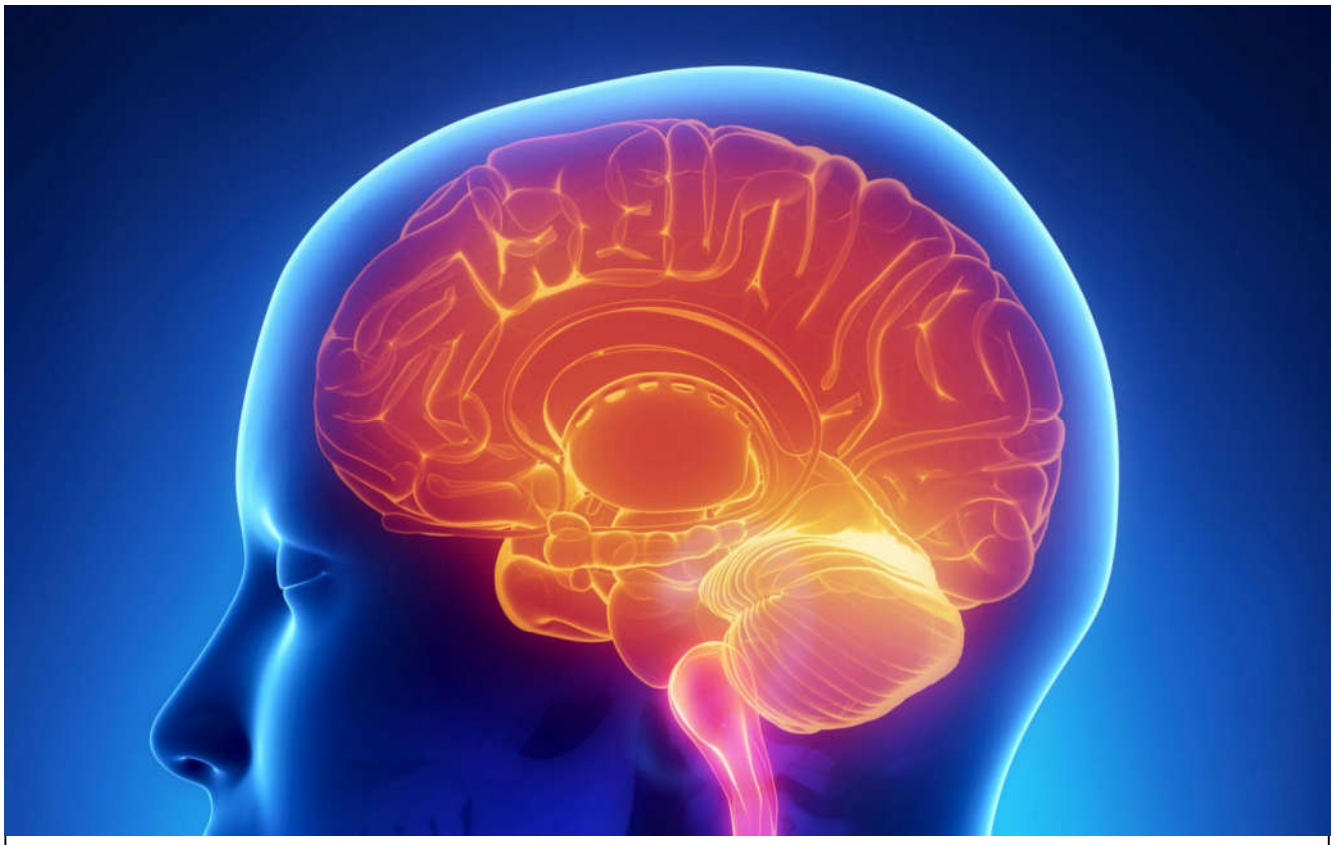

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RESEARCH ARTICLE

STUDY OF ZOOPLANKTON DIVERSITY AND DESITY IN CHIKODI (HALATTI) TANK

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ABSTRACT

Chikodi: is located at 16.25° N 74.34° E. It has an average elevation of 760 meters. Zooplankton sample were Collected by sieving 60 litres of water through plankton hand net made of nylon bolting10th (68 cm poresize) for quantitative estimation. In the samples of Chikodi Tank total of 33 species were identified in the present investigation. Of which 13 are belonging to Rotifera, 10 to cladocera, 7 to copepada & 3 species to ostracoda.They are cladocera like Diphonosoma exisom, Ceriodaphnia cornuta , Bosminopsis deitersi, Macrothrix goeldi,Moina Brachiata, Monia Macrocopa, Alona Cambouei, Alona Pulchela, Chydorus Spaericus, Chydorus reticulates,

Copepods: like Rhinediaptomus indicus, Heliodiaptomus Viduus, Neodicaptomus Stringilips, Paracyclops fibriatus, Tropocyclops Prasinus Mescocyclops leuckartii, Copepods larvae

Rotifers: like Brachionus Caudaus, Brachionus Plicatilis, Brachionus Calycirus , Brachionus falcatus, Brachionus bidentata, Brachionus ureolaris, Keratella tropica, K. Cochlearis, Monostyla bulla, Filinia longiseta and

Ostracodans: like Hyocypriis gibba, Darwinula Species were quantitatively estimated.The highest Rotiferan densities were recorded in Chikodi Tank in Marcm 2010. Lower number of cladocers was recorded in Chikodi tank. This is due to lack of Macrophytes 2 plants. High copepodal densities were recorded in the Tank throughout study period due to the lower water level & high nutrient content in summer. In survey during post mansoon season, H. fossucula was the most frequent ostracodan,

INTRODUCTION

As water forms an important constituent of living organisms, there is no life without water. Water covers about 71% of the earth's surface and provides the most extensive medium for aquatic animals to live. Water is the primary need to all life processes, because it contains several essential minerals and gases on which the life depends. Man has utilized lakes, ponds and reservoirs as important water resources and exploited them for various purposes like bathing, drinking, agriculture industry, pisciculture, power, recreation etc. Thus water becomes most important substance of life. Fresh water bodies constitute one-fifth of the earth's surface.

Plankton are any drifting organism that inhabits the water column of oceans and fresh water bodies. They are widely considered to be some of the most important organisms on Earth, because they supply food to most aquatic life. The term 'plankton' was first proposed by the Oceanographer to designate that heterogeneous assemblage of minute organisms occur in the waters of the sea and float about at the will of the waves and other water movements.

Plankton are classified into phytoplankton and zooplankton. Phytoplanktons are plant plankton freely floating on the water. Zooplanktons are animal plankton. They float on the water and move passively with the water current. The abundance of zooplankton is more or less governed by the interaction of physical, chemical and biological factors. Zooplankton forms the basic link of food chain for all aquatic animals and fish abundance depends on zooplankton abundance. Zooplankton feed on unicellular algae and other microscpic organisms. In turn, they may serve as food for worms, crustaceans, etc. which are fed by small fish. These in turn are eaten by larger fishes that are devoured by various animals and also relished by man, thus becoming an important part of the fresh water food chain especially in ponds and lakes. The Zooplankton community is a major link in the energy transfer at the secondary level of food chain of aquatic ecosystem.

The quality of life is linked with the quality of environment. The need for water is increasing day by day invariably due to increase in population, industrialization, urbanization etc. Simultaneously, the quality of standing water is deteriorating and is unfit to mankind due to human activities, neglect and mismanagement. Several workers have attempted to study the hydrobiological profile of varied water bodies and the diversity

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of organisms. There are numerous natural and artificial ponds, lakes in the Indian subcontinent (Rao 1975). Chikodi is a small own located in hilly area with optimum climatic factors. In the present study much emohasis was given to investigate the planktonic fauna of Chikodi Tank, District Belgaum, Karnataka State.

The following statement by Goldman and Horne (1983) – "An important role of education in limnology is increase the number of people who, although not full time limnologists can understand, apply its general concept bread range of related disciplines. Further research in limnology will require renewal of dedication for working out more widely applicable principles. This can be accelerated by the wise selection of proven as well as new technologies which may need to be applied on a large scale", is felt to be appropriate in the context of present work undertaken to investigate the zooplankton fauna of Chikodi tanks.

Objectives

To evaluate the quality of water of Chikodi Tank with special reference to the Zooplankton.

Approach Concept

- To fix locations in both the lakes for the study of Zooplankton.
- To collect water samples at prefixed locations.
- To determine the seasonal variations of Zooplankton.

MATERIALS AND METHODS

Study Area

Chikodi Geography

Chikodi is located at 16.25° N 74.34° E. It has an average elevation of 760 meters. The city is situated in the northwestern parts of Karnatak and lies at the border of state, Maharashtra. It is one of the oldest towns in the state, lying at a distance of 580 km from Bangalore and 500 km from Mumbai. It is aTalka head-quarter. The taluka comprising 131 villages wiyh an area of 96,509 hectares.

Sample Collection

Zooplankton sample were Collected by sieving 60 litres of water through plankton hand net made of nylon bolting10th (68 cm poresize) for quantitative estimation. Samples were fixed in 4 % formaldehyde. Fresh material was also used to identify philodinidae species. Organisms were microscopic and a specialized bibliography.

Chikodi Tank (Halatti Tank)

Topography

This Tank is located near village called Halatti, Chikodi City. Water spread area is about 6.07 hectares with live capacity of about 9.70 Mcft. Its construction year is not known but it is notified that it was for the purpose of minor irrigation and domestic use. Tank is surrounded with bund. Top width of bund is 3.00 meters and length is about 648 meters.

Objectives

- Study of fauna, flora and biological indicators with biodiversity of the tank.
- Identification of the major pollution problems of water Tank.

RESULTS

Biotic Fators

Plank tonic population density

Cladocerans

Family: Sididae

Diphonosoma exisom

Parappana population density of this organism is 70 to 700 organisms/litre the maximum organism s i.e. 700 organisms/ litre is observed during the month of April 2010 and minimum population i.e. 70 organisms/litre In the month of November 2009.

Family: Daphinidae

Ceriodaphnia cornuta

Population density of this organism in Ckikodi Tank varies from 30 to 590 organisms /litre. The maximum population was 590 organisms/litre observed during the months of December and minimum i.e. 30 organisms/litr in the month of May 2010. Organisms were absent during June and July 2009 in an observation period.

Family: Bosminidae

Bosminopsis deitersi

Population density of this organism in Chikodi Tank varies from 30 to 250 organisms /litre. The maximum population density was 250 organisms /litre in the month of April and minimum in the month of June 2009.

Family Macrothricidae

Macrothrix goeldi

Population density of this organism in 30 Chikodi Tank during November. Rest of the period it was absent.

Family Moinidae

Moina Brachiata

Population density of this organism in Chikodi Tank varies from 10 to 110 organisms/ litre. Maximum was in the month of Nonember (110 organisms/littre) and minimum in the month of February (10 organisms/litre). During May and July these species were absent.

Monia Macrocopa

Population density of this organism in Chkodi tank varies from 90 to 250 organisms/ litre. Maximum density was in the month of November 2009 (250 organisms/litre) and minimum during December (90 organisms/litre). Species were found during August and September 2010 and rest of the study period was absent.

Family: Chydoridae

Includes five species

Alona Cambouei

Population density pf this organism in Chikodi Tank varies from 30 to 200 organisms/ litre. This species were absent during April to July month.

Alona Pulchela

Population density of this organism in Chikodi Tank varies from 50 to 130 organisms/ litre. Maximum in the month of April (130 organisms/ litre) and minimum during February (50 organisms/ litre). During rainy season this species were absent.

Chydorus Spaericus

Population density of this organism in Chikodi Tank varies from 30 to 140 organisms/litre minimum during February, 2010 (30 organisms/ litre) and maximum during January 2010 (104 organisms/litre). Species was noticed during rest study period.

Chydorus reticulates

Population density of this organism in Chikodi Tank varies from 0 to 30 organisms/ litre. The species was noticed during January, but absent during rest study period.

Copepods

There are seven species found in Belgaum district which belongs to two different families. Family Diaptomidae consist of 3 species. i.e. Rhinediaptomus indicus, Heliodiaptomus viduus includes 3 species Trochocyclops prasinus, paracyclops prasinus, paracyclops fimbriatus and mesocyclops leuckarti.

Rhinediaptomus indicus

Population density of this organism in Chikodi Tank varies from 40 to 230 organisms/ litre. Maximum during May and minimum of 40 in the month of April. This species was noticed during February, March, April, May, November and December and was absent in the rest of the period.

Heliodiaptomus Viduus

Population density of this organism in Chikodi Tank varies from 40 to 390 organisms/ litre. Maximum during November and minimum in the month of July 2010.

Neodicaptomus Stringilips

Population density in Chikodi Tank varies 50 to 750 Organisms/ litre. Maximum was in the month of May and absent during February and June.

Paracyclops fibriatus

Population density varies from 100 to 670 organisms/ litre. It was maximum during May and minimum in the month of December.

Family: Cyclopidae

Tropocyclops Prasinus

In Chikodi Tank population density varies from 60 to 590 organisms/ litre. It was maximum during the month of May and minimum during the month of December.

Mescocyclops leuckartii

Population density varies from 210 to 710 organisms/ litre. Maximum during the month of May and minimum during month of January.

Copepods larvae

Varies from 500 to 6100 organisms/ litre. It was maximum during the month of May and minimum during the month of December.

ROTIFERS

There are 23 species belonging to 7 families found in Belgaum district.

Family: Brachionidae Brachionus angularis

Population density in Chikodi Tank varies from 60 to 360 organisms/ litre. Maximum in the month of May and minimum in the month of February.

Brachionus Caudaus

Density in Chikodi Tank varies from 50 to 900 organisms /litre. Maximum during April month and minimum in the month of November.

Brachionus Plicatilis

Population density varies from 60 to 430 organisms /litre in Chikodi Tank. Maximum in the month of April and minimum in the month of July.

Brachionus Calycirus

In Chikodi Tank it varies from 30 to 360 organisms/ litre. Maximum in the month of November and minimum during December.

Brachionus falcatus

Population Density in Chikodi Tank varies from 50 to 290 organisms /litre. Maximum numbers were observed during the month of April and minimum during January.

Brachionus bidentata

Population Density in Chikodi Tank varies from 100 to 220 organisms/ litre. Density was maximum in the month of February and minimum in July month.

Brachionus ureolaris

Density varies from 70 to 240 organisms/ litre in Chikodi Tank. It was maximum during April and minimum during November.

Keratella tropica

Population density in varies from 50 to 1500 organism/ litre. It was maximum during April and minimum during the month of December.

K. Cochlearis

Population density of it varies from 130 to 1550 organism/litre. It was maximum in April and minimum in the month of February.

Family: Lecanidae

Monostyla bulla

Population density of it varies from 70 to 150 organism/ litre. It was noticed during the months from March to June and in the remaining study period it was absent.

Family: Filinidae

Filinia longiseta

In Chikodi Tank the population Density of this species varies from 30 to 200 organisms/ litre. Maximum in the month of November.

Ostracods: There are 4 species belongs to 4 different families.

Family :Ityocypridae

Hyocypriis gibba

Population density of this species varies from 60 to 90 organisms/ litre & was noticed only between June to August in Chikodi Tank.

Family Darwinulidae

Darwinula Species: - In Chikodi Tank population density of this species from 50 to 120 organisms /litre. Maximum was in the month of April and minimum in the month of November.

DISCUSSION

Biotic Factors

Species composition, abundance, diversity & evenness. In the samples of Chikodi Tank total of 33 species were identified in the present investigation, of this, 13 are belonging to Rotifera, 10 to cladocera, 7 to copepada & 3 species to ostracoda. High species richness may be attributed to small water body highly stained shallow water with blue green algal blooms. Recorded species include a considerable number of rotifers.

Rotifers

Rotifera also called as 'Rotatoria' or 'wheel animalcules', are a group of small usually microscopic during the nine months study 13 number of species were recorded in the Chikodi Tank. In general high densities of rotifers reflect the availability of a wide range natural sestonic food particle, which rotifers may consume. The highest Rotiferan densities were recorded in Chikodi Tank in Marcm 2010. This is due to water level. Because during March/April 2010 Tank was becoming dry. In the same month species richness was also found high. The various investigators reported that the rapid increase in rotifers number may be attributed to their intrinsic high fecundity supported by favorable physical and chemical conditions, so, also abundance of diatoms followed by blue – green algae were responsibility for promoting the growth of rotifers.

Though the species richness was high in the Tank the variation may be due to the dominance of B. angularies, U.B.Ureceolaries species in the month of March. K.Tropica was major contributor to the to the Rotiferan density. During survey keratella tropica was the most frequent rotifer occurred in all water bodies followed by K.cochlearis, B.plicatilis, Branchionus caudatus, B. bidentata, B.calyciflorus, B.falcatus, B.urceolaries, Fillinia longisata, B.angularis, B.forficula, monostyla bulla, B.rubens,

Cladocerans

Cladocerans are commonly called as "water flea" which prefer to live in water. About 600 species of fresh water cladocrems have been reported to occur throughout the world & in India 110 species have been recorded. In the present study 10 cladoceran species are recorded.

During the Nine Month study period lower number of cladocers was recorded in Chikodi tank. This is due to lack of Macrophytes 2 plants near the bank of tank because the macrophytes & plants allow. Though the species richness low in the tank the cladoceran density was observed high in the tank. This is due to rapid increase in Diphanosoma excisum this species grows rapidly in high nutrient conditions, because presence of lower level in summer. Remains of dead and decaying vegetation as well as burnt and half burnt dead bodies, which results into the increase of organism anic matter 2 growth of bacteria population which increase the zooplankton population. The seasonal succession of the cladocera is quite variable; some species are perennial & over winter in low population densities as adult rather than as rusting eggs. Some

perennial only during colder periods. Some estival resting egg stage commonly develop population maximum in the summer.

In the present study it was observed that Diaphanosoma excisom & Criodaphnia cornuta were the major contributor to the cladoceran density in parappana Tanbk & Majangaon Tank it was D.excisum which alone contributed 20% of cladoceran densities. Cladoceran species was also found high in pre mansoon season compared to post mansoon season. This variation may be attributed to the high turbid water, as the survey was carried out in the September month, in south India rainy season will start in June & end in September.

Copepods

Freshwater copepods, though small in the number of species, constitute one of the major zooplanktonic communities occurring in all type of water bodies & ranging from free living to parasitic forms. They serve as food for several fishes, play a major role in ecological pyramids, trophic levels, food chain & energy transformations, in the fresh water ecosystems. Some copepods are the vectors of fishes, tapeworms & Nematodes. Approximately 1200 marine and fresh water species of calanodis, 1000 cyclopedia & 1200 harpacticoids have been recorded from India. 7 species of copepods are recorded in Belgaum district. In the present study also seven species have been found belonging to 3 genera of calanoids 23 genera of cyclopedia.

During the Nine months study period six were recorded in two wateries. High copepodal densities were recorded in the Tank throughout study period due to the lower water level & high nutrient content in summer. In survey during post mansoon season among calnoids N. Strigillpes was comparatively high in its accordance than that of H. Viduus, R.Indicus was the most frequent which accrued in 2 water bodies.

Ostracods

Ostracods are small crustaceans having the bivalve carapace enclosing the laterally compressed entire body. The inhabit all kinds of freshwater marine environment. In freshwater osteracods in lakes tanks, pools, swamps, streams living & few are commensals on the gill of cray fishes and the intestine of fishes and amphibians there are no parasitic forms.

Approximately 110 species are known from the in land water bodies of the Indian subcontinent. In the present study four species were recorded. Among ostracoda the most abundant species was H. fossucula which contributed 70% - 71% to the ostracod densities. In survey during post mansoon season, H. fossucula was the most frequent ostracodan, which occurred in all water bodies followed by I. gibba and Darwinula Species. No particular seasonality was observed for ostracods during pre and post mansoon survey.

SUMMARY AND CONCLUSION

This tank was investigated for monthly variation of zooplankton composition, and 33 species of zooplankton were recorded in this water reservoir. Cladocera was taxonomically dominant group and copepoda was high in density. Reservoir was in eutrophic or hypereutrophic state in March to May (summer) and in winter seasons, in the remaining months it was either in oligotrophy or in mesotrophy state. Chikodi Tank has 33 species of zooplanktons Rotifera was taxonomically dominant group. Both Rotifera and Copepoda were equally dominant in density the pond was in eutrophic or hypereutrophic condition throughout our study period except between June & July.

The anthropogenic activities, sewage and fertilizers used in agricultural fields may be the causes of eutrophication in these tanks. Such eutrophication is harmful to aquatic organism s which lead to the disturbance in the biodiversity of the tanks. If the habitats have to be preserved for their intended use, sustained and holistic management measures for the redemption of the tanks are an immediate necessity. As there is no single piece of legislation, which comprehensively addresses the problem of eutrophication of fresh water bodies, it is suggested to the concerned authorities to provide facilities for proper management and recycling of the urban sewage, using biofertilizers and subjecting the tanks to least anthropogenic activities.

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