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POPULATION DYNAMICS OF PLANKTER IN A PERENNIAL WATER BODY

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ABSTRACT: Present study was carried out to investigate the population dynamics of plankter and productivity status of perennial aquatic body. Morawane dam is a perennial water body in Chiplun Tehsil of Ratnagiri district in Maharashtra, India. The qualitative and quantitative analysis of plankter was carried out with the help of Sedgwick- Rafter cell method during January 2012 to December 2013. The percent composition of phytoplankter belonging to six major groups were Chlorophyceae (53%), Bacillariophyceae (22%), Cyanophyceae (Myxophyceae) (22%), Xanthophyceae (1%), Dinophyceae (1%), Chrysophyceae (1%). The group Chlorophyceae was represented by 37 genera / species, among which *Pediastrum* sp. *Chlorella*, *Scenedesmus*, *Spirogyra* and *Treubaria* were dominant in descending order. The group Cyanophyceae was represented by *Microcystis*, *Synecocystis*, *Oscillatoria*, *Aphanocapsa*, *Gleocapsa*, *Merismopedia* and Bacillariophyceae by *Synedra*, *Navicula*, *Nitzschia*, *Cocconeis*, *Suriella* and *Fragillaria*. Study further reported five major groups *viz.* Rotifera (41%), Cladocera (24%), Copepod (23%), Anostraca (10%) and Ostracoda (2%) of zooplankter. Group Rotifera showed increase in number from December to May and successive decline from June to November. Copepoda group showed decline in their number from January to May with steady increase from June to December with peak in November and December. The seasonal fluctuations in zooplankter were well synchronized with phytoplankter. The study dam is located at low altitudes and supporting moderate number of species of zooplankton indicating mesotrophic conditions. This is further supported by the presence of *Microcystis*, *Oscillatoria*, *Nitzschia*, *Navicula*, *Scenedesmus* and *Coleospharium*.

Key words: Population dynamics, Perennial water body, Phytoplankter, Zooplankter, Mesotrophic.

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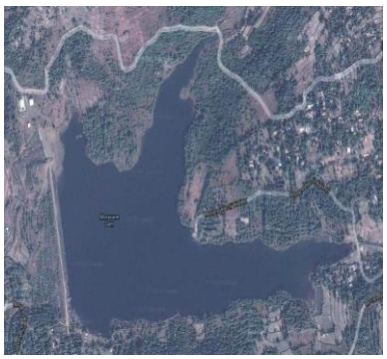
1.INTRODUCTION

Study of the biological aspects such as phytoplankton, zooplankton, fishes, amphibians, reptiles, aquatic birds, insects, etc. of the freshwater body determines the status of the aquatic environment. But the productivity of water body, in terms of planktonic biomass, is regulated by various physico-chemical factors viz., temperature, transparency, pH, electrical conductivity, total hardness, nitrogen and phosphorus (Mahboob *et al.,* 1993). About 75% of freshwater fish feed is plankton at one or the other stage of their life cycle. Phytoplankton, algae and vascular aquatic plants conduct aeration of water by releasing the oxygen and absorbing the carbon dioxide; and act as a main source of food directly or indirectly to the fish population. Phytoplankton encompass a surprising range of cell size and cell volume from the largest forms visible to the naked eye, *Volvox* (500 to1500 µm), to micro plankton which vary from 60 to 500 µm. Nanoplankton are very small, their size varies from 5 to 60 µm. These can only be collected with a special nanoplankton net having mesh size of 30 µm (Wetzel, 1975). The Diatoms (Odum, 1971) are good indicators of water quality whereas benthic algae (Hunding, 1971) are an important producer component of the littoral zone of eutrophic lake but plankton algae (Palmer, 1980) are much more important than the attached algae in deep reservoirs. The algae are more sensitive to detergents than bacteria and fungi (Issa and Ismail, 1995) and therefore commonly used for monitoring environmental contamination (Wu, 1999). Zooplankton and other micro invertebrates also depend upon phytoplankton for their existence. Zooplankter are minute organisms that float in the surface water and play important role in the food web. Importance of zooplankter as fish food has been studied by different workers (Fontaine and Revera, 1986 and Geiger, 1983). They are considered to be the ecological indicators of water bodies (Gajbhiye and Desai 1981). Zooplankters serve as the connecting link between primary producers and secondary consumers in food chains of the lentic water bodies. Therefore, studies on long-term fluctuations in the abundance of plankter are important in relation to the conservation of aquatic resources. Availability of zooplankter as food for larval fish is thought to be one of the key factors that determine the class strength of commercial fish (Cushing, 1978; Kane, 1993). Study of plankton biomass is also important for the fish production. The high biomass values indicate the high fish production. The distribution and abundance of plankton in polluted and unpolluted waters can provide information on the status of water body. Hence, Morawane dam from Ratnagiri district of Maharashtra, India was selected to study its status from the view point of planktons.

Study area



Google view of Morawane dam

Morawane dam is a perennial fresh water body situated in Chiplun Tehsil of Ratnagiri district (MS) in the ranges of Sahyadri of Western Ghats. The dam is constructed across the Morawane Nalla in Vashishthi River Basin in the year 2004 at the Latitude 17^0 32' 55" N and Longitude 73^0 36' 40" E and comes under Konkan Irrigation Circle, South Division, Ratnagiri. Its catchments area is 8.03 sq. km. receives an average annual rainfall of about 3300 mm. The dam is of earthen type having length of 420 meters and maximum height of 24.37 meters with spillway of about 75 meters. The spillway of dam is of Ogee type with maximum flood discharge of 281.015 M^3. It has only one outlet in the form of Left Bank Canal (LBC) of 5.50 km length. The 75% dependable yield of the dam is about 19.65 Mm^3 with gross annual utilization of about 3.841 Mm^3. Out of total water, 0.13 Mm^3 is available for drinking purpose and 2.97 Mm^3 for irrigation purpose. The information pertaining to the storage of reservoir indicates that the maximum water level (MWL) in the dam is 115 meters while full reservoir level (FRL) is 112 meters. Two village *viz.* Morawane and Dalvatne come under the command of dam with gross command area of about 286 hectares. The total land area under submergence is about 23.44 hectares.

2. MATERIALS AND METHODS:

The plankton samples were monthly collected from three different stations of the dam between 8.30 am to 11.30 am during January 2012 to December 2013. Sample collection was done by using conical net having mesh size of 120µ. Fixed volume of water (25 liters) was filtered through the plankton net and plankter collected were concentrated to 250 ml and preserved in 4% formalin. The samples were kept for setting for a period of 48 hrs. The qualitative and quantitative analysis of phytoplankton and zooplankton was carried out in the laboratory with the help of Sedgwick- Rafter cell method. Preserved and concentrated samples were agitated thoroughly for even distribution of organisms and exactly one ml of sample was transferred on to the Sedgwick- Rafter cell counting chamber. The counting of plankter was done under compound microscope (15x eyepiece, 10x and 40x objective lens) and photography was done by digital camera (Nikon) mounted on the microscope with special attachment. Identification and classification of phytoplankton and zooplankton was

done with the help of books Smith, (1951), Edmondson, (1959), Findlay and Kling, (1979), Thomas, (1983), Sarode and Kamat (1984), Adoni *et al*. (1985), Ling and Tyler (1986), Battish, (1992), Shiel, (1995), Vashishta *et al*., (2008), Bellinger, and Sigee (2010) and http://www.algalweb.net website. Identified planktons and observations were presented in percent composition and population dynamics. Results were expressed as unit/l for phytoplankton and organism/l for zooplankton. The phytoplankter and zooplankter were identified up to generic level while some of them were identified up to species level.

3. RESULTS AND DISCUSSION

Phytoplankter:

Phytoplankter reported from Morawane dam belonged to five major divisions such as Chlorophyta, Chrysophyta, Bacillariophyta, Dinophyta (Pyrrophyta) and Cyanophyta. The Chlorophyta reported to be the largest division and included 37 genera/species of phytoplankton belonging to 12 families, 4 orders and one class. Second largest division was Cyanophyta contained 8 genera/ species belonging to 3 families, 2 orders and one class, the Cyanophyceae (Myxophyceae). Division Bacillarophyta contained only one class i. e. Bacillariophyceae which further contained 01 order, 05 families and 06 genera/species. The division Dinophyta included only 01 class i.e. Dinophyceae that included 02 orders, 02 families and 02 genera/species. The Chrysophyta division included two classes such as Chrysophyceae and Xanthophyceae. Each of the classes contained 01 order, 01 family and one (Table No. 1).

Table No. 1: Phytoplankton diversity in Morawane dam.

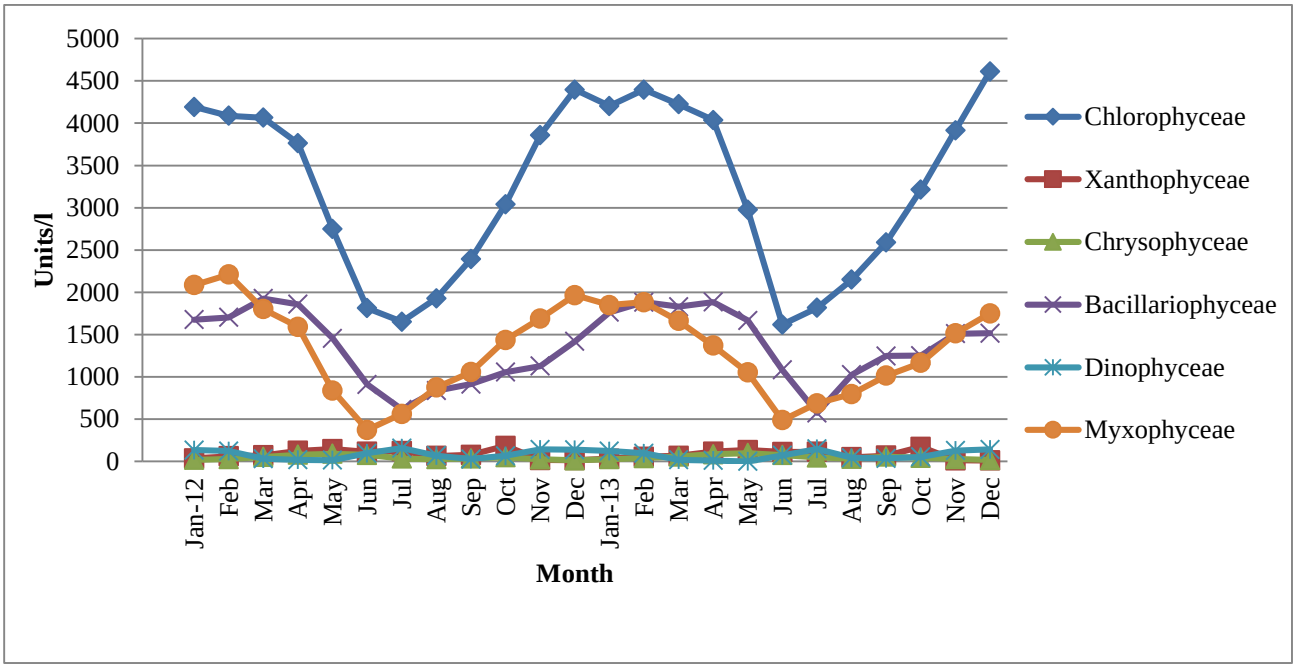
Division	Class	Order	Family	Genera
Chlorophyta (Green Algae)	**Chlorophyceae**	Chlorococcales	Dictyosphaeriaceae	*Botryococcus sp*
			Hydroditctyaceae	*Pediastrum sp*
			Coelastraceae	*Coelastrum sp*
			Oocystaceae	*Ankistrodesmus sp*
				Chlorella sp
				Treubaria sp
			Scenedesmaceae	*Scenedesmus sp*
				Crucigenia sp
				Actinastrum sp
		Ulotrichales	Ulotrichaceae	*Ulothrix sp*
			Microsporaceae	*Microspora sp*
			Protococcaceae	*Protococcus sp*
		Volvocales	Volvocaceae	*Eudorina sp*
				Volvox sp
		Zygnematales	Desmidiaceae	*Arthrodesmus sp*
				Closterium sp
				Cosmarium botrytis

				Cosmarium brebissonii
				Cosmarium contractum
				Cosmarium depressum
				Cosmsrium formulosum
				Desmidium sp
				Penium margaritaceum
				Staurastrum longispinum
				Staurastrum manfeldtii
				Staurastrum anatidum
				Staurastrum arctison
				Staurastrum cerastes
				Staurastrum inflexum
				Staurastrum johnsonii
				Staurastrum ophiura
				Staurastrum planktonicum
				Staurastrum sexangulare
				Staurastrum singulum
			Gonatozygonaceae	*Gonatozygon sp*
			Zygnemataceae	*Spirogyra sp*
				Zygnema sp
Chrysophyta	**Chrysophyceae**	Ochromonadales / Chrysomonadales	Ochromonadaceae / Dinobryaceae	*Dinobryon sp*
	Xanthophyceae	Heterotrichales	Tribonemataceae	*Tribonema sp*
Bacillarophyta (Diatoms)	**Bacillariophyceae**	Bacillariales / Pennales	Fragilariaceae	*Fragillaria sp*
				Synedra sp
			Achnanthaecae	*Cocconeis sp*
			Naviculaceae	*Navicula sp*
			Nitzschiaceae	*Nitzschia sp*
			Surirellaceae	*Suriella sp*
Pyrrophyta / Dinophyta	**Dinophyceae**	Peridiniales	Gonyaulacaceae	*Gonyaulax sp*
		Gymnodiniales	Gymnodiniaceae	*Gymnodinium sp*
Cyanophyta	**Cyanophyceae / Myxophyceae**	Chroococcales	Chroococcaceae	*Gloeocaspa sp*
				Synecocystis sp
				Aphanocapsa sp
				Microcystis sp
				Merismopedia sp

				Coelosphaerium sp
		Nostocales	Oscillatoriaceae	*Oscillatoria sp*
			Rivulariaceae	*Gloetrichia sp*

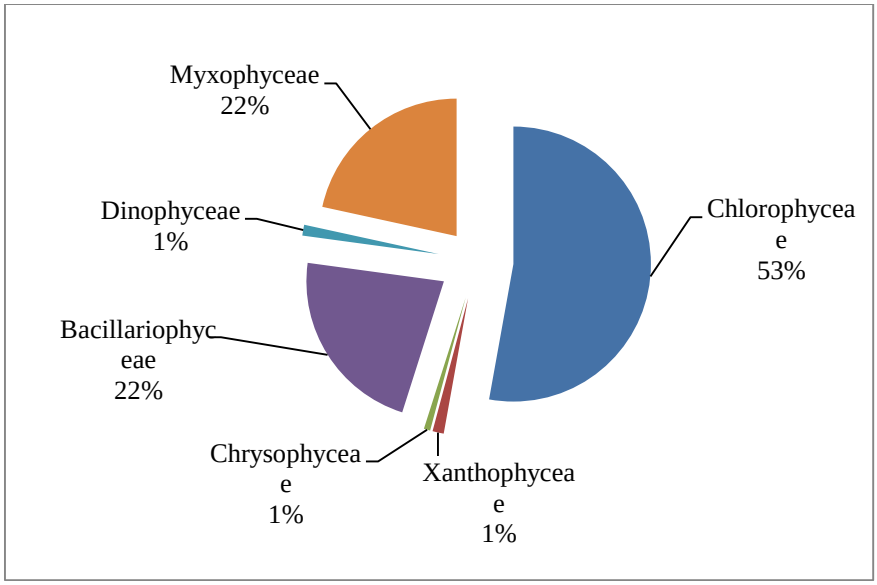
Monthly variations in algal groups during January 2012 to December 2013 are depicted in Fig. No.1. The minimum numerical density of Chlorophyceae (1618 units/l) was reported during June 2013 and maximum (4612 units/l) during December 2013. The range of Xanthophyceae was from 10 to 182 units/l. It was reported minimum during December 2013 and maximum during October 2012. The Chrysophyceae group showed range between 12 units/l during December 2012 and 98 units/l during May 2013. The Bacillariophyceae were reported to be minimum (572 units/l) during July 2013 and maximum (1926 units/l) during March 2012. The Dinophyceae group showed range from nil during May 2013 to 156 units/l during July 2012. The Myxophyceae showed range between 372 units/l during June 2012 and 2211 units/l during February 2012.

Fig. No. 1: Monthly variation of Phytoplankton groups (units/l) in Morawane dam during January 2012 to December 2013



In the present investigation the order of dominance of various groups of phytoplankton in Morawane dam was represented as: Chlorophyceae (53%) > Bacillariophyceae (22%) > Cyanophyceae (Myxophyceae) (22%) > Xanthophyceae (1%) > Dinophyceae (1%) > Chrysophyceae (1%) (Fig. No. 2).

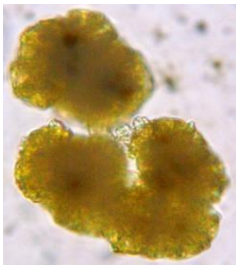
Fig. No - 2: Percent composition of Phytoplankton groups in Morawane dam.



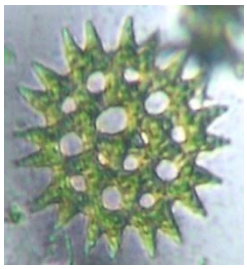
The dominance of Chlorophyceae was noticed from October to April in Morawane dam. Its population declined during monsoon. Similar trend was exhibited by Bacillariophyceae and Myxophyceae. The Xanthophyceae, Chrysophyceae and Dinophyceae maintained their existence throughout the study period with little variations (Fig. No.1). Dominant species of phytoplankter reported in the study dam are micro photographed and depicted in Plate-.I.

PLATE – I: Photographs of dominant species of phytoplankton reported in the study dam.

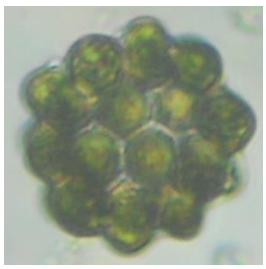
CLASS - CHLOROPHYCEAE



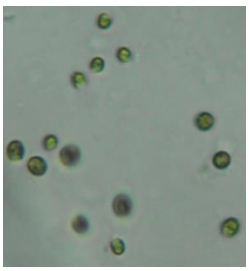
Botryococcus sp



Pediastrum sp

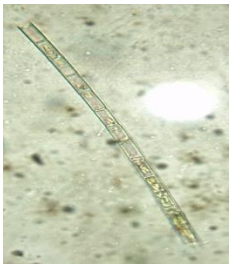


Coelastrum sp

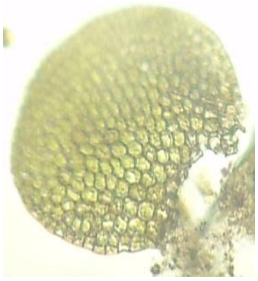


Chlorella sp

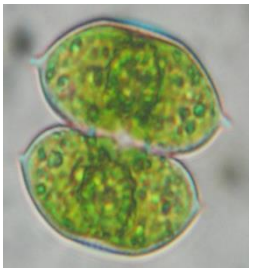
Ulothrix sp



Microspora sp

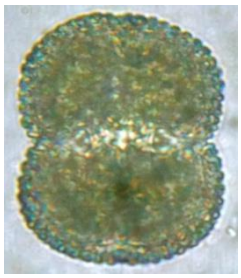


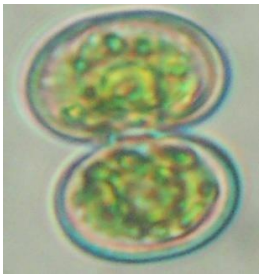
Volvox sp

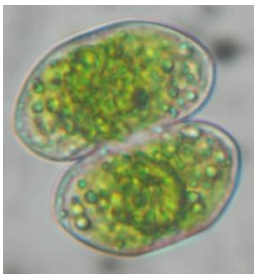


Arthrodesmus sp

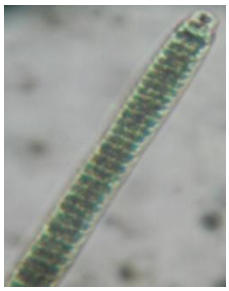

Cosmarium botrytis


Cosmarium brebissonii


Cosmarium contractum


Cosmarium depressum


Cosmarium formulosum


Desmidium sp


Staurastrum longispinum


Staurastrum manfeldtii


Staurastrum anatidium

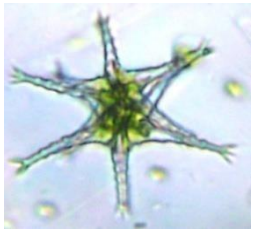

S. arctison

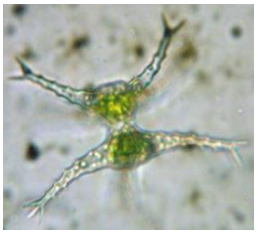

S. inflexum

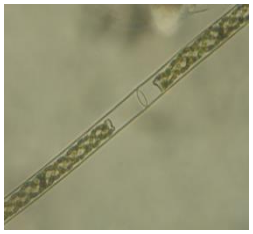

S. ophiura

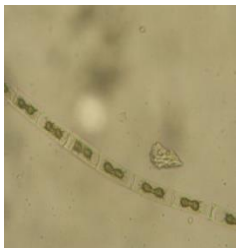
Cont…


S. planktonikum


S. sexangulare


S. singulum


Spirogyra sp


Zygnema sp

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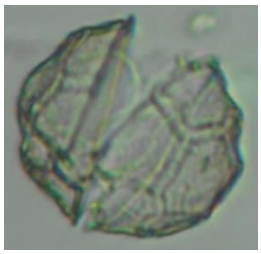
2016 Jan- Feb RJLBPCS 1(5) Page No.248

CLASS - CHRYSOPHYCEAE

Dinobryon sp

CLASS - DINOPHYCEAE



Gonyaulax sp

Gymnodinium sp

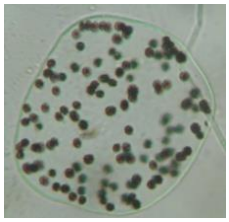
CLASS - BACILLARIOPHYCEAE

Synedra sp

Navicula sp

Nitzschia sp

CLASS - MYXOPHYCEAE / CYANOPHYCEAE



Aphanocapsa sp

Microcystis sp

Gloetrichia sp

Zooplankter:

The zooplankter reported from Morawane dam belonged to two major phyla such as Rotifera and Arthropoda. Phylum Rotifera included 15 genera/species that belonged to class Monogononta; and 2 orders and 7 families. Amongst seven families of Monogononta, the family Brachionideae was reported to be dominant. Phylum Arthropoda was major group that contained 20 genera/species that belonged to only 1 class Crustacea, 5 orders and 11 families. Among all the families Cyclopoidae was reported to be dominant (Table No. 2).

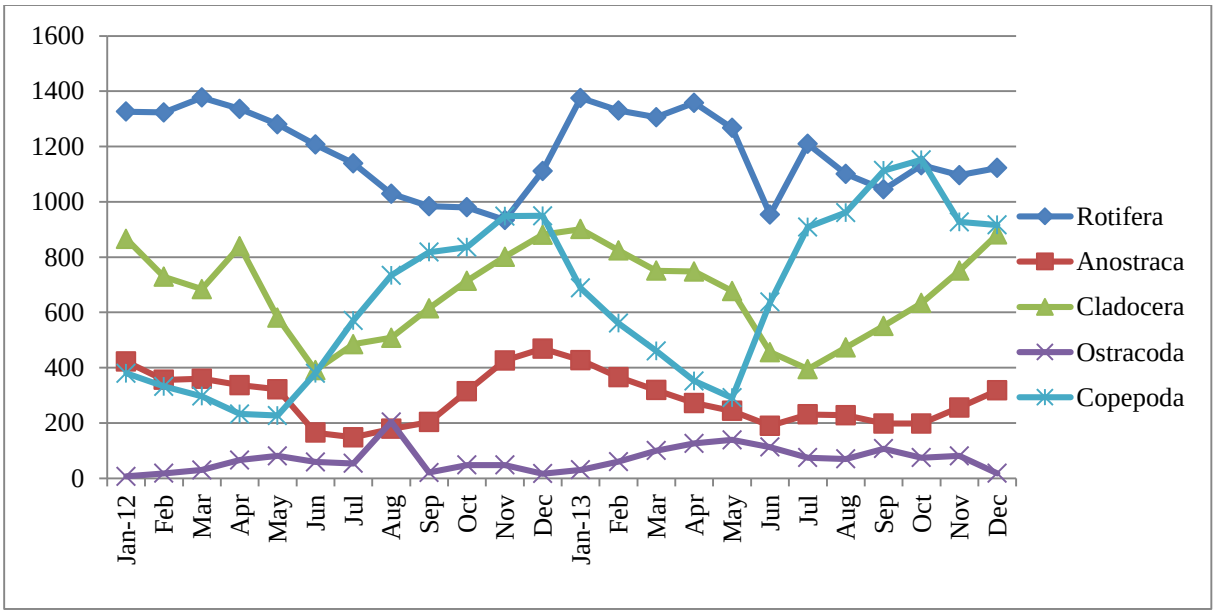
Table No. 2: Zooplankton diversity in Morawane dam.

Phylum	**Class**	**Order**	**Family**	**Genera**
Rotifera	**Monogononta**	**Ploimida**	Brachionidae	*Brachionus calyciflorus*
				Brachionus forfocula
				Kellicottia sp
				Keratella cochlearis
				Keratella tropica
				Notholca sp
				Colurella sp
			Lecanidae	*Lecane sp*
			Notommatidae	*Cephalodella sp*
				Notommata copeus
			Trichocercidae	*Trichocerca cylindrica*
				Trichocerca sp
			Synchaetidae	*Ploesoma sp*
		Floscullariacea	Filinidae	*Filina sp*
			Testudinellidae	*Pompholyx sp*
Arthropoda	**Crustacea**	**Anostraca**	Streptocephsalidae	*Steptocephalus diaptomus*
			Thamnocephalidae	*Eubranchipus sp*
		Cladocera	Daphnidae	*Daphnia sp*
			Moinidae	*Moina sp*
			Bosminidae	*Bosminia sp*
			Chydoridae	*Camptocercus sp*
			Macrothricidae	*Macrothrix sp*
		Ostracoda	Cypridae	*Cypris sp*
				Cyprinotus ostracod
		Cyclopoida	Cyclopoidae	*Cyclops sp*
				Mesocyclops sp
				Cyclopoid copepod
				Eucyclops sp
				Ectocyclops sp
				Tropocyclop sp
				Nauplius sp
		Calanoida	Diaptomidae	*Diaptomus sp*
				Neodiaptomus sp
			Centropagidae	*Limnocalanus sp*
				Limnocalanus macrurus

Monthly variations in various groups of zooplankton in the study dam during January 2012 to December 2013 are depicted in Fig No. 3. The numerical density of Rotifera fluctuated from 934 units/l during November 2012 to 1377 units/l during March 2012. The Anostraca group indicated numerical density from 148 units/l during July 2012 to 469 units/l during December 2012. The

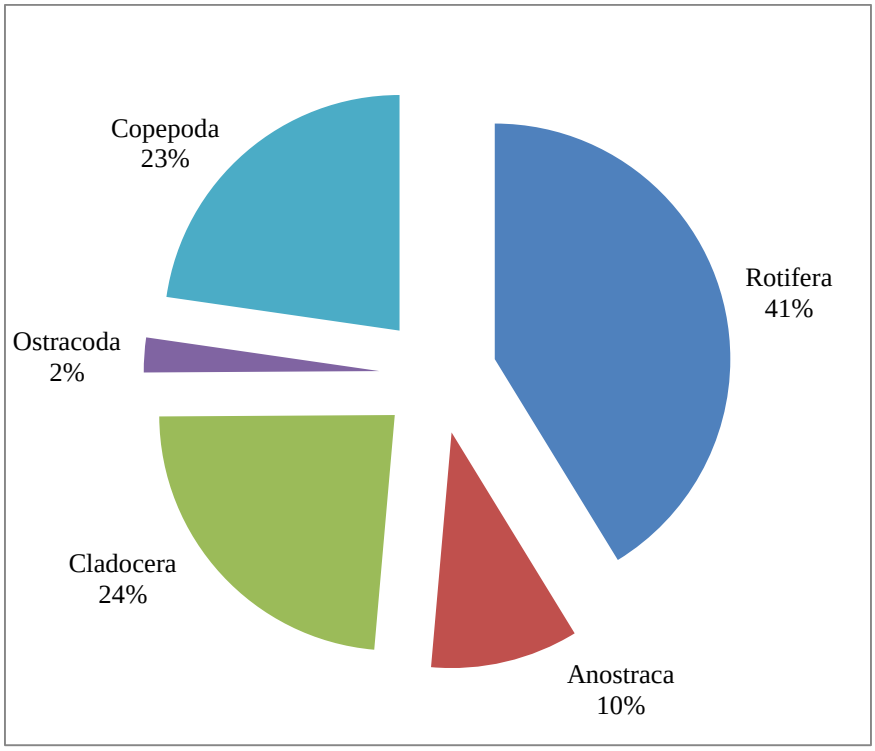
Cladoceran density ranged between 395 units/l during July 2013 to 901 units/l during January 2013. The numerical density of Ostracoda ranged from 7 units/l during January 2012 to 204 units/l during August 2012. The Copepodan density range was from 227 units/l during May 2012 to 1152 units/l during October 2013. The groups Cladocera, Anostraca and Copepoda showed rather similar trend where their number was maximum during late monsoon and early winter; and low during June. Rather opposite trend was shown by group Ostarcoda. Lowest number of Rotifera was reported during November 2012 and January 2013; and highest from January to April in both the years (Fig.No.3).

Fig. No. 3: Monthly variation of Zooplankter (units/l) in Morawane dam during January 2012 to December 2013



In the present investigation order of dominance of various groups of zooplankton in Morawane dam was represented as Rotifera (41%) > Cladocera (24%) > Copepod (23%) > Anostraca (10%) > Ostracoda (2%) (Fig.No.4).

Fig. No.4: Percent composition of zooplankton groups in Morawane dam.



Dominant species of zooplankter reported in the study dam are micro photographed and depicted in Plate-.II.

PLATE – II: Photographs of dominant species of zooplankton reported in study dam.

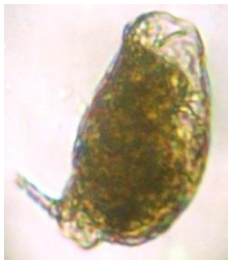
GROUP - ROTIFERA

Brachionus forfocula

Kerattella tropica

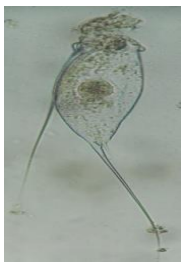
Keratella cochlearis

Lecane sp



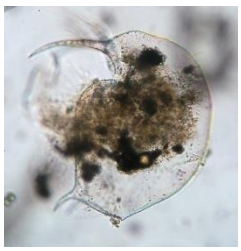
Cephalodella sp

Tricocerca sp



Filina sp

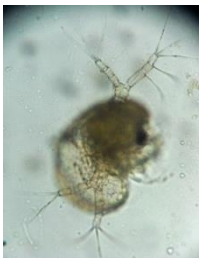
GROUP – CLADOCERA



Bosmania sp

Daphnia sp

Moina sp



Macrothrix sp

GROUP – CYCLOPOIDA

Cyclopoid copepod

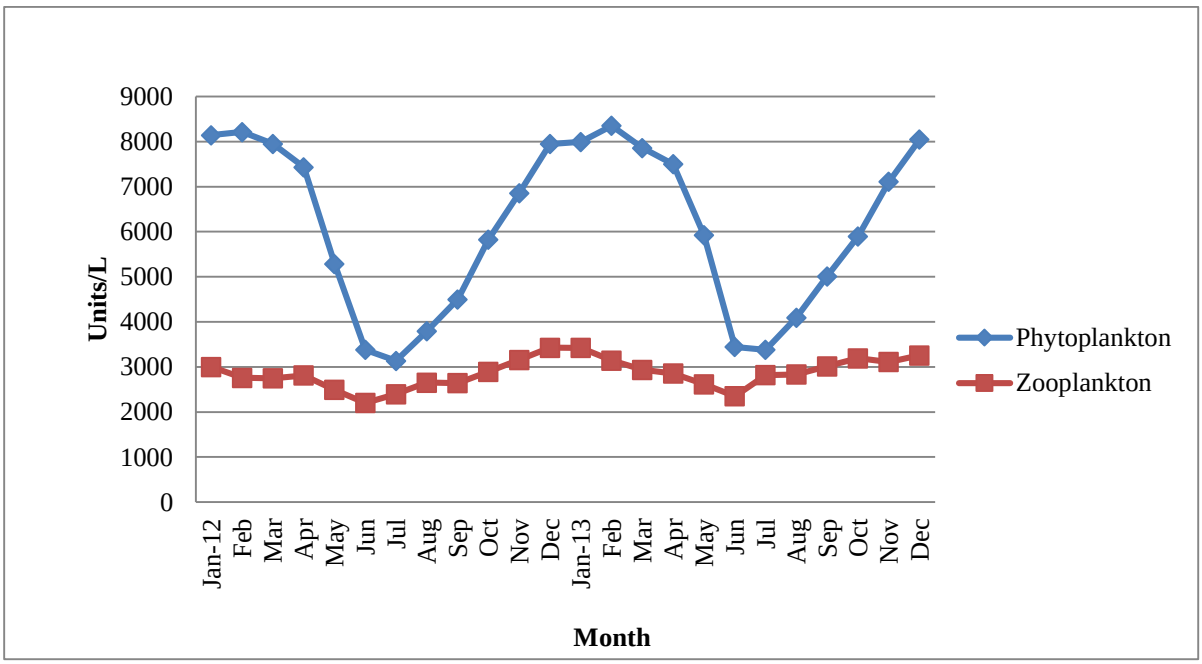
Nauplius sp

GROUP – CALANOIDA

Limnocalamus sp

Population dynamic study of phytoplankton and zooplankton in the study dam during entire study period indicated that the phytoplankton density was much more than the zooplankton. Both the phytoplankton and zooplankton densities started declining from May and reached their lowest count during June and July; and slowly increased to reach their peaks from December to February (Fig. No.5). Season wise ups and downs in the population size of phytoplankter were followed by the zooplankter.

Fig. No. 5: Monthly variations of population dynamics of phytoplankton and zooplankton in Morawane dam during 2012 and 2013



DISCUSSION:

Phytoplankter:

Phytoplankter are the minute aquatic non motile autotrophs carried by air currents and water currents and essential in studying photosynthesis, understanding aquatic ecosystems and in production of useful substances in aquatic body. Their population in aquatic ecosystem is regulated by various environmental factors (Hutchinson, 1967). Excessive nutrients and organic inputs in water bodies have led to their eutrophication, which is characterized by increase in phytoplankton nuisance algal blooms, loss of water clarity and loss of oxygen in bottom waters. Therefore, phytoplankter and their seasonal succession can be a better predictor of long term environmental changes in the aquatic environment than the more usual descriptors of biomass and productivity indices (Moline and Prezelin, 1996). In the present investigation Phytoplankter showed higher densities during winter and summer. Maximum density of Chlorophyceae was observed during winter particularly in the months of December and January and minimum during monsoon, particularly in the month of June. Similar trend was exhibited by Bacillariophyceae and Myxophyceae (Cyanophyceae) in the study dam. Garcia de Emiliani (1993) reported high density of phytoplankton during summer in the flood plain lake of Argentina. Kalyani *et al.,* (1999) have recorded two peaks, one in summer and other in winter, of phytoplankton in Bhadrakali lake. Devika *et al*., (2006) have reported high population of Chlorophyceae during summer due to high water temperature and transparency. Laskar and Gupta (2009) have reported highest number of phytoplankton in pre-monsoon followed by monsoon, post monsoon and winter in Chatla Floodplain Lake, Assam, but diversity and abundance of phytoplankton always remains high in summer Wojciechowsk *et al.,* (2007). Rajgopal *et al*., (2010) have determined sequence of dominance as Chlorophyceae followed by Cyanophyceae and Bacillariophyceae in Chinnapperkavil pond and Nallanchettipatti pond, Tamil Nadu and further stated that Chlorophyceae and Cyanophyceae are tolerant to organic pollution and resist the stress caused by pollution. Therefore, they may be used as pollution indicators. High phytoplankton density during April and low during August was recorded by Mahor and Singh (2010) in freshwater reservoir Ighra, Gwalior, MP. Bacillariophyceae was reported to be dominant group during winter due to weak light and low temperature in wetlab Ghat in Wular lake (Ganai *et al*., 2010). Kotadiya and Acharya (2013) determined maximum count of phytoplankton during summer and minimum during monsoon in two freshwater bodies in rural area of Ahmadabad. The results of present study well synchronize with the finding of other researchers. The water bodies having high levels of nutrients and organic pollution provide favorable conditions to the pollution tolerant species of phytoplankton (Kelly *et al*., 1995) to thrive well at low oxygen levels (Mason, 1996). Thus, in general, the periphytic communities explain the oligotrophic nature of the water body. However, the presence of some pollution tolerance species belonging to Chlorophyceae, Diatoms, Cyanophyta and blue green

among periphytic component of alga suggested the necessity of a detailed and long term monitoring of the hydrobiology of water body as a means to protect it from catastrophic degradation due to anthropogenic impacts (Jithesh, 2008). Mishra *et al*., (1992) reported common occurrence of *Zygnema* species, *Microcystis aeruginosa*, *Oscillatoria*, in J. C. mill pond and Gangasagar pond at Gwalior and also recorded abundance of *Spirogyra* and *Pediastrum simplex* along with high concentration of oxygen in Gangasagar pond. Similar phytoplankton compositions were recorded in the study dam with comparatively higher density of *Pediastrum* species and discontinuous occurrence of *Microcystis* as its absence was reported from May to August 2013. However, the occurrence of *Microcystis*, *Oscillatoria* represent considerable pollution load (Sawyer 1947, Brook, 1965). In the present study high density occurrence of *Microcystis*, *Oscillatoria* and *Coleosphaerium* were observed in the dam. It may be due to extreme evaporation of water in summer that might be the cause for increased organic load in these water bodies. The nitrogen hetrotophic *Naviculae* and *Nitzschia* were reported throughout the study period in the dam indicating its moderate pollution status. The presence of *Microcystis*, *Oscillatoria*, *Nitzschia*, *Navicula*, *Scenedesmus* and *Coleospharium* proves meso-eutrophic nature of the dam.

Zooplankter:

Several ecological factors directly or indirectly affect existence and population dynamic of zooplankton. The larval stages of carps mostly prefer zooplankton because of their high content of proteins (Dewan *et al*., 1977). Seasonal fluctuations in the zooplankton population are a common phenomenon because their population is severely affected by the variation in physico-chemical parameters of water body. Their association, abundance, seasonal variation, richness and diversity can be used for assessment of water pollution and for the fishery management. They not only increase fish production but also help in bioremediation of heavy metals and other toxic materials (Tapas and Bidhan, 2013). So far about 1700 species of Rotifers have been identified in the world, of which 500 species have been described from Indian water bodies (Arora and Mehera, 2003; Kiran *et al*., 2007; Vasanth Kumar *et al*., 2011). In most of the Indian water bodies Rotifers have been reported as most dominant group of zooplankton. The genus Branchionus of the group Rotifera is the most ancient genus represented by 46 species in India (Harikrishnan, 1995; Sharma and Sharma, 2001). In the present study five groups of zooplanktons such as Rotifera, Copepod, Cladocera, Anostraca and Ostracoda have been reported in the dam. Group Rotifera showed increase in number from December to May and successive decline from June to November. It was dominated by *Keratella cochlearis* followed by *K. tropica* and *Branchionus forficula* and *B. Calyciflorus*. High density of *Keratella* and *Branchionus* during February to May in Morawane dam might be due to high temperature, low level of water and increased turbidity due to churning of bottom by wave action (Pailwan, 2005).

Group Cladocera was represented by five species such as *Bosminia sps*., *Moina sp.*, *Daphnia sp.*, *Camptocercus sp.* and *Macrothrix sp.* The percent composition of *Bosmonia* in these groups was maximum followed by *Moina sp.* and *Daphnia sp.* Presence of *Daphnia sp.* determines the clear and non organic pollution status of dam. Major species reported from group Copepoda were *Nauplius sps*. followed by *Limnocalanus macrurus* and *Cyclopoid copepod* during first year of study but in the second year their trend was - *Nauplius sps* > *Cyclopoid copepod* > *Tropocyclop* > *Ectocyclops*. Group Copepoda showed decline in their number from January to May in Morawane dam with steady increase from June to December with peak in November and December. The Copepods usually multiply in the stable environmental conditions but disappear with increasing level of pollution. This decrease in Copepods and Cladoceras population in summer may be attributed to the higher temperature (Shivkumar *et al*., 2001). The winter season remains most favorable period for growth and multiplication of zooplanktonic species, during which phytoplankton population also increases. Generally the water bodies situated at higher altitudes are oligotrophic and do not support the diverse group of planktonic flora and fauna. But the present study dam is located at low altitudes and supporting moderate number of species of zooplankton indicating mesotrophic conditions.

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