016). Total alkalinity ranged between 138 to 183 mg/l. Cladoceran exhibited positive correlation with total alkalinity (Graph 2G). Similar result was observed in Madappa lake (Deepthi and Sadanand, 2014). Total hardness ranged between 90 to 184 mg/l. Cladocera showed negative correlation with total hardness (Graph 2H). Our results are in conformity with the findings of Tidame and Shinde (2012).

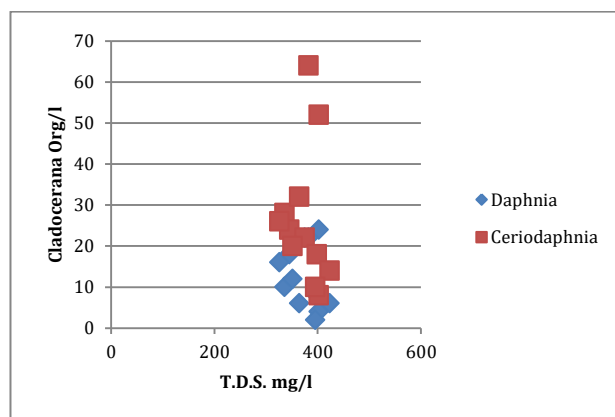
Nitrates ranged between 1.44 to 1.7mg/l. The Cladoceran abundance was high when nitrate content was more (Graph 2I). Cladocerans are reported to be the indicators of eutrophic nature of water bodies (Sharma, 2001; Tapas Kumar and Bidhan, 2013). Phosphates ranged between 0.036 to 0.087mg/l. The Cladocerans showed positive correlation with phosphates (Graph 2J). Rao (1987) stated that Cladocerans are rich in eutrophic waters. Shah and Pandit (2013) found an increase in Cladoceran density with the increase in the nutrient content of the water in Wular Lake, Kashmir.



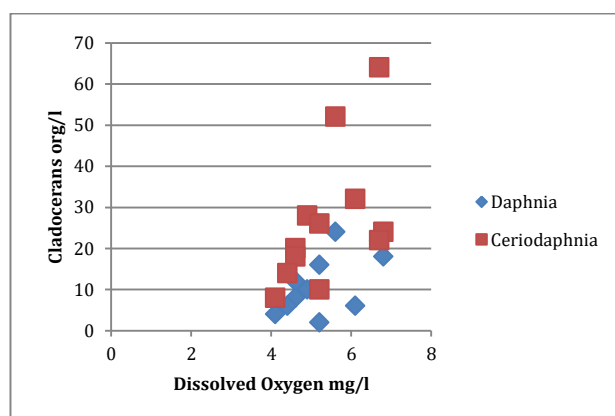
(A)



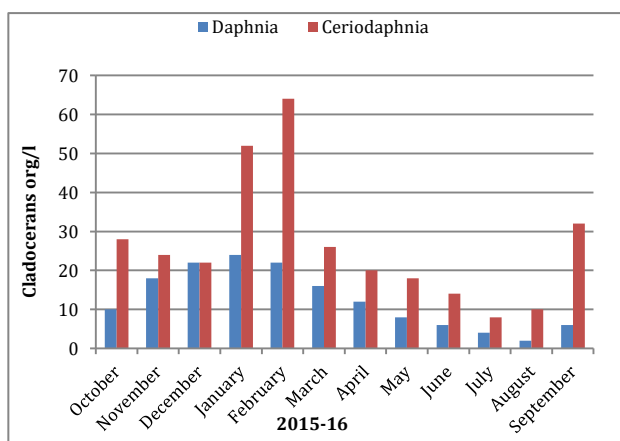
(B)



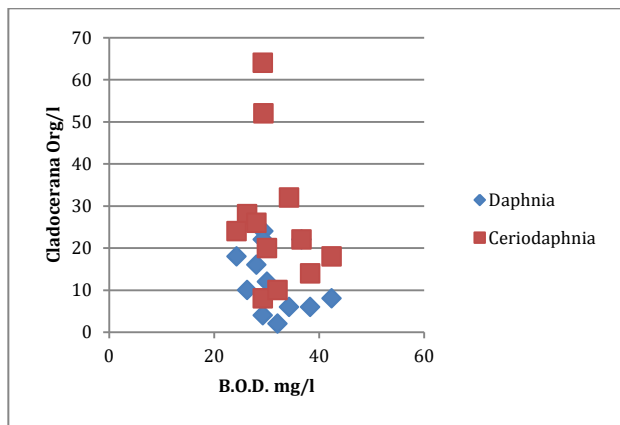
(C)



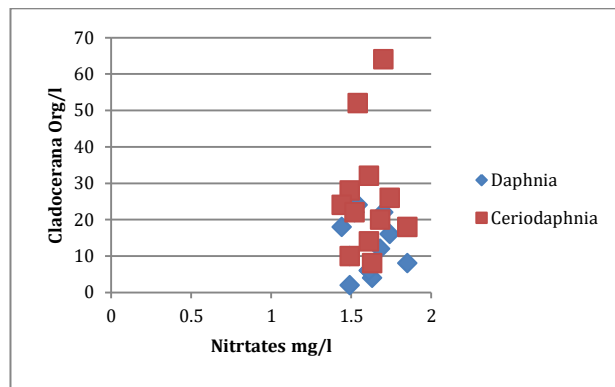
(D)



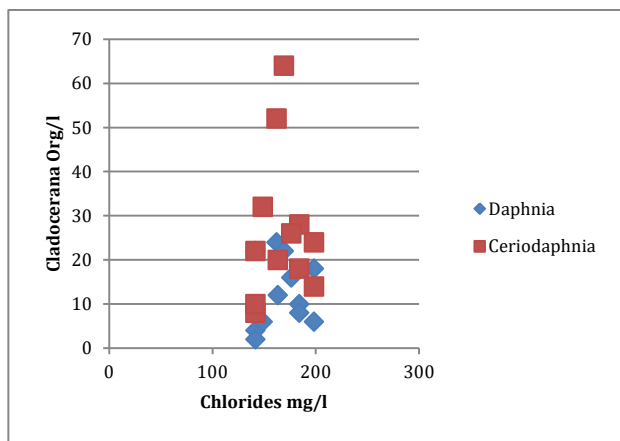
**Graph 1** Monthly variations of Cladocera org/l of Chakki talab



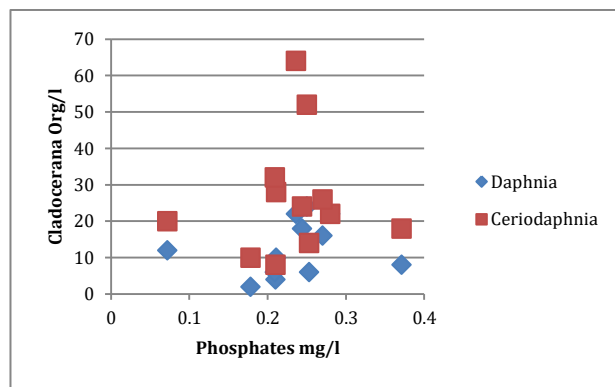
(E)



(I)

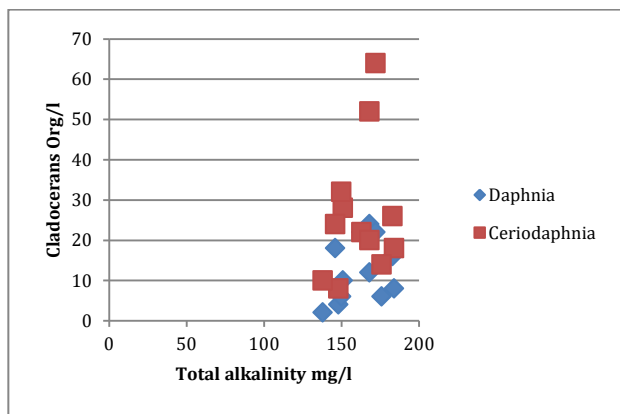


(F)

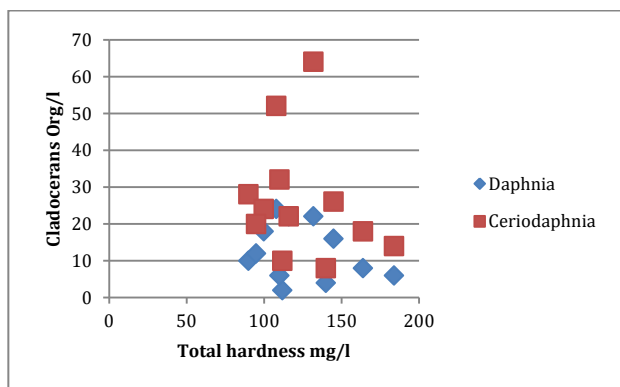


(J)

Graph 2(A-J) Correlation between Cladocera and water quality parameters



(G)



(H)

**Conclusion**

In the present study monthly variation of Cladoceran abundance was observed. They showed direct or indirect relationship with the water quality parameters studied. The Cladoceran abundance reflects the eutrophic nature of the Chakki talab.

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