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## Research Article

### STUDY OF ZOOPLANKTON IN PARAPPANA TANK (DIST: BELGAUM)

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#### ABSTRACT

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. Man has utilized lakes, ponds and reservoirs as important water resources and exploited them for various purposes.

Minute organisms called plankton occur in the waters bodies. Zooplankton are animal plankton. Plankton abundance and distribution are strongly dependant on factors such as ambient nutrient concentration, physical state of the water column and the abundance of other plankton. Zooplankton forms the basic link of food chain for all aquatic animals and fish yield to a great extent.

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.

To evaluate the quality of water with special reference to the Zooplankton some concepts are followed. Study of fauna, flora and biological indicators with biodiversity of the tank; Identification of the major pollution problems of water Tank. The zooplanktons like cladocerans ( for example: *Diphonosoma exisom*, *Ceriodaphnia cornuta*, *Macrothrix goeldi*, *Monia Macrocopa*, *Alona Pulchela*, *Pleuroxus trigonellus*, etc.), copepods (for example: *Rhinediaptomus indicus*, *Heliodiaptomus*, etc.), rotifers (for example: *Brachionus Caudaus*, *Brachionus Plicatilis*, *Brachionus Calciflorus*, *Brachionus diversicornis*, *Brachionus Quadrifentatus*, *Brachionus falcatus*, *Brachionus bidentata*, *Brachionus ureolaris*, etc.) and ostracods are studied.

The Parappana tank was investigated for monthly variation of zooplankton composition, and 44 species of zooplankton were recorded in these water reservoirs. 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.

Parapanna Tank has 44 species of zooplanktons Rotifera was taxonomically dominant group. Both Rotifera and Copepoda were equally dominant in density the pond.

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#### INTRODUCTION

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 as a universal solvent contains several essential minerals and gases on which the life depends. Water forms an important constituent of living organisms. Water is the most precious gift of nature to all the living organisms. Water is the primary need to all life processes.

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. In comparison to oceans and terrestrial habitats, inland fresh water bodies constitute one-fifth of the earth's surface.

Minute organisms occur in the waters of the sea and their movement is controlled by water current. They are called plankton. They are widely considered to be some of the most important organisms on Earth, due to the food supply they form most aquatic life. The term 'plankton' was first proposed by the Oceanographer Victor Heusen in 1887 to designate that heterogeneous assemblage of minute organisms occur in the waters of the sea and other water bodies.

Plankton abundance and distribution are strongly dependant on factors such as ambient nutrient concentration, physical state of the water column and the abundance of other plankton.

Plankton are classified into two groups namely phytoplankton and zooplankton. Phytoplankton are plant plankton freely floating on the water. Zooplankton are animal plankton. They float on the water and move passively with the water current.

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Zooplankton forms the basic link of food chain for all aquatic animals and fish yield to a great extent depends on their abundance. The Zooplankton community is a major link in the energy transfer at the secondary level of food chain of aquatic ecosystem.

Several workers have attempted to study the hydrobiological profile of varied water bodies (Singh 2000, Kaushik & Sharma 1994, Patil & Karikal 2001, Sunkad & Patil 2003) and the diversity of organisms. There are numerous natural and artificial ponds, lakes in the Indian subcontinent (Rao 1975).

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 for mankind due to human activities, neglect and mismanagement.

Belgaum city is industrially and agriculturally well developed, discharging large amount of domestic waste and industrial effluents. Cattle bathing and anthropogenic activities also contribute to deterioration of water body.

In the present study much emphasis was given to investigate the planktonic fauna of Parappana of Belgaum in Karnataka State.

#### Objectives

To evaluate the quality of water of Parappana Tank and Majagaon Tank with special reference to the Zooplankton.

#### Approach Concept

1. To fix locations in the lake for the study of Zooplankton.
2. To collect water samples at prefixed locations.
3. To determine the seasonal variations of Zooplankton.

## MATERIALS AND METHODS

#### Study Area: Belgaum

**Belgaum Geography:** It is located at 15.87° N 74.5° E. It has an average elevation of 751 meters (2463 feet). The city is situated in the northwestern parts of **Karnatak** and lies at the border of two states, **Maharashtra** and **Goa**.

#### Parappana Tank (Anigol Tank)

#### Topography

This Tank is located near village called Anigol, Belgaum City. Water spread area PS about 6.07 Hectares which 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. (Catchment area in Sq.Kms is about 0.617 (independent))

#### Sample Collection

Zooplankton sample were Collected by sieving 60 litres of water through plankton hand net made of nylon bolting 10th (68 cm pore size) 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 (Edmondson;1959; Dhanapathi

1974, 1976; Dumont velde,1977; Dumont, 1983; Sharma, 1979, 1980, 1983, 1987, 2005; Sharma and Michael, 1980, 1987; Rajapaksa and Fernando 1982.

#### Objectives

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

## RESULTS

#### Biotic Factors

Planktonic population density

#### Cladocerans

**Family: Sididae**

#### *Diphonosoma exisom*

Parappana population density of this organism is 70 to 760 organisms/litre the maximum organism s i.e. 760 organisms/litre is noticed during the month of may 2015 and minimum population i.e. 70 organisms/litre In the month of January 2015.

**Family: Daphnidae**

#### *Ceriodaphnia cornuta*

Population density of this organism in parappana Tank varies from 70 to 620 organisms/litre. The maximum population was 620 organisms/litre observed during the months of September and minimum i.e. 70 organisms/litr in the month of May 2015 organism s were absent. During June and July 2015 in an observation period.

**Family: Bosminidae**

#### *Bosminopsis deitersi*

Population density of this organism in Parappana Tank varies from 80 to 360 organisms/litre. The maximum population density was 360 organisms/litre in the month of April and minimum in the month of May and June 2015.

**Family: Macrothricidae**

#### *Macrothrix goeldi*

Population density of this organism in 60 Parappana Tank varies from 40 to 60 organisms/litre 60 organisms/litre found during August and 40 during July.

**Family Moinidae**

#### *Moina Brachiata*

Population density of this organism in Parappana Tank varies from 20 to 360 organisms/litre.

Maximum was in the month of August (360 organisms/litre) and minimum in the month of February (20 organisms/litre). During may and July. These species were absent.

#### *Monia Macrocopa*

Population density of this organism in Parappana tank varies from 60 to 140 organisms/litre.

Maximum density was in the month of September 2015 (140 organisms/litre) and minimum during March (60

organisms/litre). Species were found during August and September 2015 and rest of the study period was absent.

**Family: Chydoridae**

**Includes five species**

***Alona Cambouei***

Population density of this organism in Parappana Tank varies from 70 to 300 organisms/litre. This species were absent during January to July month. In Majangaon tank population density of this organism varies from 30 to 60 organisms/litre.

***Alona Pulchella***

Population density of this organism in Parappana Tank varies from 50 to 120 organisms/litre. In Majangaon Tank population density varies from 70 to 380 organisms/litre. Maximum in the month of April (380 organisms/litre) and minimum during February (70 organisms/litre). During rainy season this species were absent.

***Pleuroxus trigonellus***

Population density of this organism in Parappana Tank was 20 organisms/litre during January 2015. Only species found during and was absent during study period. In Majangaon tank this species density 30 organisms/litre.

***Chydorus Spaericus***

Population density of this organism in Parappana Tank varies from 190 to 420 organisms/litre minimum during January (190 organisms/litre) and maximum during September 2015 (420 organisms/litre). Species was noticed during rest study period.

***Chydorus reticulates***

Population density of this organism in Parappana Tank varies from 0 to 190 organisms/litre species was noticed during September, 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, Heliadiaptomus viduus includes 3 species Trochocyclops prasinus, paracyclops prasinus, paracyclops fimbriatus and mesocyclops leuckarti.

***Rhinediaptomus indicus***

Population density of this organism in Parappana Tank varies from 40 to 330 organisms/litre maximum during July and minimum in the month of march. This species was noticed during March, April, May, July, January rest it was absent.

***Heliadiaptomus Viduus***

Population density of this organism in Parappana Tank varies from 80 to 480 organisms/litre maximum during September, May and minimum in the month of July.

***Neodiaptomus Stringilips***

Population density in Parappana Tank varies 50 to 920 organisms/litre maximum was in the month of May and absent during June, July and August.

***Paracyclops fibriatus***

Population density varies from 100 to 990 organisms/litre. It was maximum during May and minimum in the month of August.

**Family: Cyclopidae**

***Tropocyclops Prasinus***

In Parappana Tank population density varies from 60 to 700 organisms/litre. It was maximum during the month of May and minimum during the month of September.

***Mesocyclops leuckartii***

Population density varies from 240 to 960 organisms/litre in Parappana Tank maximum during the month of may and minimum during month of February.

***Copepods larvae***

Varies from 870 to 7800 organisms/litre it was maximum during the month of may and minimum during the month of September.

***Rotifers***

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

**Family:- *Brachionidae Brachionus angularis***

This family includes 13 species *Brachionus angularis* population density in Parappana Tank varies from 140 to 600 organisms/litre. Maximum in the month of May and minimum in the month of February.

***Brachionus Caudaus***

Density in Parappana Tank varies from 50 to 1180 organisms/litre. Maximum during September month.

***Brachionus Plicatilis***

Population density varies from 60 to 110 organisms/litre in Parappana Tank. It was noticed only during April, May and July. Rest of the study period it was absent in Parappana Tank.

***Brachionus Calciflorus***

Density varies from Tank it varies from 90 to 460 organisms/litre minimum in the month of January and minimum during February in Parappana Tank.

***Brachionus diversicornis***

Population density varies from 80 to 230 organisms/litre in Parappana Tank. It was maximum in the month of April and minimum in the month of February to September.

***Brachionus Quadrifentatus***

Density varies from 40 to 180 organisms/litre in Majangaon Tank. It was maximum in the month of May and minimum in the month of June. In Parappana Tank it was 25 to 130 organisms/litre.

The species were noticed during February, September months and were absent during rest of the study period.

### ***Brachionus falcatus***

Population Density in Parappana Tank varies from 40 to 340 organisms/litre. Maximum number were observed during the month of March and minimum during August.

### ***Brachionus bidentata***

Population Density in Parappana Tank varies from 50 to 320 organisms/litre. This species were noticed during rainy season and were absent in summer season. Density was maximum in the month of September and minimum in July month.

### ***Brachionus ureolaris***

Density varies from 180 to 1020 organisms/litre in Parappaana Tank. It was maximum during April and minimum during September.

### ***Brachionus rubens***

Population Density in Parappana tank varies from 80 to 1600 organisms/litre. It was maximum during September and minimum during the month of May.

### ***Keratella tropica***

Population density in Parappana tank varies from 180 to 890 organisms/litre. It was maximum during April and minimum during the month of September.

### ***K. Cochlearis***

In Parappana Tank it varies from 110 to 2280 organisms/litre. it was maximum in April and minimum in the month of August.

### **Family: Mytilinidae**

#### ***Mytilina accathophora***

In Parappana Tank it varies from 40 to 150 organisms/litre. It was maximum in April and minimum in the month of March. The species. Species were absent during rainy season.

### **Family: Testudinella**

#### ***Pompholyx sulcata***

Population density in Parappana Tank varies from 130 to 360 organisms/litre. It was noticed during March and April and remaining study period it was absent.

### **Family: Lecanidae**

#### ***Monostyla bulla***

Population density in Parappana Tank varies from 70 to 260 organisms/litre. This species was noticed during the month of September and the remaining study period this species were absent.

#### ***Lecane luna***

Population Density in Majangaon tank varies from 30 to 150 organisms/litre. It was noticed during February, March, May and remaining month it was absent.

### **Family: Filinidae**

#### ***Filinia longiseta***

In Parappana Tank the population Density of this species varies from 50 to 310 organisms/litre.

#### ***Filinia Opoliensis***

Population Density of this organism varies from 90 to 320 organisms/litre in Parappana Tank. During rainy season i.e. during the month of June to August this species were absent.

### **Family: Philodinidae**

#### ***Habrotracha bidens***

Population density in Parappana Tank varies from 70 to 360 organisms/litre this organism was noticed between April to September month and absent during the rest study period.

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

### **Family Ityocypridae.**

**Hyocypris gibba**:- Population density of this species varies from 60 to 90 organisms/litre & was noticed only between June to August in Parappana Tank.

### **Family Darwinulidae.**

**Darwinula Species**: - In Parappana Tank population density of this species from 80 to 250 organisms/litre. Maximum was in the month of April 2 minimum during tank it varies from 260 to 530 organisms/litre.

## **DISCUSSION**

**Biotic Factors.** Species composition, abundance, diversity & evenness.

In the samples of Parappana Tank total of 45 species were identified in the present investigation of this 23 to them belonging to Rotifera, 11 to cladocera, 7 to copepoda & 4 species to ostracoda 5 species are new to this region (one cladoceran & 4 Rotifers).

High species richness in Parappana Tank 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 26 number of species were recorded in the Parappana Tank. During the whole study period higher Rotiferan densities were recorded in the Parappana Tank. In general high densities of rotifers reflect the availability of a wide range natural sestonic food particles, which rotifers may consume the highest Rotiferan densities were recorded in Parappana Tank in April 2015. This is due to water level. Because during March/April 2015 Tank was becoming dry. In the same month species richness was also found high (18 species) various investigators reported that the rapid increase in rotifers number may be attributed to their intrinsic high fecundity supported by favorable physical chemical conditions as also abundance of diatoms followed by blue – green algae were responsibility for promoting the growth of rotifers.

During survey keratella tropica was the most frequent rotifer occurred in all water bodies followed by *Branchionus caudatus*, *B. urceolaris*, *B. bidentata*, *B. forficula*, *B. falcatus*, *B. angularis*, *K. cochlearis*, *Filinia longiseta*, *B. calyciflorus*, *B. diversicornis*, and *F. opoliensis*, *habrotracha bidens*, *B. plicatilis*, *B. quadidentatus*, *B. rubens*, *M. acanthophora*,

*pompholix sulcata, monostyla bulla, Lecane luna, Aplancha priodanta, A.brightwelli, rotifer tardus.*

**Cladocerans:-** Cladocerans are commonly called as “water flea” which prefer to live in water. About 600 species of fresh water cladocerans have been reported to occur throughout the world & in India 110 species have been recorded. In the present study 11 cladoceran species are recorded.

During the study period lower number of cladocera was recorded This is due to rapid increase in *Diaphanosoma 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, organic matter and growth of bacteria population which increase the zooplankton population. The seasonal succession of the cladocera is quite variable, both among species & within species living in different lake conditions some species are perennial & over winter in low population densities as adult rather than as resting eggs. These species may exhibit one, two, more irregular maximum.

In the present study it was observed that *Diaphanosoma excisum* & *Criodaphnia cornuta* were the major contributor to the cladoceran density in parappana Tank.

Cladoceran species was also found high in pre monsoon season compared to post monsoon 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 calanoids, 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. Throughout study period the highest densities were recorded in May again due to the lower water level & high nutrient content in summer. In Parappana Tank among adult copepods, cyclopedia was most abundant & were dominant over the calanoids & accounted 26% of copepod densities. In survey during post monsoon season among calanoids *N.Strigillipes* 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 monsoon season, *H. fossucula* was the most frequent ostracodan, which occurred in all water bodies followed by *I. gibba* and *Darwinula* Species, *Stenocypris* species rare. No particular seasonality was observed for ostracods during pre and post monsoon survey.

#### **SUMMARY AND CONCLUSION**

The parappana tank was investigated for monthly variation of zooplankton composition, and 44 species of zooplankton were recorded in these water reservoirs. 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. Parappana Tank has 44 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 courses of eutrophication in these tanks. Such eutrophication is harmful to aquatic organisms 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.

#### **References**

- Dumont J.Henri. (1983). Biogeography of rotifers. *Hydrobiologia*. **104**: 19-30.
- Edmondson W.T. (1959). Freshwater biology. 2<sup>nd</sup> ed. John Wiley & sons, New York, USA.
- Patil, C. S. and B.Y.M. Gouder. (1985). Ecological study of fresh water zooplankton of a subtropical pond (Karnataka state, India). *int Revue, ges. Hydrobiologia*. **70 (2)**: 259-267.
- Rajapaska, R and C.H. Fernando. (1982). The cladocera of Srilanka (Ceylon) with remarks on some species. *Hydrobiologia*. **94**: 49-69.
- Sharma B.K. (2005). Rotifer communities of floodplain lakes of the Brahmaputra basin of lower Assam (N.E.India): biodiversity, distribution & ecology. *Hydrobiologia*. **533**: 209-221.
- Sharma, B.K. and R.G. Michael, (1980). Synopsis of taxonomic studies on the Indian