

Seasonal Variation in Plankton Diversity of Dhamapur Lake (Malvan) of Sindhudurg District (MS), India

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ABSTRACT

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Plankton, the microscopic diversity hold the key role in designing the food web of aquatic ecosystem. Dhamapur Lake from Malvan taluka in Sindhudurg district was studied to understand seasonal variation in plankton diversity for duration of one year from January 2012 to December 2012. During the study, 10 phytoplankton species (7 species of class Chlorophyceae, 1 species of class Euglenophyceae and 2 species of class Myxophyceae) and 7 zooplankton species (4 species of Cladocera, 1 species of group Ostracoda and 2 species of group Rotifera) were recorded. Season wise highest diversity of both zooplankton and phytoplankton were observed in winter season. As compared to zooplankton, phytoplankton showed mark abundance in Dhamapur Lake.

Introduction

Planktons are microscopic life dwelling in water, drifting with water currents and floating freely in epilimnion due to limited locomotion. Planktons are further classified as Phytoplanktons which are the micro flora and Zooplankton including micro fauna (APHA, 1985). Phytoplanktons are the primary producers in any aquatic ecosystem. They act as food source for all the other secondary consumers in aquatic ecosystem. According to Benarjee and Narasimha(2013) phytoplanktons not only serve as food for aquatic animal but also play an important

role in maintaining the biological balance and quality of water.

Whole aquatic life relies on phytoplankton population as they constitute the primary producers of most water bodies. Apart from forming an important food item of commercially important fishes, the phytoplankton communities have been extensively used as biological monitors from various parts of the world, Atazadeh *et al*, (2007).

Phytoplanktons are followed by Zooplanktons. Aarti *et al*, (2013) states that zooplanktons too play an important role in the food chain, as they are second in trophic level as primary consumers and also contributes to the next trophic level. Trophodynamics, ecological energetics, cycling of material and aqua cultural productivity of water body is influenced by zooplanktons. Zooplanktons show diversified assemblage of taxonomically unrelated microscopic organisms and only the common ecological characteristic is this habitat, they are found freely in the epilimnion. Surve *et al* (2004) stated that occurrence and abundance of zooplanktons in the pond depends on its productivity which in turn is influenced by the physico – chemical parameters and the level of nutrients.

Lentic ecosystems like ponds, lakes, etc harbor a rich biodiversity of the planktons as compared to the lotic ecosystems. Dhamapur Lake is a lentic ecosystem located in between Are and Katta village of Malvan taluka. It is a man- made lake and was constructed by the King Nagesh Desai in 1530. It has beautiful scenic hill ranges on its two sides with rich vegetation. The lake covers an area of about 22 hectares with the depth of about 12 meters. Dhamapur Lake receives water during monsoon season and remains full throughout the year, thus fulfilling the water requirements of the human civilization in its surrounding villages.

Freshwater ecosystems provide vital resources for humans and are the role habitat for an extra ordinarily rich and sensitive biota. Demands on freshwater ecosystems are increasing day to day, leading to large and growing threats to biodiversity around the world. As a result of this global crisis, documenting losses of biodiversity, diagnosing their causes and finding

solutions have become major part of contemporary fresh water ecology research.

Materials and Methods

The water samples were collected in the first week of every month at the selected stations between 7:30 am to 10:00 am. The collection was done using conical plankton collecting net (diameter of mouth -25cm, mesh size-60µm). Fixed volume of water (35 liter) was filtered through the conical plankton net and the samples of the plankton collected were concentrated to 25 ml in glass bottle.

Planktons samples thus collected were preserved in Lugol's solution and transported to the laboratory for the further analysis. The permanent preservation was done in 4% formalin. Identification and classification of planktons was done with the help of books by Edmondson (1959), Sarode and Kamat (1984), Battish (1992), Kodarkar(1992).

Results and Discussion

The data obtained during the study is presented in Table 1, Table 2 and Figure 1. Phytoplanktons play crucial role in aquatic ecosystem as they have the tendency to convert the radiant energy of sunlight into chemical energy. These phytoplanktons are consumed by the primary consumers and thus the stored energy is transferred to next trophic level in food chain. Hence study of planktons as far as their diversity, density, distribution is important to maintain water body healthy.

In the present study, phytoplanktons representing 3 classes were recorded at Dhamapur Lake in Malvan taluka. They were Chlorophyceae, Euglenophyceae and Myxophyceae. Representatives of Chlorophyceae showed maximum appearance then other two classes. Similar

observations were also reported by Angadi *et al* (2005) in Papanash Pond, Bidar, Karnataka.

In the present study done Dhamapur Lake in Malvan taluka, 7 different genera of class Chlorophyceae viz; *Chlorella sp.*, *Microspora sp.*, *Spirogyra sp.*, *Pediastrum sp.*, *Ulothrix sp.*, *Volvox sp.*, *Zygnema sp.*

were reported. Class Chlorophyceae were abundantly found in winter season while minimum count was recorded in summer season. Comparatively higher values of class Chlorophyceae were recorded in monsoon season than in summer season. *Spirogyra sp.* was the highest recorded genera in all season while *Volvox sp.* was lowest recorded in comparison to others.

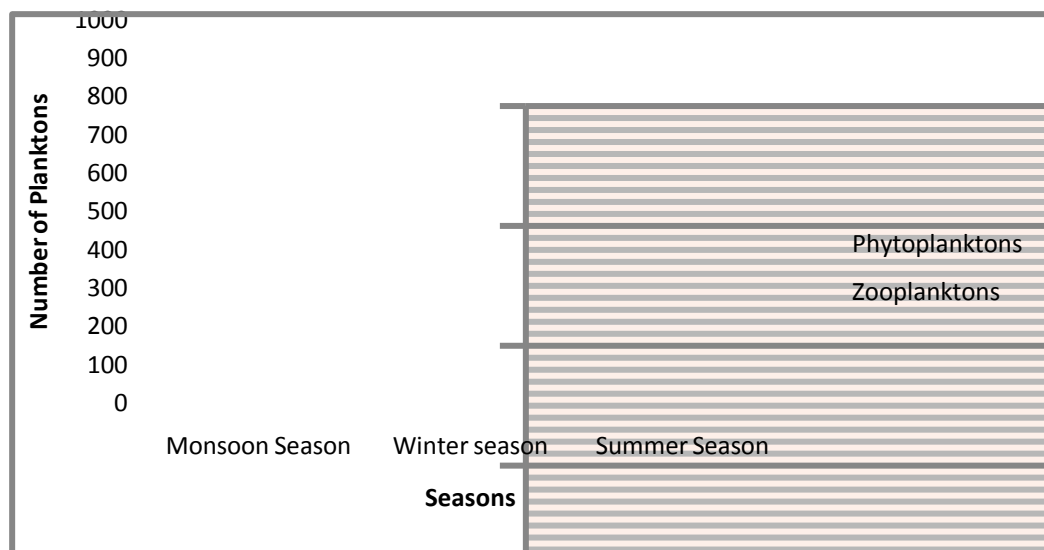
Table.1 Seasonal Variation Shown by Phytoplanktons at Dhamapur Lake

Class	Genera	Monsoon season	Winter season	Summer season
Chlorophyceae	<i>Chlorella sp.</i>	39	83	27
	<i>Microspora sp.</i>	81	135	17
	<i>Pediastrum sp.</i>	37	116	10
	<i>Spirogyra sp.</i>	143	194	71
	<i>Ulothrix sp.</i>	24	102	59
	<i>Volvox sp.</i>	6	3	5
	<i>Zygnema sp.</i>	86	125	56
	Total Count	416	758	245
Euglenophyceae	<i>Euglena sp.</i>	57	67	62
	Total Count	57	67	62
Myxophyceae	<i>Oscillatoria sp.</i>	80	141	86
	<i>Nostoc sp.</i>	16	5	31
	Total Count	96	146	117
Total Phytoplankton Count /ml		569	971	424

Table.2 Seasonal Variation Shown by Zooplanktons at Dhamapur Lake

Group	Genera	Monsoon season	Winter season	Summer season
Cladocera	<i>Bosmina sp.</i>	28	74	17
	Total Count	28	74	17
Copepoda	<i>Cyclops sp.</i>	29	89	37
	<i>Mesocyclops sp.</i>	26	61	8
	<i>Nauplius sp.</i>	20	667	18
	Total Count	75	217	63
Ostracoda	<i>Cypris sp.</i>	7	5	19
	Total Count	7	5	19
Rotifera	<i>Branchionus sp.</i>	12	47	16
	<i>Keratella sp.</i>	4	15	4
	Total Count	16	62	20
Total Zooplankton Count /ml		126	358	139

Figure.1 Comparative Seasonal Variation in Phytoplanktons and Zooplanktons



A single genus of class Euglenophyceae that is *Euglena sp.* was recorded. Higher values were recorded in winter season while minimum values were recorded in monsoon season.

2 genera of class Myxophyceae were recorded. They were *Oscillatoria sp.* and *Nostoc sp.* Maximum values of class Myxophyceae were recorded in winter season while minimum values were recorded in monsoon season. *Oscillatoria sp.* was highest recorded in all seasons as compared to *Nostoc sp.*

Phytoplankton studies worldwide were also done by many researchers like Sirsath *et al* (2004); Sakhare and Joshi (2006); Bahura (2001); Reynoldson (1997); Zhang *et al* (2008); Hulyal and Kaliwal (2008).

Zooplanktons are minute members of second trophic level of food chain in aquatic life. During the present study 4 groups of zooplanktons were recorded. They were Cladocera, Copepoda, Ostracoda and Rotifera. Representatives of Copepoda showed maximum appearance then other 3 groups recorded.

A single genera, *Bosmina sp.* of group Cladocera was recorded. Higher values were recorded in winter seasons while minimum values were recorded in summer season.

3 genera namely *Cyclops sp.*, *Mesocyclops sp.* and *Nauplius sp.* of group Copepoda were reported. Maximum values were reported in winter season while minimum values in summer season. Of the 3 genera, *Cyclops sp.* was higher as compared to other recorded species of the group.

Cypris sp. was the only one genera represented by group Ostracoda. Higher values were recorded in summer season while lower values in winter season.

Branchionus sp. and *Keratella sp.* represented group Rotifera. Higher values were observed in winter season while minimum values were observed in monsoon season. *Branchionus sp.* showed higher values in all seasons as compared to *Keratella sp.*

Zooplanktons studies worldwide were also done by many researchers like Sousa *et al*

(2008); Rajeshkhar *et al* (2010); Pejavar and Gavrav (2008); Kiran *et al* (2007); Sharma and Hussain (2001).

To conclude, phytoplanktons are primary producers, the members of first trophic level, who play significant role in energy production and its circulation throughout the aquatic food web. Zooplanktons, the members of second trophic level are important link in aquatic food web and also help in energy transfer in ecosystem. The diversity, density and distribution of planktons are much influenced by environmental factors in which they live. Hence study of planktons can give a idea of water quality and can prove a good tool for monitoring and management of aquatic ecosystem.

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