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Research Article

QUALITATIVE PLANKTON OF A MANAGED AND UNMANAGED POND OF ANAIKKADU, THANJAVUR DISTRICT, TAMIL NADU, INDIA

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ABSTRACT

The qualitative plankton of managed pond (pond 1) and unmanaged pond (pond 2) was studied in Anaikkadu, Thanjavur district. The study was undertaken on February first 2015. A total six classes of phytoplankton and three classes of zooplankton were recorded which contained 15 phytoplankton and twelve zooplankton species from both pond 1 and pond 2. Out of which eight species of phytoplankton and ten species of zooplankton were common at both the pond. Pond 1 alone had ten species of phytoplankton and twelve species of zooplankton. Pond 2 had fifteen species of phytoplankton and ten species of zooplankton. Pond 1 was richer in zooplankton and pond 2 was richer in phytoplankton. An inverse relationship was observed between phytoplankton and zooplankton abundance.

Keywords: Phytoplankton, Zooplankton, Plankton diversity, Plankton Net.

INTRODUCTION

Water is the base of life and development. The wetland forms unique biological freshwater ecosystem on the planet earth. These water bodies stores the freshwater form adjoining are during rainy season .It plays an important role in any ecosystem, hydrology of area and economy. They provide the habitats for migratory birds, aquaculture, plants, animals, planktons and microbes. Water is one of the major components of environmental resources (Usha *et al*., 2006; Prithwiraj Jha *et al*., 2008). Water is the necessity of life, without it there would be no life. Most of the biological reactions use water as the medium. Water is the habitat for a large number of aquatic organisms ranging from microscopic plankton to large aquatic animals and macrophytes. Moreover, there is a very close relationship between the metabolism of aquatic organisms and hydro biological parameters in a freshwater body (Mann *et al*., 2003; Desmukh and Ambore, 2006).

In fresh water ecosystem phytoplanktonic and zooplanktonic organisms are important food sources for many aquatic animals specially fishes. The main for major carps like rohu, catla and their hybrids were found to be planktonin origin (Mozumder and Naser, 2009). Plankton is a free floating organism, which is unable to maintain its distribution against water current. There are two types of planktonic organisms, namely phytoplankton and zooplanktons. Phytoplanktons are autotrophs; by zooplanktons depend on either photoplankton or other zooplanktons.

MATERIALS AND METHODS

Study Area

The qualitative plankton of a managed and unmanaged pond of Anaikkadu, Thanjavur was studied on first February 2016 are two ponds viz. A managed fish farm pond 1 and unmanaged pond 2. The pond 1 was used only for the purpose of culture of fish. Pond 2 was being used by villagers for multiple purposes. The collection of plankton was made by a net mode of bolting silk of 25 meshes with openings between the meshes 0.06mm squares. Since the dimensions of phytoplankton and zooplanktons are between

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0.06 mm and 5 mm, the bolting silk No.25 was used. Each time plankton samples was collected by filtering about 200 liters of the surface water through the net. Immediately after collection of planters, samples were preserved in 10 percent neutral formalin (one part of formalin diluted with three parts of distilled water adding a few drops of 10 percent NaOH). Plankters were observed under compound microscope and identified based on the keys for the identification of plankton. The identification of plankton species was done with the aid of plankton identification key and monographs by Needham and Needham (1962), and Battish (1992). Qualitative analysis was made using plankton counting chamber (Sedgewick Rafter counting Chamber).

RESULTS

The qualitative plankton of a managed and unmanaged pond is shown in tables 1 and 2. Four classes of phytoplankton (Cyanophyceae, Bacillariophyceae, Chlorophyceae and Xanthophyceae) were recorded from P1 and six classes (Cyanophyceae, Bacillariophyceae, Zygnemophyceae, Chlorophyceae, Zygematophyceae and Xanthophyceae) were recorded from Pond 2. Ten species of phytoplankton (*Microcystis* sp., *Nostoc* sp., *Navicula* sp., *Synedra* sp., *Fragilaria* sp., *Eudorina* sp., *Scenedesmus* sp., *Pediastrum* sp., *Oscillatoria* sp., and *Tribonema sp.* were found in Pond 1 and fifteen species (*Microcystis* sp., *Nostoc* sp., *Eunotia* sp., *Navicula* sp., *Frustulia* sp., *Stauroneis* sp., *Fragilaria* sp., *Desmidium* sp., *Cosmarium* sp., *Closterium* sp., *Eudorina* sp., *Scenedesmus* sp., *Oscillatoria* sp., *Spirogyra* sp. and *Tribonema* sp.) were found in Pond 2 (Table 1).

Table 1. Distribution of phytoplankton in unmanaged pond.

Class	Species Name	Distribution
Cyanophyceae	*1. Microcystis sp.,*	Pond 1 & 2
	2. Nostoc sp.,	
Bacillariophyceae	*3. Eunotia sp.,*	Pond 2
	4. Navicula sp,.	Pond 1 & 2
	5. Synedra sp.,	Pond 1
	6. Frustulia sp.,	Pond 2
	7. Fragilaria sp.,	Pond 1 & 2
	8. Stauronesis sp.,	Pond 2
Chlorophyceae	*9. Eudorina sp.,*	Pond 1 & 2
	10. Scenedesmus sp.,	Pond 1 & 2
	11. Pediastrum sp.,	Pond 1
	12. Oscillatoria sp	Pond 1 & 2
Zygnemophyceae	*13. Desmidium sp.,*	Pond 2
	14. Cosmarium sp.,	Pond 2
	15. Closterium sp.,	Pond 2
Xanthophyceae	*16. Tribonema sp.,*	Pond 1 & 2
Zygematophyceae	*17. Spirogyra sp.,*	Pond 2

Three classes (Rotifera, Branchiopoda, and Crustacea) of zooplankton were observed at both Pond 1 and Pond 2. Twelve species of zooplankton (*Branchionus flucatus, Branchionus rubens, Branchionus caudatus, Branchionus filina, Angularis hiden sp., Daphnia sp., Moina sp., Cyclops sp., Mesocyclops sp., Microcyclops sp., Paracyclops sp.* and *Macrocyclops sp.*) were recorded from Pond 1 and Ten species (*Branchionus flucatus, Branchionus rubens, Branchionus caudatus, Branchionus filina, Daphnia* sp., *Moina sp., Macrothrix sp., Cyclops sp., Mesocyclops sp.* and *Paracyclops sp.*) were recorded from Pond 2 **(**Table 2).

Table 2. Distribution of zooplankton in unmanaged pond.

Class	Name of the Species	Distribution
Rotifera	1.*Branchionus flucatus*	Pond 1 & 2
	2.*Branchionus rubens*	Pond 1 & 2
	3.*Branchionus caudatus*	Pond 1 & 2
	4.*Branchionus filina,*	Pond 1 & 2
	5.*Branchionus Angularis*	Pond 1
Branchiopoda	6.*Daphnia sp.,*	Pond 1 & 2
	7.*Moina sp.,*	Pond 1 & 2
	8.*Macrothrix sp.*	Pond 2
Crustacea	9.*Cyclops sp.,*	Pond 1 & 2
	10.*Mesocyclops sp.,*	Pond 1 & 2
	11.*Microcyclops sp.,*	Pond 1
	12.*Paracyclops sp.,*	Pond 1 & 2
	13.*Macrocyclops sp.,*	Pond 1

DISCUSSION

The qualitative plankton of a managed pond and unmanaged pond was studied in Anaikkadu, Thanjavur district. Phytoplankton forms the vital source of energy as primary producers and serves as a direct source of food to the other aquatic plants and animals (Battish, 1992). Among them eight species were found to be common at both the ponds. Ten species were recorded from Pond-1 and fifteen species were recorded from Pond-2. *Synedra sp.* and *Pediastrum sp*. was the species that were recorded only from Pond-1. *Eunotia* sp., *Frustulia* sp., *Stauronesis sp., Desmidium* sp., *Cosmarium* sp., *Closterium* sp. and *Spirogyra* sp. were the species that were recorded only from Pond 2 (Table 1). They are generally found in organic polluted waters (Sarwade and Kamble, 2006). Pond-2 was found to be richer in phytoplankton and showing eutrophic condition.

The paper deals with occurrence and biodiversity of phytoplankton. Occurrences of phytoplankton in four lakes were investigated in the month July, August and December, 2009. In these lakes 68 species of phytoplankton and 13 species of filamentous algae were recorded belonging to five major classes of algae namely Cyanophyceae, Euglenophyceae, Dinophyceae, and Bacillariophyceae (Leela *et al.,* 2010). As regards phytoplankton *Microsystis* sp. showed a diurnal pattern of decrease at day time and increase at night hours. These phytoplankton avoided

strong lights and look shelter at the soil water inter-phase during day time and subsequently ascend to the surface at night. This is an agreement with the findings of Petrucio and Barbosa (2004) and Melo *et al*. (2004).

In the present investigation *Nostoc punctiforme* were observed at 8 pm and 11 pm only. They were absent in the remaining period. So the *Nostoc punctiforme* did not show any distinct diel migration. This is in contrary to the findings of Banerjee (1967). *Oscillatoria tenuis* was found in abundant measure and their peak period of occurrence was at 2 am and minimum occurrence at 8 pm. This is in agreement with earlier worker (Melo *et al*., 2004). Zooplankton 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 (Battish, 1992). Total Thirteen zooplanktons had been found from Pond 1 and Pond 2. Nine species were common at both the ponds. Twelve species were recorded from Pond 1 and ten species were recorded from Pond 2. A*ngularis hidens, Microcyclops sp., and Macrocyclops sp*. was the species that were only recorded from Pond 1. *Macrothrix sp*. was the species that were only recorded from Pond 2 (Table 2). Pond 1 was found to be richer in zooplankton. In the present investigation *Rotifera* were observed in pond 1 and pond 2. This is in contrary to the findings of Ahmad and Singh (1993). The present investigation is in agreement with the findings of Michael (1996) with regard to some species of rotifer. In the present investigation Branchipoda were observed in pond 1 and pond 2. This finding is agreement with the reports of Verma *et al.* (1987) and Ahamed and Singh (1993). Among zooplankton components Crustacea copepods were numerically abundant. In the present investigation crustacea copepods were observed in pond 1 and pond 2. This report is similar to the earlier workers (Ahamad and Singh, 1993; Murugan and Angelo Irudayasamy, 1996). In the present study Pond 2 was found to be richer in phytoplankton. Pond 1 was found to be richer in zooplankton.

CONCLUSIONS

An inverse relationship was observed between phytoplankton and zooplankton abundance. The managed fish culture pond which was periodically limed manure and fertilized showed greater planktonic diversity, with zooplankton being the dominant group. Whereas the unmanaged pond showed a less diverse and eutrophic condition, with phytoplankton being the dominant group. It implies that a large amount of ecological niches are remaining void and unutilized in unmanaged ponds. Whereas all the available ecological niches are being effectively utilized by the stocked fishes and periodically replenished by fertilization in the managed fish culture pond. Therefore selective stocking with appropriate species at low densities and extensive fish culture practices in the unmanaged ponds has ample scope. Adoption and transformation of such unmanaged ponds by scientific management practice into semi intensive fish culture ponds may prove to be an ecologically efficient, financially feasible and socially viable venture.

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