ISSN 0976 – 3333

Available Online at www.ijpba.info

International Journal of Pharmaceutical & Biological Archives 2012; 3(1):153-156

ORIGINAL RESEARCH ARTICLE

Investigation of Plantktonic Diversity in Krishnagiri Reservoir, Krishnagiri District, Tamil Nadu, India

C. Prabhahar[*1], K .Saleshrani[2], K. Tharmaraj[1] and V.M. Kumar[1]

[1]*Department of Zoology, Annamalai University, Annamalai Nagar - 608 002, Chidambaram, Tamil Nadu, India*
[2]*Department of Zoology, Manonmaniam Sundaranar University, Thirunelveli, Tamil Nadu, India*

Received 29 Nov 2011; Revised 29 Jan 2012; Accepted 06 Feb 2012

ABSTRACT

In this present study, hydro biological characteristic features of the Krishnagiri reservoir Dam, the dates for the present study were collected from 3 sampling stations for the period of 6 months in both premonsoon and monsoon seasons. A total number of 44 Zooplankton and 14 Phytoplankton species were identified in the study area. Totally 6 groups of Zooplankton such as Rotifer, Copepod, Cyclops, Ostracod, Protozoan and Insect were observed during the study period. With regards to zooplankton, a total number of 44 species were recorded under the group during the study period. The genus *Brachionus* and *Lecane* were dominant over the other species. Among different groups, *Brachionus* ranked first out of 35 followed by *Lecane* with 2 species. In the present study, it is noted that whenever two or more species of a genus occurred, only one species was dominant.

Key words: Dams, Premonsoon season, Monsoon season, Hydro biological characters, Phytoplankton and Zooplankton.

1. INTRODUCTION

Aquatic ecosystems are transitional zones between land and water is efficient in filtering sediments. They can intercept run-off from land before it reaches the water and help in filtering nutrients, wastes and sediments from floodwaters. In certain lakes, plants are so efficient in removing wastes that artificial wastewater treatment systems use aquatic plants for the removal of pollutants from water. Lakes remove nutrients (especially nitrogen and phosphorus), particulates and total biological oxygen demand from flooding waters for plant growth and help prevent eutrophication or over-enrichment of other forms of natural waters [1]. However, overloading a aquatic environment with nutrients, beyond its threshold, impairs its ability to perform basic functions.

Dams and reservoirs are under increasing stress due to the rapidly growing population, technological development, urbanization and economic growth. Additional pressures on reservoirs from natural causes like subsidence, drought, hurricanes, erosion etc., and human threats coming from over exploitation, encroachment, reclamation of vast reservoir areas for agriculture, commercial and residential development and silviculture have altered the rate and nature of the aquatic ecosystem functions particularly, in the last few decades. The primary pollutants causing degradation are sediments, nutrients, pesticides, salinity, heavy metals, metals, low dissolved oxygen, pH and selenium [2]. The quality of water flowing into lakes may be impaired indirectly, by alterations to the water regime or by different types of polluting activities. Pollution of inland waters is mainly due to the discharge of domestic sewage, industrial wastewaters and agricultural operations. Pollution can be classified as point source (emanating from an identifiable source) or non-point pollution (emanating from a diffuse source). The wastewater coming from point sources are easier to treat than that from non-point sources. The effects of diffuse pollutants are cumulative and can adversely affect lakes even at some distance. Lower quality results in degradation or destruction of lakes.

Decline in reservoir quality results in increased undesirable growth of weeds and algal blooms. When these algal blooms decompose, large amounts of oxygen are used up, depriving fish and other aquatic organisms of oxygen resulting in their death. The extraordinary productivity of

***Corresponding Author:** C.Prabhakar, **Email:** prabhaharc@yahoo.com

water ecosystems means that many different stakeholders or users have easy access to and use of lakes resources. The overexploitation of these resources entails intense cropping, overgrazing, over fishing and excess hunting pressure. The cumulative impacts of these activities threaten biodiversity. Water plays an important role in the development of a country. In India, where majority of the population is agrarian, quantity and quality of aquatic resources play a major role in the ecological and economic sustenance of the people. India is blessed with water resources in the form of numerous rivers and streams. By virtue of its geographical position and varied terrain and climatic zones, it supports a rich diversity of inland and coastal lakes.

The rivers, streams, lakes, ponds, pools and reservoirs water vapour etc. form the hydrosphere. Water is one of the most unusual natural compounds found on earth, and it is also one of the most important. The water lakes are inland depressions containing water. They may vary in size from small ponds of less than a hectare to large seas covering thousands of square kilometers. They may range in depth from a few centimeters to over 1666 meters. Ponds, however, are considered as small bodies of standing water so shallow that rooted plants can grow over most of bottom. Most ponds and lakes have outlet streams and both are more or less temporary features on the landscape because their filling is inevitable. The aquatic habitats of lake and pond remain vertically stratified in relation to light intensity, wave length absorption, hydrostatic pressure and temperature etc. A study plankton community from Krishnagiri dame water may be interesting to provide new accounts of lentic planktonic species as a best example from the part of Tamil Nadu.

2. MATERIALS AND METHODS

2.1. Sampling design

Totally three sampling sites were fixed to study about the hydrological features of Krishnagiri reservoir (ie. physico-chemical and biological parameters) during four seasons Premonsoon Monsoon, post Monsoon and summer respectively period from June-2010-2011.

2.2. Collection of samples

To study the hydro biological features of Krishnagiri reservoir the samples were collected from three different zones.

2.3. Selection of sampling sites

Totally 3 sampling sites have been selected in this water body of which one is from east of the reservoir (road side) other one is west which collects municipal waste and the area 3 covers north of the dam where the human settlements is more situated on the south of the dam where normal human activities takes place.

Site: 1

This site is located on the east (road side) of the reservoir. This site is deep infested with a number of green algae particularly in all the seasons. Human activity at this site is limited to occasional bathing, cloth washing and the inlet areas where the chemplast industrial wastes are mixed into the dam. Water is drawn from this area for irrigation and gardening purposes.

Site: 2

It is the farthest site located at the north region of the water body. This site is used for fishing. At this site the human activity is the term of bathing, clothing, washing and fishing is common. There is an outlet to receive the domestic and run off.

Site: 3

It is located on the south side of the reservoir near this site where maximum bathing and cloth washing was observed. The water here was generally supplied for irrigation.

2.4. Collection of Plankton samples

The plankton samples were collected by passing 100L of surface water through 63μm plankton net. The samples were preserved in 5% formalin at the sampling site itself.

3. RESULTS AND DISCUSSION

A total number of 14 species of phytoplankton were identified in the Krishnagiri Dam during the study period (**Table 1**). The following species *Scenedemus* sp., *Rediastrum duplex, Bacillaria* sp., *Cymbella leptoceros, Gamphonema* sp., *Meloxira* sp., *Navicula cyplocephala, N. caspidala, N. viridula, Nitchia obtusa, Pinnularia* sp., *Chleriva* sp., *Oscillatoria currices and O. limosa* were found to present during the monsoon period. The genus *Navicula* and *Oscillatoria* were noticed to be a dominant species. Among the different group of genera *Navicula* ranked first followed by *Oscillatoria* with 2 species. With regards to zooplankton, a total number of 44 species were recorded under the group during the study period (**Table 2**).

Of these 6 groups, Protozoa, rotifer, copedpod, cladocera and ostracoda were concentrated. The species of zooplankton *Arella discoidae, A. vulgaris, Difflugia* sp., *Euglypha* sp., *Vorticella* sp., *Anuracopris fissa, Brachionus anularis, B. calciflorus, B. rubens, B. quadridentata, Euchanis dilita, Filina longiseta, Keratella cochlearises, Lecane bulla, L. bulla, Monostylla bulla, Synchacta* sp., *Mytilina* sp., *Nauplius larva,*

Cyclops sp., *Diatomis* sp., *Mesocyclops hyalinus, Daphnia* sp., *Moina branchiata, Naupli, Ceriodapherie reticulata, Chydornus* sp., *Cypris* sp., *Postomu cypris, Culex* sp., *Corixa* sp., *Helocharus lividus* and *Tipula* sp. were found to be occurred at both the stations. The genus *Brachionus* and *Lecane* were dominant over the other species. Among different groups, *Brachionus* ranked first out of 35 followed by *Lecane* with 2 species. In the present study, it is noted that whenever two or more species of a genus occurred, only one species was dominant. Further, whenever more than one zooplankton genus dominated the situation, any one species in each group was found to be dominant. These observations agree well with the findings of [3,4].

Table 1: Phytoplankton species recorded in the study area during 2010-2011.

Name of the organism	Station		
	1	2	3
Scenedesmus sp.	+	+	-
Pediastrum duplex	+	-	-
Mycrocystis	+	+	-
Cymbella leptoceros	-	-	+
Nitchia obtuse	+	-	-
Pinnularia sp.	-	+	+
Gomphonema sp.	-	+	+
Melosira sp.	-	+	+
Navicula cyphocephala	-	+	+
Navicula capsidala	-	+	-
Navicula viridula	+	-	-
Chytridium	-	+	-
Oscillotoria curricess	+	+	-
Oscillotoria limosa	+	-	+

Because of wide distribution and ubiquitous presence of the abstraction structures being under direct control of the user, ground water has become to stay as a preferred source for meeting the water demand for various user sectors. It is invisible that of human interference has become endangered resource to contaminate the aquatic environment in many parts of India. Ground water reservoirs once polluted cannot be restored to its pristine state. The relative contribution of different planktonic groups in the lentic habitats had been shown to be influenced by trophic level of water. The waters with copepod abundance are regarded to be at a lower trophic stage than rotifers abundance [2]. Copepoda is comprised of orders calanoidea, cyclopoidea and harpacticoidea, of which calanoids and cyclopoids are the common Zooplankton of freshwater ecosystems. Lakes rich in organic matter support higher number of cyclopoids [5] thus suggesting their preponderance in higher trophic state of water. Cyclopoid copepods were quantitatively dominant in Kalavam bazar lake indicate its eutrophic condition. No definite period is observed to be suitable for growth of cyclopoids, instead they flourish in different seasons January-February as observed by [6].

Cladocerans are being filter feeder feed on algae and at the same time, the favorable prey of vertebrate and invertebrate predators from aquatic environment. Cladocerans represent a key group in energy transfer along the food chain. During the present study cladocera occupied VI position in order of dominance in total Zooplankton. They contributed 33.33% of total zooplankton such lower contribution of cladocerans in total zooplankton was also recorded by [7]. The general scarcity of cladocerans in lakes has been related to the factors like shortage of suitable sized food particles and production of fish [8].

Further, the biomass of phytoplankton and zooplankton dominant at station I when compared to station II & III. This is clearly indicated that station I has higher biomass, species richness, composition and diversity. Relation between Physico-chemical parameters and plankton diversity of an important component in many aquatic ecosystems as they are related with food chain implications. Phytoplankton and zooplankton constitute the main food of fish and fish larvae and thus phytoplankton have a direct bearing on the secondary and tertiary producers [9]. The zooplankton mainly comprised of Protozoa, Rotifers, Copepods, Cladocerans, Ostracods and Insecta. Among the groups Rotifers were the largest contributor in term of density (33%) followed by Cladocerans (18%) Protozoa (16%) Copepods (11%), Ostrocods (7%) and Insecta (15%) at station II & III. With regards to station I, Rotifers (34%) Copepods (25%) Protozoa (18%), Cladocerans (13%) and Ostracods and Insecta (5%) were present with different concentrations. At both the stations, Rotifers 35% Copepod, Cladocerans and Protozoa 16%, Insecta 11% and Ostracods 6% were found to be shared during the present study.

The species phytoplankton, were mainly comprised of the group Chlorophyceae (31%), Bacillariophyceae and Cyanophyceae (20%), while Bacillariophyceae (40%) was the largest contribution in terms of density. In the order of the abundance at station I. At station II Cyanophyceae (52%) Bacillariophyceae (40%) and Chlorophyceae (8%) and at station III *Bacillariophyceae* (40%), *Chlorophyceae* (32%) and *Cyanophyceae* (28%) were found to present in the different concentration. The wide distribution, spatial abundance of phytoplankton and zooplankton diversity are dependent upon the user of the water, ground and surface water quality and

the dilution of factor of rain water. It is invisible that human interference has become endangered resources in many parts of Tamil Nadu especially in Krishnagiri Dam water reservoir. It is concluded from this study that the plankton diversity and its abundance are due to the dilution factors performed in the sampling stations and enhanced by the Physico chemical variability in coordination with seasonal and spatial variations.

Table 2: Zooplankton species recorded in the study area during 2010-2011

S.No	Name of the zooplankton	Station I	Station II	Station III	S. No	Name of the zooplankton	Station I	Station II	Station III
	Protozoa				24	*Oithona brevicornis*	+	+	+
1	*Arella discoidae*	-	+	+	25	*O. simplex*	-	+	+
2	*A. vulgaris*	-	+	+		**Cladocerans**			
3	*Difflugia.* sp.	-	-	+	26	*Alona quadrangulars*	+	+	-
4	*Euglypha* sp.	+	+	+	27	*Bosmina longirasttris*	+	+	+
5	*Vorticella* sp.	+	-	+	28	*Cerioda pheriereticulata*	-	+	+
	Rotifers				29	*Chyderinae* sp.	-	-	+
6	*Anuracopris fissa*	-	+	+	30	*Chydornus* sp.	-	+	+
7	*Brachionus*	+	+	+	31	*Daphnia carinata*	+	+	+
8	*B. calciflorus*	+	+	+	32	*Moina micrura*	+	-	+
9	*B. quadridentanus*	+	-	+	33	*M. brachiata*	-	+	+
10	*B. rubens*	+	+	+		**Ostracods**			
11	*Euchlanis dilita*	+	+	+	34	*Cypridapsis dispar*	-	+	+
12	*Filina longiseta*	+	+	+	35	*Cypris protubera*	+	-	+
13	*Kertalla cochlearies*	+	-	+	36	*Cypris* sp.	+	-	+
14	*Lecane bulla*	+	+	+	37	*Eucypris bispinosa*	+	+	+
15	*L. luna*	-	+	+	38	*Halocypris brerirostris*	-	+	+
16	*Monostyla bulla*	+	-	+	39	*Hetero cypris*	-	+	+
17	*Synchacta* sp.	-	+	+	40	*postomocypris*		+	+
18	*Mytilina* sp.		+	+		**Insecta**			
	Copepods				41	*Culex* sp.	+	+	+
19	**Nauplius larva**	+	-	+	42	*Corixa* sp.	-	+	-
20	*Cyclops* sp.	+	+	+	43	*Helocharus lividus*	-	+	+
21	*Diatoms* sp.	+	+	-	44	*Tipula* sp.	-	+	-
22	*Mesocyclops hyaliners*	+	-	+					
23	*Oneaca venusta*	-	+	+					

+ denotes presence; - denotes absence

ACKNOWLEDGEMENT

The authors are deeply indebted to Professor and Head, Department of Zoology, Annamalai University, Annamalai Nagar, Tamil Nadu, India for their inspiring help, constant support and for providing adequate laboratory facilities in the department to carry out the research work.

REFERENCES

1. Nene Vrinda. 1985. Ecological studies of Masunda Lake, Thane M.Sc. Thesis submitted to University of Bombay, (Unpublished).
2. Yousouf, A.R. 1988. *J. Indian Inst. Sci*., 68: 307 – 313.
3. Govindasamy, C., L. Kannan and J. Azariah. 2000. Seasonal variation in physico-chemical properties of primary production in the coastal water. Biotopes of Coromandel Coast. *India J. Environ. Biol.* 21(1): 1-7.
4. Kemdirim, E.C. 2000. Diet rhythm of plankton and physico chemical parameters in Kangimi reservoir, Kaduna State. Nigeria. *J. Aquat. Sci.,* 15: 35-39.
5. Subbamma D.V. 1992. Plankton of a temple pond near Machuli Patnam, Andhra Pradesh. *J. Aqua. Biol.,* 7 (1 & 2): 17-21.
6. Odum, E.P., C.C. Melvor and T.J Smith. 1982. The ecology of mangroves of South Florida, a community profile. U.S. Fish and Wild Life Service, Washington, D.C. 144p.
7. Datta Munshi, J and Datta Munshi, J. S. 1995. Fundamentals of fresh water Biology Narendra Publishing House, New Delhi, pp 222.
8. Wanganeo, A. 1980. Phytoplankton photosynthesis, nutrient dynamics & tropic status of Manasbal lake, Kashmir. Ph. D. Thesis, Kashmir University (Unpublished).
9. Agarwal, S.K. 2005. Water Pollution A.P.H. Publication, New Delhi.