Phytoplankton Biodiversity of Bhoj wetland and Shahpura Lake Bhopal, M.P. India

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Abstract

Bhoj Wetland, Bhopal comprise of two lakes i.e. Upper and Lower lakes, India. These wetlands are listed amongst the 25 lakes recognized by Ramsar (2007). The twin lakes (i.e. Upper and Lower lakes of Bhopal) have a total water spread area of 32.29 sq. km and catchment area of 370.6 sq. km and both lakes support a rich and diverse range of flora and fauna. Shahpura lake is situated in one of the posh localities of Bhopal, this is a man made perennial lake and constructed during the period of 1974-1975. The latitude of the lake is 23˚12N and longitude of the lake is 77˚25E having an area of 8.29 km². The source and main use of the lake water is to rain sewage water of residential colony, irrigation recreation and aquaculture also In Upper Lake total --172--genera of phytoplankton were recorded. Out of which -66 generas belong to the Chlorophyceae, -54 generas belong to Bacillariophyceae, 30 generas belong to Cyanophyceae, 15 generas in Euglenophyceae and 10 generas to Dinophyceae. Among phytoplankton Chlorophyceae were dominant over others such as Dinophyceae and euglenophyceae were Recessive. Zooplankton species at Upper lake during study period were recorded as total 88 of which-18 Sp belong to Rotifera - 33 to Cladocera, 15 to Copepoda and 8 to Ostracods and 14 to Calanoida In Lower lake -167 genera of phytoplankton were recorded. . Out of which -70 generas belong to the Chlorophyceae, -60 generas belong to Bacillariophyceae, 29 generas belong to Cyanophyceae,9 generas in Euglenophyceae and 5 generas to Dinophyceae. Among phytoplankton Chlorophyceae were dominant over others such as Dinophyceae and euglenophyceae were Recessive. Zooplankton species at Lower Lake during study period were recorded as 100 of which 20 Sp belong to Rotifera, 37 to Cladocera, 8 to Copepoda and 10 to Ostracods and 24 to Calanoida. In Shahpura lake 235 generas of phytoplankton were recorded. . Out of which 117 generas belong to the Chlorophyceae, 57 generas belong to Bacillariophyceae, 33 generas belong to Cyanophyceae, 18 generas in Euglenophyceae and 10 generas to Dinophyceae. Among phytoplankton Chlorophyceae were dominant over others such as Dinophyceae and euglenophyceae were Recessive. Zooplankton species at Shahpura Lake during study period were recorded as 121 of which 22 Sp belong to Rotifera, 36 to Cladocera, 16 to Copepoda, 10 to Ostracods and 27 to Calanoida.

Keywords: Biodiversity, Seasonal Variation, Bhoj wetland Lakes

1. Introduction

Bio diversity refers to variations of life forms. It is the variations among animals, plants and microorganisms. The diversity changes from one location to another over time. Biodiversity is everywhere both in land and in water. Biodiversity refers to variety of plants and animals in a particular ecosystem. Human induced activities pose serious threats to the biodiversity, which ultimately leads to environmental degradation. The knowledge about the biodiversity of lakes along with its present conservation status will help in the wise-use of these lakes, enabling in their sustainable utilization, for the benefit of humankind by maintenance of its natural properties. The most important step to prevent degradation of lake ecosystems is to maintain its biological integrity and health. The aim of the present investigation is to study the fluctuations of the plankton abundance with respect to different seasons. Plankton communities do not respond only to natural changes into the lakes, but may also present variations as a consequence of human interventions affecting the water body, either directly or through activities carried on in the basin as a whole. These influences affecting the lakes result in modifications to the structure and composition of the plankton, which may take the form of changes in the tax a of which the algal associations are composed, in the abundance of each taxa, the richness and diversity of the associations, and other community parameters. Finally, due to the interdependence existing between the different organisms of which systems are composed, these variations in the plankton communities translate to changes in the trophic chain and the productivity of the lakes. The biological spectrum of the lentic fresh water bodies are multidimensional where phytoplankton is useful in bio monitoring the ecological disturbance caused by a number of physico-chemical factors, sewage pollutants and other anthrogenic factors. One of the main causes of biodiversity loss is the change in the environment. Environmental conditions play a key role in defining the function and distribution of organisms, in combination with other factors. Sharma and Misra (2011). Biodiversity is a function of species richness and evenness with which the individuals are distributed in these species (Margalef, 1958). In the present study, we focused on the abundance and distribution patterns of phytoplankton and zooplanktons in the twin lakes i.e upper and lower lakes of bhopal known as Bhoj Wetland.

Water pollution has been a major issue as water forms an important component of our day to day activity. Contamination of fresh water by sewage is a common occurrence. Excess nutrients either from sewage discharge or agriculture run-off add to the imbalance in the dynamics of water quality. Biological monitoring of a wetland is an integral part for the management of the total ecological health of the water body and is becoming increasingly important in water quality monitoring and assessment.

Earlier studies on Lake Phytoplankton diversity (Pieterse and Van, 1988; Vaulot, 2001; Pongswat et al., 2004; Kendirim, 2001; Millman et al., 2005; Tiwari and Chauhan, 2006; Sridhar et al., 2006; Tas and Gonulol, 2007; Senthil kumar and Sivakumar, 2008; Ganai et al., 2010) revealed the importance of this type of study. Studies showed that most of the phytoplankton was a great deal sensitive to the varying environment condition. That is to say, a negative change in phytoplankton composing the primary productivity affects all living creatures. Therefore, phytoplankton that is composed of the first ring of food chain should be examined taxo-nomically and ecologically.

Plankton species have different physiological requirements and thus show diverse responses to physical and chemical parameters such as light, temperature and nutrient regime. Their sensitivity and variations in species composition are often a reflection of significant alteration in ambient condition within an ecosystem (Devassy and Goes, 1988, 1989). Hence before any utilization of lake resources comes into consideration, plankton study is of primary interest.

2. Study Area

Figure 1: Bhopal map showing Upper Lake, Lower Lake and Shahpura Lake of Bhopal

Bhopal, the capital of Madhya Pradesh, is known as the "City of Lakes" owing to the occurrence of a large number of water bodies situated in and around its surrounding. The Upper lake, besides being the most magnificent lake of Bhopal, is also one of the most important sources of drinking water supply to the city of Bhopal. It is a man-made lake, which was constructed by erecting an earthen dam by Raja Bhoj in the 11th century A.D. between 1010 - 1055 at Kamla Park area .The Upper lake is an East-Westernly elongated shallow lake with irregular margins and dense growth of macrophytes and algae. The lake is situated at an altitude of 532 meters above the MSL. The major supply of water to the Upper lake is through two rivers namely Kolans and Uljhavan which originate from the district of Sehore, about 45 km from Bhopal. Bhadbhada weir with eleven sluice gates is constructed to let out the excess water of the lake into a channel, which later on Kaliasot reservoir, which on its own turns leads to a small river known as Kaliasot. Some of the important morphometric features of the lake are as follows: Longitude 77 o 18' - 77 o 24' E Latitude 23o 13' - 23o 16' N Maximum length 10.6 km Catchment area 361.00 sq. km. Submergence area at FTL 30.72 sq. km Maximum depth 11.7 m Mean depth 6.0 m Storage capacity 101.5M. cum Full tank level 1666.80R.L. feets Lowest tank level 1654.50R.L. feet Dead storage level 1656.58 R.L. feet Total length of Bhadbhada weir 102.1 Sewage waste water inflow 5.381 m/day Total silt load from catchment 0.36M cum/annum (Estimated) Main use of water Potable water supply after the declaration of Bhopal as capital of Madhya Pradesh, population of the city has increased with very rapid pace. Large part of population has settled on the banks of Upper and Lower lakes of Bhopal. About 1/3rd marginal area of Upper lake is occupied by the habitants while 2/3rd remains open to the forest and agriculture fields Raw sewage and polluted water from these habitations are released into Upper

lake through 14 nallahs Flow of sludge and sewage into the lake is predominant in the area around the Medical College Hostels, Kohe-Fiza settlement and in the area South of Van Vihar. It is

estimated that 9.82 MGD of sewage water is coming into Upper lake every day and that 7,500 m3 sewage and 360 m3 animal liquid discharge join the Upper lake per day. It has been observed that about 2000 persons take bath and also use to wash and clean their cloths and vehicles every day adding large amount of nutrients, which promote eutrophication, and growth of algal and aquatic plants in the lake. . Shahpura is situated in one of the posh localities of Bhopal yet it is considered as the most polluted lake of bhopal, this is a man made perennial lake and constructed during the period of 1974-1975. The latitude of the lake is 23˚12N and longitude of the lake is 77˚25E. having an area of 8.29 km². The source and main use of the lake water is to rain sewage water of residential colony,Bio medical waste from hospitals, irrigation purposes, recreation and aquaculture also.

3. Materials And Methods

Samples have been collected from the identified stations. Water samples were filtered through plankton net of different sizes and a total 10 ml was concentrated for every sample. The samples were then preserved by adding lugol's iodine and Formaline solution for zooplankton and phytoplankton respectievely.The standard method *i.e.* Drop count method for the analysis were followed, as prescribed in APHA (1995). As the objective of the sampling was to study the distribution of aquatic micro flora and fauna, the samples were chosen to be representative of the entire water quality of the lakes. The present study was conducted in Upper and Lower lakes of Bhopal, India a period of one year *i.e.* 20017. For this, four sampling stations were selected along with their reference stations.

Details of Sampling Stations In Upper Lake

(i) Medical College station (UL/1): This station is situated on northeastern part of the lake adjoining medical college. A major inlet joins the lake at this station that brings domestic sewage from the adjoining residential areas (particularly from Shaheed Nagar). This area remained subjected to various developmental activities particularly due to Bhoj Wetland Project.

(ii) Khanugaon station(UL/2) : This station is also situated on northern part of the lake and designated as one of the most polluted zones of the lake. This station is also subjected to various anthropogenic activities like bathing, swimming, washing as it is very close to residential area. The station is present in the littoral zone of the lake. Therefore due to availability of light and nutrients many species of macrophytes are flourishing here.

(iii) kamla park station (UL/3): This station is situated on northwestern part of the lake adjoining temples and city area, due various religious activities and sewage from city algal blooms are common here.

(iv) Reference Station (UL/R): This station is situated near Takia Island, which is situated in the middle and one of the deepest point of the lake.

Details Of Sampling Stations In Lower Lake

(i) Khatlapura station (LL/1): This is one of the most polluted stations of Lower Lake. This station is situated near the densely populated Jehangirabad area and two major sewage inlets join the Lower lake at this station.

(ii)Karishma park station (LL/2): This sampling station is situated near a densely populated area, named as Bhoipura, where mostly fisherman community lives. Some non-point pollution sources (small drains) join the lake near this site.

(iii) Bhoipura station (LL/3): This sampling station is situated near the Khatlapura temple, which is a major idol immersion site. Apart from this, direct human intervention is also witnessed at this station.

(iv) Reference Station (LL/R): This sampling station is situated near mintu hall. Situated in the middle of the Lake, as this zone is away from direct human intervention.

Details Of Sampling Stations In Shahpura Lake

(i) Manisha market inlet station (SL/1)-sewage is dumped from manisha market and nearby areas in the lake through this inlet. The water was fowl smelling and black in colour due to water anthropogenic activities and also due to the discharge from nearly located bansal Hospital.

(ii) PCB station (SL/2)-this lake sample was collected nearby EPCO, PCB bhopal. Due to less interventions in this area, the water was relatively cleaner

(iii) Kolar line station (SL/3)-this sample was collected from kolar site. The rear end of the lake, this area is usually prone to garbage dumping

(iv) Reference station (SL/R)-Situated few meters away from Pollution control board. This station is least effected by human exploitation.

4. Results

Phytoplankton In Upper Lake Distribution of phyplankton species at different sampling stations in Upper lake during the study period-

In Medical college (UL/1) total 53 Species were recorded in which 20 species (sp) belong to *Chlorophyceae*,16 sp belong to *Bacillariophyceae*, 10sp *Cyanophyceae*, 4 sp *Euglenophyceae* and 3 Sp *Dinophyceae*.

In Khanugaon (UL/2) total 47 species were recorded of which 18sp belong to *Chlorophyceae*, 15 sp belong to *Bacillariophyceae*, 7to *Cyanophyceae*, 4to *Euglenophyceae* and 3 to *Dinophyceae.*

In kamla park(UL/3) total 42 species wererecorded of which 13sp belong to *Chlorophyceae*, 12*Bacillariophyceae*, 10*Cyanophyceae*, 5 *Euglenophyceae* and 2*Dinophyceae*.

In Reference station (UL/R) total 30 species were recorded in which 15 sp *Chlorophyceae*,8 sp *Bacillariophyceae*,3.sp *Cyanophyceae*, 2sp *Euglenophyceae* and 2sp *Dinophyceae.*

Zooplankton In Upper Lake Whearas distribution of zooplankton species at different sampling stations at Upper lake during study period-

In Medical college (UL/1) total 25 Species were recorded of which 5 sp belong to *Rotifera*,, 9Sp belong to *Cladocera*, 3 species to *Calanoida*, 5 to *Copepoda*and 3 to *Ostracods.*

In Khanugaon (UL/2) during study period, total 28species were recorded of which 6 sp belong to *Rotifera*, 10 to *Cladocera*, 6 species to *Calanoida*, 4 to *Copepoda* and 3to *Ostracods.*

In kamla park (UL/3) , total 20 species were recorded of which 4 sp belong to *Rotifera*, 8 to *Cladocera*, 2 species to Calanoida 4 to *Copepoda* and 2to *Ostracods.*

In reference (UL/R) sample during 2017, total 15species were recorded of which 3 sp belong to *Rotifera*, 6 to *Cladocera*, 3 sp of *Calanoida*, 2 to *Copepoda* and 1 to *Ostracods.*

Phytoplankton In Lower Lake Distribution of phytoplankton species at different sampling stations in Lower lake during study period is as follows-

In khatlapura (LL/1) station during study period total 51species of phytoplankton population was recorded of which *Chlorophyceae* contributed 23*Bacillariophyceae* contributed 14sp while *Cyanophyceae* 9 sp, *Euglenophyceae* 3sp and *Dinophyceae* 2 sp.

In Karishma park (LL/2) total 54 sp were recorded of which 27 sp *Chlorophyceae*, 17 sp *Bacillariophyceae*, 4 sp *Cyanophyceae*, 4 *Euglenophyceae* and 2species of *Dinophyceae*

In Bhoipura (LL/3) total 37 species of phytoplankton population was recorded in which *Chlorophyceae* contributed 16species, *Bacillariophyceae* contributed 17species while *Cyanophyceae* was represented by 7 species, *Euglenophyceae* by 2 sp and *Dinophyceae* by 1 species.

In Reference (LL/R) sample total species of phytoplankton population was recorded of which *Chlorophyceae* contributed 25species, *Bacillariophyceae* contributed 4species while *Cyanophyceae* was represented by 12species.

Zooplankton In Lower Lake While Distribution of zooplankton species at different sampling stations in Lower Lake during study period shown in Fig.2.2

In Khatlapura (LL/1) during study period total 30 species of zooplankton population was recorded of which 5 sp of *Rotifera* 12 sp of *Cladocera* while *Calanoida* was represented by 8 sp, *Copepoda* by 2 sp and *Ostracoda* by 3 sp.

In Karishma park (LL/2) total 26 species of zooplankton population was recorded of which *Rotifera* contributed 6 sp,11 sp of *Cladocera* , *Calanoida* was represented by 4 sp, *Copepoda* by 3 sp and *Ostracoda* by 2 sp

In bhoipura station (LL/3) total 25 species of zooplankton population was recorded of which *Rotifera* contributed 5 sp, 8 sp of *Cladocera*, 7 sp of *Calanoida*, *Copepoda* by 2. sp and *Ostracoda* by 3 sp.

In Reference (LL/R) total 19 species of zooplankton population was recorded of which 4 sp of *Rotifera* ,6 sp of *Cladocera* ,while *Calanoida* contributed 5.sp, *Copepoda* 1.sp and *Ostracoda* 2 sp

Phytoplankton In Shahpura Lake Distribution of phytoplankton species at different sampling stations in Lower lake during study period is as follows-

In Manisha market inlet station (SL/1) station during study period total 72 species of phytoplankton population was recorded of which *Chlorophyceae* contributed 35, *Bacillariophyceae* contributed 19 sp while *Cyanophyceae* 10 sp, *Euglenophyceae* 5 sp and *Dinophyceae* 3 sp.

In PCB Station (SL/2) total 64 sp were recorded of which 31 sp *Chlorophyceae*, 15 sp *Bacillariophyceae*, 12 sp *Cyanophyceae*,4*Euglenophyceae* and 2species of *Dinophyceae*

In Kolar line station (SL/3) total 63 species of phytoplankton population was recorded in which *Chlorophyceae* contributed 36species, *Bacillariophyceae* contributed 12species while *Cyanophyceae* was represented by 9 species, *Euglenophyceae* by 4 sp and *Dinophyceae* by 2 species.

In Reference (SL/R) sample total species of phytoplankton population was recorded 36 of which *Chlorophyceae* contributed 15species, *Bacillariophyceae* contributed 11 species while *Cyanophyceae* was represented by 2 species, 5 *Euglenophyceae* and 3 species of *Dinophyceae*

Zooplankton In Shahpura Lake While Distribution of zooplankton species at different sampling stations in Lower Lake during study period is as follows-

In Manisha Market Inlet (SL/1) during study period total 33 species of zooplankton population was recorded of which 7 sp of *Rotifera* 10 sp of *Cladocera* while *Calanoida* was represented by 8 sp, *Copepoda* by 5 sp and *Ostracoda* by 3 sp.

In PCB station (SL/2 during study period total 32 species of zooplankton population was recorded of which 5 sp of *Rotifera* 11 sp of *Cladocera* while *Calanoida* was represented by 8 sp, *Copepoda* by 5 sp and *Ostracoda* by 3 sp.

In Kolar station (SL/3) during study period total 36 species of zooplankton population was recorded of which 6 sp of *Rotifera* 8 sp of *Cladocera* while *Calanoida* was represented by 6 sp, *Copepoda* by 4 sp and *Ostracoda* by 2 sp.

In Reference (SL/R) during study period total 20 species of zooplankton population was recorded of which 4 sp of *Rotifera* 7 sp of *Cladocera* while *Calanoida* was represented by 5 sp, *Copepoda* by 2 sp and *Ostracoda* by 2 sp.

The Cyanophyceae groups are characteristic of eutrophic environments which have high concentrations of nutrients. Consequently, these represented the second most dominant group in the phytoplanktonic community. The Bacillariophyceae also had an increase number of individuals since they adapt better to more stable environments during aeration. The Euglenophyta group was represented by few species which is very common in these environments. The mechanical aeration caused the dominance of the Chlorophyta with greater

species diversity. Misra *et. al.* (2001) reported 94 phytoplankton species of above mention group in Upper lake and 88 species in Lower lake.

A number of workers have reported many algal species as indicators of water quality (Naik et al., 2005; Nandan and Aher, 2005; Zargar and Ghosh, 2006). Zargar and Ghosh (2006) in a study on Kadra reserviour of Karnataka listed several algal forms belonging to Chlorophyceae, Cyanophyceae, Euglenophyceae and Bacillariophyceae as indicators of water pollution. The Lake is subjected to pollution due to addition of industrial effluents, fertilizers from agricultural lands and domestic sewage. Progressive enrichment of water with nutrients leads to mass production of algae, which in turn leads to the increased productivity and other undesirable biotic changes. Nandan and Aher (2005) has shown the algal genera, Euglena, *Oscillatoria, Scenedesmus, Navicula, Nitzschia* and *Microcystis* which are the species found in organically polluted waters. Palmer (1969) has shown that genera like *Schenedesmus, Oscillatoria, Microcystis, Navicula, Nitzschia* and *Euglena* are the species found in organically polluted waters supported by More (1997). Similar genera were recorded in the present investigation thereby showing that lake is organically polluted. The epilethic and epiphytic algae are excellent indicators of water pollution (Round, 1965). In the present study, occurrence of *Oscillatoria, Phormidium, Lyngbya* and *Ulothrix* as epilethic algae and certain diatoms like *Gomphonema, Cymbella* and *Navicula* as epiphytic were recorded. Thus, algal communities can be used as indicators of pollution for assessing the water quality of this lake of international importance. The algae like *Microcystis aeruginosa* was used as the best single indicator of pollution and it was associated with the highest degree of civic pollution (Nandan and Aher, 2005). In the present study, *Microcystis* was also recorded in the selected site. The occurrence of *Oscillatoria* in the present study indicates pollutants of biological origin which agreed with the observations of Gadag et al. (2005).

It is reported that excessive growth of certain algal genera, viz., *Scenedesmus, Anabaena, Oscillatoria* and *Melosira* indicate nutrient enrichment of aquatic bodies (Kumar, 1990; Zargar and Ghosh, 2006).The present study on Wular Lake also support the findings. Studies show that the dominant phytoplankton and their seasonality are highly variable in different water bodies according to their nutrient status, age, morphometry and other locational factors (Gopal and Zutshi, 1998). The study revealed that the water quality parameters such as temperature, pH, nitrate and phosphate play a very important role in altering the phytoplankton distribution. The human anthropogenic are the main cau-sative agents in the increase of the nutrients in this lake of international importance.

The phytoplankton density and diversity depend more to physical factors than chemical factors of water which influence their seasonality and distribution pattern in the water body in this physiographical environment. That is why certain phytoplanktons and their density are regulated by seasonal fluctuations of water temperature and apparently disappear in severe condition due to the fact that certain species either become too scarce or occur as spore, resting eggs, etc. whichare not easily detectable. [15-17] also reported that phytoplankton biodiversity is influenced by physico-chemical.

Quantitatively seasonal fluctuation of total phytoplankton and group density were recorded maximum during post - monsoon season and minimum during monsoon season dominated by Chlorophyceae. Similar observations were made by (Tiwari and Chauhan, 2006; Singh et al., 2010; Dubey and Boswal, 2009; Lokhande and Shembekar, 2009; Jayabhaye, 2010; Kotadiya

and Acharya, 2013; Kanagasabapathi and Rajan, 2010; Laskar and Gupta, 2009; Shiddamallayya and Pratima, 2011). Low temperature and low turbidity enhance the growth of green algae; maximum population of Chlorophyceae and Bacillariophyceae during winter may be due to high D.O. and nutrients as well as alkalinity (Tiwari and Chauhan, 2006). Chattopadhyay and Banerjee (2007) reported seasonal diversity is low during monsoon as lakes receive rainfall, resulting in enhanced concentrations of suspended solids, inorganic particles and dissolved organic matter, thereby adversely affecting seasonal abundance and phytoplanktons diversity. Species composition in phytoplankton did not show consistent dominance two lakes.

The data revealed that different species appear at different times of the year and their abundance varies greatly from one another in both lakes. Compositions of phytoplanktons are affected by different environmental factors such as pH, light, temperature and nutrients (Ganie, et al., 2010; Buzzi, 2002). The dominancy of Chlorophyceae in the similar physiographic region(Alwara lake) has also been reported by various workers Ashok Kumar Verma, Shri Prakash, Brijesh Kumar Mishra (20016). It showed maximum of Chlorophyceae (41%), followed byBacillariophyceae (37%), Cyanophyceae (19%) and lastly Euglenophyceae (3%).

In Upper Lower and Lower Lake distribution of zooplankton were largely regulated by variousfactors. In most lakes zooplankton are the central trophic link between primary producers and fish. Zooplankton is ubiquitous in all lakes and quickly and easily sampled in the field (Pani *et. al.*, 2000). Zooplankton species richness is reduced under chemical stresses (Barker & Christensen 1991) and abundant large Daphnia are associated with clear lakes with healthy sport fish populations (Mazumdar, 1994). Zooplankton composition and abundance of these lakes were observed variable with respect to time and location. Pani *et. al.*, (2000) recorded 29zooplankton species in Upper lake and 38 species in Lower lake. Verma (2007) studied the distribution of micro flora and fauna in Upper and Lower lakes (Bho jwetland). In the present study 26 euglenoids species were recorded. According to Hutchinson (1967) algal blooms of *Euglena* usually occur in organically polluted bodies of water. Based on this assumption, the present water body can be considered as organically polluted. This is in agreement with the observation made by Hutchinson (1967) who suggested that Euglenophyceae are widely distributed in open waters of lakes. The composition of zooplankton communities in the studied lakes was spatially and temporally determined according to macrophyte banks and to seasonal and environmental parameters of water. Temperature was the most important factor in determining the zooplankton community in both lakes. There was a high turnover of species between the lakes, which differ mainly by high richness and low density of individuals in the small lake overgrown by macrophytes, and lower richness and high density in the open lake. Rotifers predominated in two studied lakes upon cladocera and copepoda, both in richness and density. More studies on zooplankton communities need to be developed. This knowledge emphasizes biodiversity and straightens a necessity of conservation in aquatic ecosystems.

Biodiversity contributes both directly and indirectly to many constituents of human wellbeing, including security, basic material for a good life, health, good social relations, and freedom of choice and action. Over the last century, many people have benefited from the transformation of natural ecosystems and the exploitation of biodiversity, but the losses in biodiversity and changes in ecosystem services have adversely affected the well-being. The present study reveals that lakes are rich in micro as well as macro flora and fauna. The distribution of aquatic macrophytes in lakes explains that both lakes are rich in planktonic biodiversity. Similar observations were

recorded by (Sharma, 2010; Verma and Singh, 2010; Tiwari et al., 2001).Presence of Microcystis, Scenedesmus, Ankistrodesmus, are ceain spp. which are pollution tolerant species clearly indicates organic pollution (Hutchinson, 1967; Palmer, 1969; Tiwari and Shukla, 2007; Tiwari and Chauhan, 2006; Fathi et al., 2009; Sharma et al., 2008; Senthilkumar and Sivakumar, 2008; Zafer, 1968). Quantitatively seasonal fluctuation of total phytoplankton and group density were recorded maximum during post - monsoon season and minimum during monsoon season dominated by Chlorophyceae. Similar observations were made by (Tiwari and Chauhan, 2006; Singh et al., 2010; Dubey and Boswal, 2009; Lokhande and Shembekar, 2009; Jayabhaye, 2010; Kotadiya and Acharya, 2013; Kanagasabapathi and Rajan, 2010; Laskar and Gupta, 2009; Shiddamallayya and Pratima, 2011). Low temperature and low turbidity enhance the growth of green algae; maximum population of Chlorophyceae and Bacillariophyceae during winter may be due to high D.O. and nutrients as well as alkalinity (Tiwari and Chauhan, 2006). Chattopadhyay and Banerjee (2007) reported seasonal diversity is low during monsoon as lakes receive rainfall, resulting in enhanced concentrations of suspended solids, inorganic particles and dissolved organic matter, thereby adversely affecting seasonal abundance and phytoplanktons diversity. Species composition in phytoplankton did not show consistent dominance in two lakes.

The data revealed that different species appear at different times of the year and their abundance varies greatly from one another in two lakes. Compositions of phytoplanktons are affected by different environmental factors such as pH, light, temperature and nutrients (Ganie, et al., 2010; Buzzi, 2002).In a water ecosystem, phytoplanktons are free floating unicellular, microscopic and colonialautotrophic organisms. The movement of phytoplanktons is more or less influenced by watercurrents Millman MC et.all (2005). They play a key role in maintaining equilibrium between abiotic and biotic components of aquatic ecosystem Pandey et all (2004). These phytoplanktons directly provide fabricating material for constructing the nests by the birds inhabiting there and indirectly provide food for them. Vasantha Naik et all (2012) studied the phytoplankton diversity of lentic water bodies. Prakash S et all (2015) studied seasonally variations in phytoplankton density and Prakash S and Verma 2016 performed the limnological studies in Alwara lake (Wetland).

Table 1: Description of number of phytoplankton species collected from all the three lakes (Qualitative Analysis)

S.No	PHYTOPLANKTON		UPPER LAKE				LOWER LAKE				SHAHPURA LAKE			
	CLASS	Species	UL/1	UL/2	UL/3	UL/R	LL/1	LL/2	LL/3	LL/R	SL/1	SL/2	SL/3	SL/R
1	Chlorophyceae	Ankistrodesmus falcatus	-	-	-	+	+	-	-	+	-	+	-	+
		Ankistrodesmus hantzchii	+	+	+	-	-	+	+	-	+	-	-	-
		Ankistrodesmus sp	+	+	-	+	-	+	-	+	+	+	-	+
		Botryococcus brauni	-	+	-	-	+	+	+	-	-	-	+	+
		Characium limneticum	+	+	+	+	+	+	-	+	+	+	-	-
		Chlorella sp	+	-	-	-	-	-	+	-	+	-	-	+
		Chlorococcum humicola	-	-	+	+	+	-	+	+	-	+	-	-
		Closteriopsis sp	+	-	+	-	-	-	-	-	+	-	-	+
		Closterium longissima	+	-	-	+	+	-	+	+	+	+	-	+
		Closterium sp	-	-	-	-	-	-	-	-	-	-	+	-
		Coelastrum cambrium	+	+	+	+	-	+	+	+	+	+	-	+
		Coelastrum microporum	+	-	+	-	+	-	-	-	+	-	-	-
		Coelastrum reticulatum	+	-	-	+	+	-	+	+	+	+	-	+
		Cruciginia crucifera	-	+	-	+	+	+	-	-	-	-	+	-
		Elkalothrix viridis	+	+	-	-	-	+	+	+	+	-	-	+
		Elkatothrix sp	+	+	+	+	+	+	-	-	+	+	+	-
		Euastrum bidentatum	-	-	-	-	-		+	-	-	-	-	+
		Euastrum denticulatum	+	+	+	+	+	+	-	-	+	-	-	-
		Eudorina elegans	-	+	-	+	+	+	+	-	-	-	-	+
		Oecystis sp	+	+	+	-	-	+	-	-	+	-	+	+
		Oedogonium sp	+	+	-	+	+	+	+	-	+	+	-	+
		Oocystis naegali	-	-	-	-	-	-	-	-	-	+	-	+
		Oscillatoria sp	+	+		+	-	+	-	+	+	+	-	-
		Pediastrum duplex	+	+	+	+	+	+	-	-	+	+	-	+
		Pediastrum duplex perforates	+	-	-	+	-	-	-	+	-	-	-	-
		Pediastrum duplex reticulata	+	+	-	-	+	+	+	-	+	+	+	+
		Pediastrum	+	+	+	+	-	+	-	-	+	+	-	+

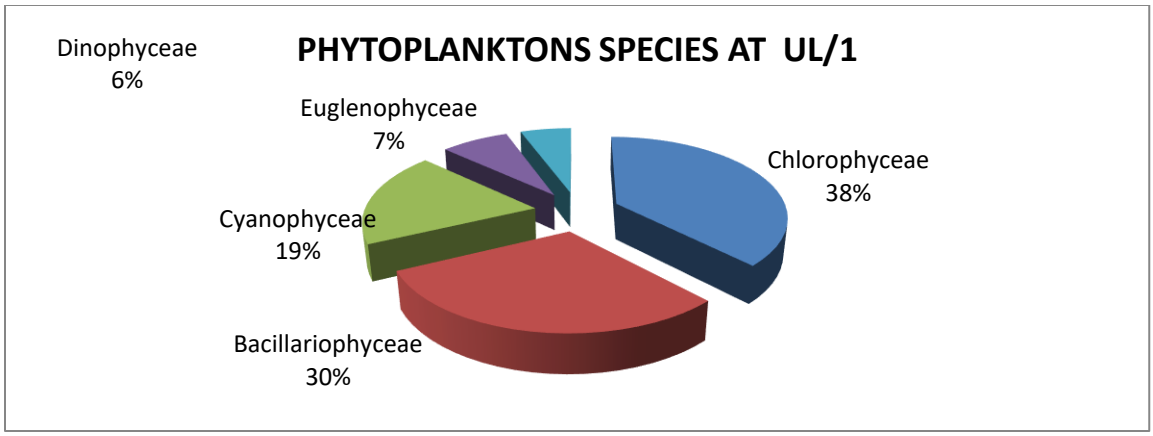
		simplex												
		Pediastrum tetras	+	+	-	-	+	+	-	-	+	-	-	+
		Pediastrum tetras tetradon	-	-	-	+	-	-	-	-	-	+	-	+
		Pleodorina sp	+	-	-	+	+	-	+	-	+	-	+	-
		Schroederia sp	-	+	-	+	+		-	+	-	-	-	+
		Schroederis sp	+	+	-	+	+	+	-	+	+	-	-	-
		Spirogyra sp	+	+	-	-	-	+	-	-	+	-	+	+
		Ulothrix sp	-	-	-	+	+	-	-	+	-	-	-	-
		Volvox sp	+	-	-	-	-	-	+	-	+	-	-	+
2	Bacillariophyceae	Amphora sp	+	+	-	+	-	-	+	+	-	-	+	-
		Anomoeomus sp	-	-	-	+	+	+	+	+	-	-	-	-
		Asteronella sp	-	-	+	+	-	-	+	+	+	-	-	+
		Bacillaria paradoxa	-	-	+	+	+	+	+	+	-	-	+	-
		Cyclotella sp	+	-	-	-	+	+	-	-	+	+	+	+
		Cymbella sp	+	+	-	+	-	-	-	+	-	-	-	-
		Denticulla sp	+	-	-	+	-	+	-	+	+	-	+	-
		Epithemia sp	+	-	-	-	+	-	-	-	+	-	-	+
		Epithemia turgida	-	-	-	+	-	-	-	+	+	-	+	+
		Fragillaria sp	+	+	+	+	+	-	+	+	-	+	+	+
		Frustula sp	+	-	-	+	-	-	-	+	+	-	-	+
		Gomphonrma sp	+	-	+	-	-	-	-	-	-	-	-	-
		Hanzchia sp	+	-	-	-	-	-	+	-	+	-	+	+
		Melosira granulata	+	+	+	+	+	+	+	-	+	+	+	+
		Melosira sp	+	+	+	+	+	+	+	+	+	-	-	-
		Melosira varians	+	+	-	-	-	-	-	-	-	-	-	+
		Navicula sp	+	-	-	+	-	-	+	+	+	-	+	+
		Nitzchia sp	+	-	-	-	+	+	+	+	+	+	-	+
		Pinnularia sp	+	-	-	+	+	-	+	+	+	-	-	-
		Rhopalodia sp	+	-	-	-	-	-	+	+	-	-	-	-
		Tabellaria sp	+	-	-	+	+	+	-	+	+	+	-	-
3	Cyanophyceae	Anabaena sp	+	-	-	+	-	-	+	-	+	-	+	+
		Anabaena spiroides	+	-	+	-	+	+	+	+	-	-	-	+
		Glotrichia sp	-	+	-	+	-	+	-	-	-	+	+	-
		Lyngbya majuscula	+	+	+	+	+	-	+	+	+	-	-	-
		Merismopedia sp	+	-	-	-	-	+	+	-	-	-	+	-
		Microcystis aeruginosa	+	+	+	+	-	+	+	+	+	+	+	-
		Microcystis flosaquae	+	+	-	-	+	+	-	-	+	-	-	-
		Microcystis pseudofilamentosa	+	-	+	+	-	-	-	+	+	+	+	+
		Oscillatoria curviceps	+	-	+	-	+	-	-	-	-	+	+	-

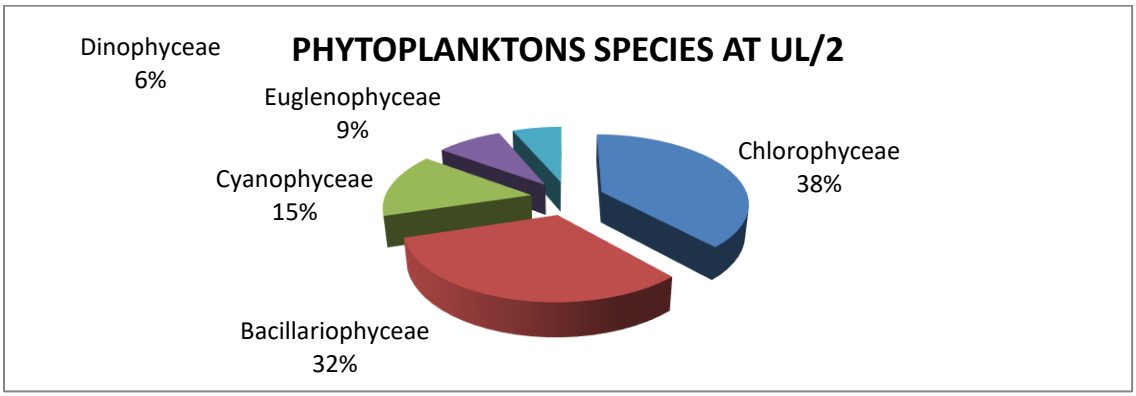
		Oscillatoria tenius	+	+	+	-	-	-	+	+	+	-	-	-
		Phormidium sp	-	-	+	-	+	+	+	-	+	-	+	+
		Rivalaria aquatica	-	+	-	+	-	-	-	+	-	-	-	-
		Spirulina major	-	+	+	+	+	+	-	-	+	+	+	-
		Spirulina sp	+	-	+	+	-	+	-	+	+	-	-	+
4	Euglenophyceae	Euglena acus	+	+	-	-	+	+	+	-	+	+	+	+
		Euglena oxyuris	+	-	+	+	+	-	-	-	+	-	+	+
		Phacus meson	+	+	+	+	-	-	-	-	+	+	+	+
		Phacus sp	+	-	+	-	+	+	-	-	+	-	+	+
		Trachelomonus sp	-	+	+	+	-	-	-	-	+	+	-	+
5	Dinophyceae	Peridinium sp I	+	-	-	+	-	-	-	-	+	-	-	+
		Peridinium sp II	+	-	-	+	+	-	-	-	+	+	+	+
		Glenodium sp.	+	-	-	+	+	-	-	-	+	+	+	+

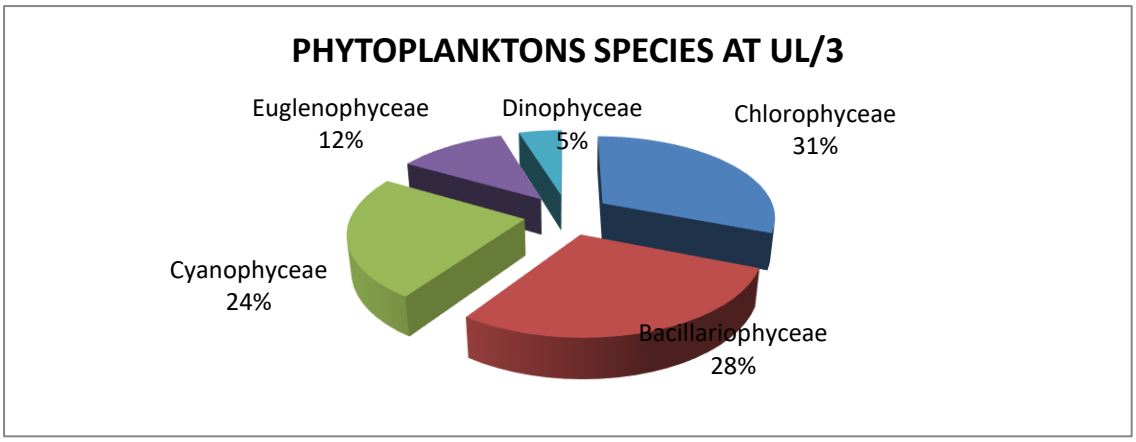
Table 2: Description of number of Phytoplankton species collected in three the lakes (Quantitative Analysis)) in μg/ml

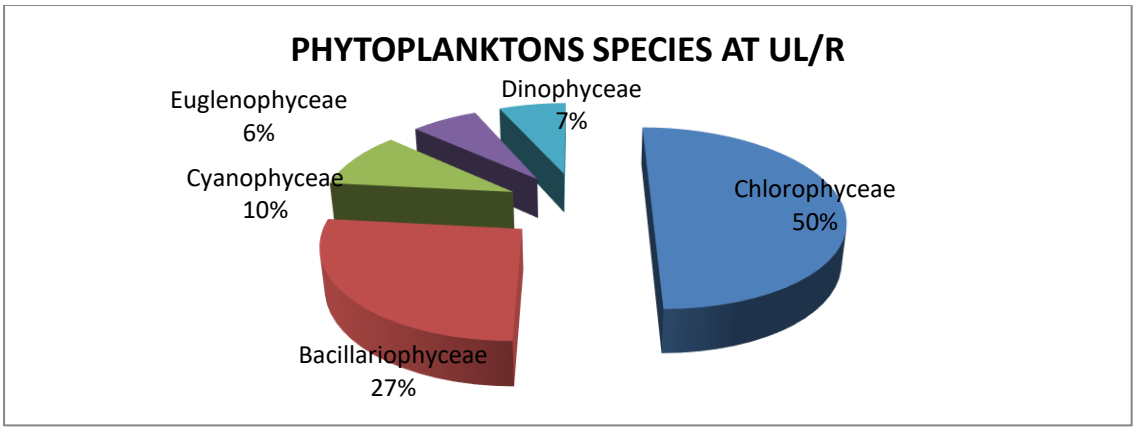
S.No	PHYTOPLANKTON	UPPER LAKE				LOWER LAKE				SHAHPURA LAKE			
	CLASS	UL/1	UL/2	UL/3	UL/R	LL/1	LL/2	LL/3	LL/R	SL/1	SL/2	SL/3	SL/R
1	Chlorophyceae	20	18	13	15	23	27	16	4	35	31	36	15
2	Bacillariophyceae	16	15	12	8	14	17	17	12	19	15	12	11
3	Cyanophyceae	10	7	10	3	9	4	7	9	10	12	9	2
4	Euglenophyceae	4	4	5	2	3	4	2		5	4	4	5
5	Dinophyceae	3	3	2	2	2	2	1		3	2	2	3
	Total sp.	53	47	42	30	51	54	37	25	72	64	63	36

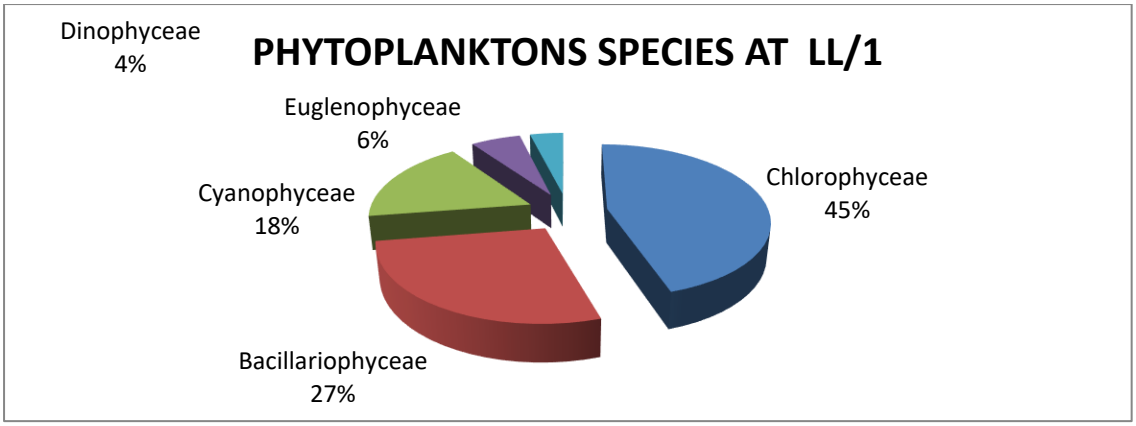
5. Graphs Of Variations In Phytoplankton Species At Various Sample Stations

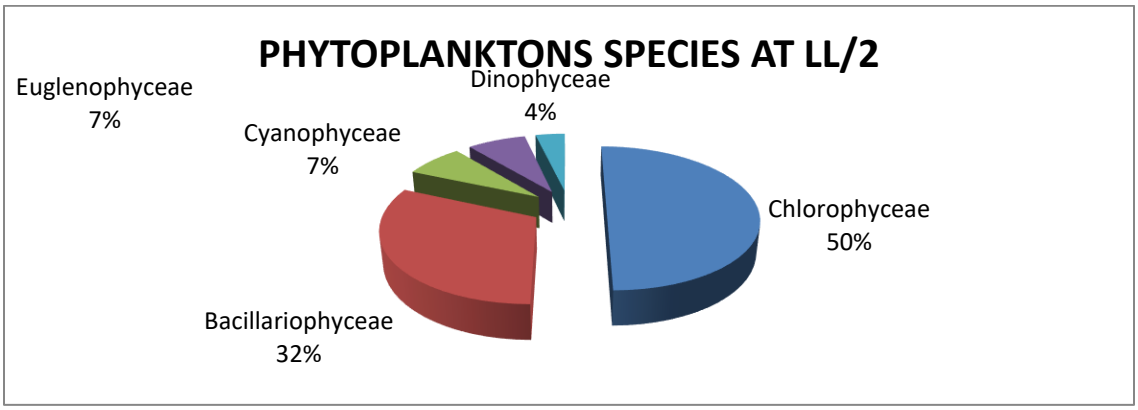

PHYTOPLANKTONS SPECIES AT UL/1
Dinophyceae 6%
Euglenophyceae 7%
Chlorophyceae 38%
Cyanophyceae 19%
Bacillariophyceae 30%

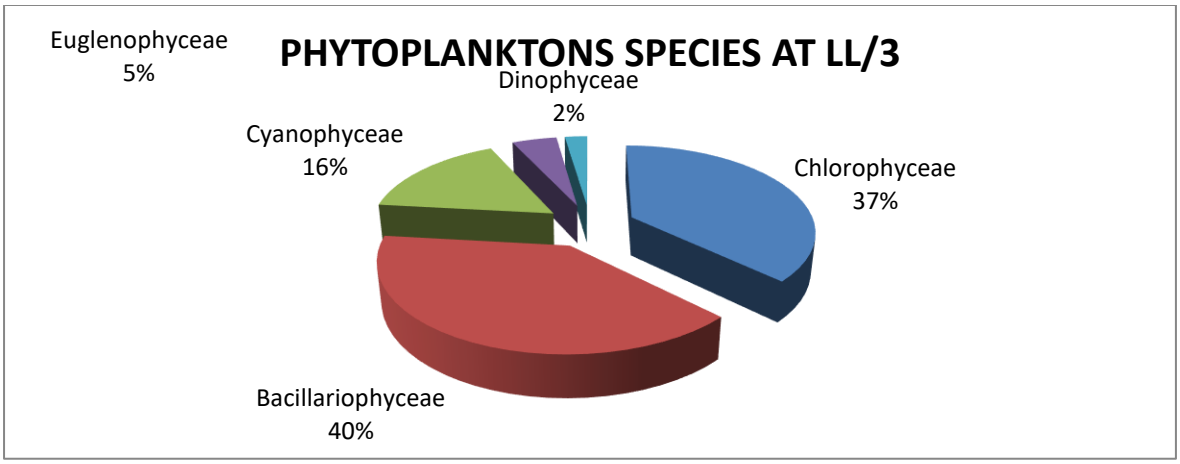

PHYTOPLANKTONS SPECIES AT UL/2
Dinophyceae 6%
Euglenophyceae 9%
Chlorophyceae 38%
Cyanophyceae 15%
Bacillariophyceae 32%

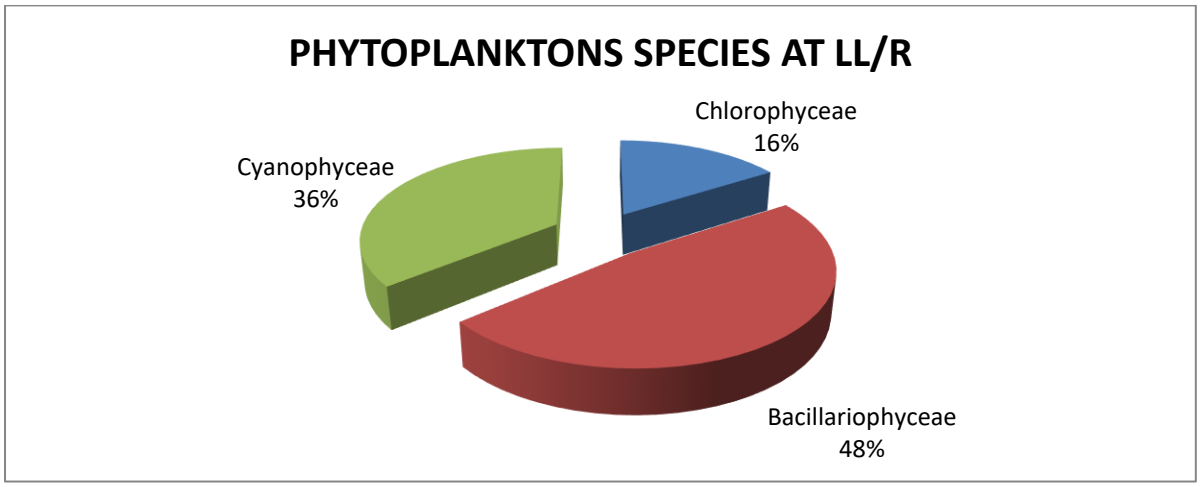

PHYTOPLANKTONS SPECIES AT UL/3
Euglenophyceae 12%
Dinophyceae 5%
Chlorophyceae 31%
Cyanophyceae 24%
Bacillariophyceae 28%

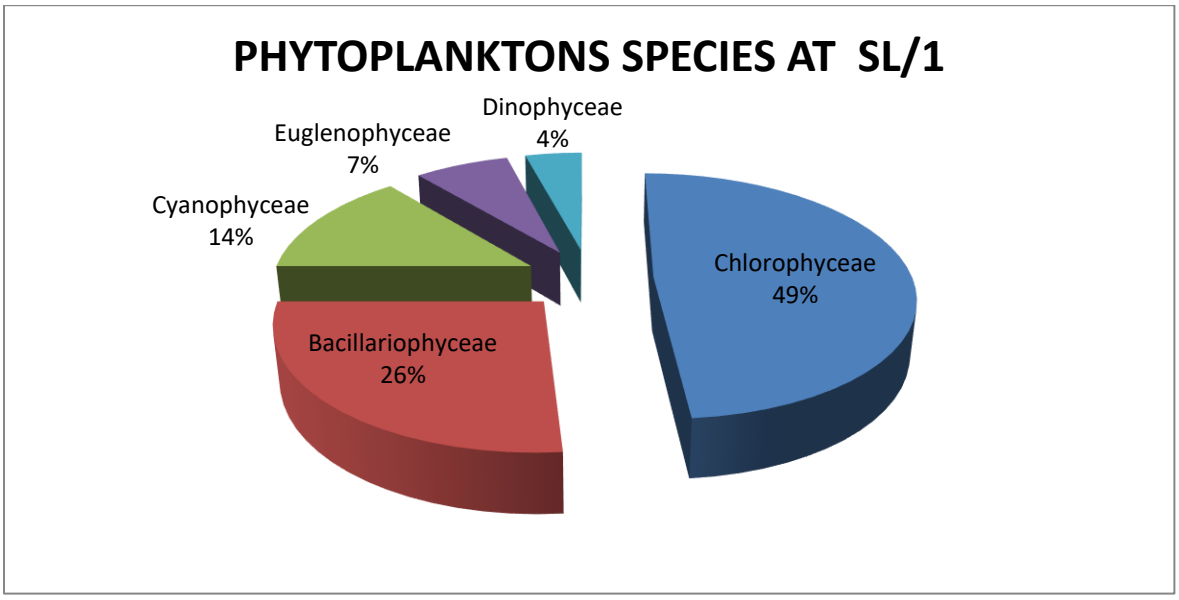

PHYTOPLANKTONS SPECIES AT UL/R
Euglenophyceae
6%
Dinophyceae
7%
Cyanophyceae
10%
Chlorophyceae
50%
Bacillariophyceae
27%

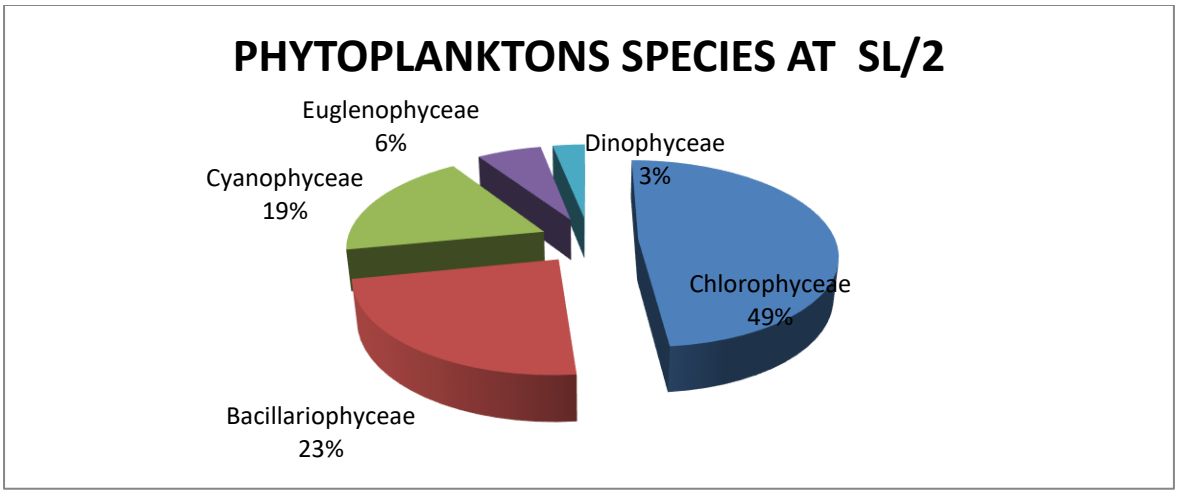

Dinophyceae
4%
PHYTOPLANKTONS SPECIES AT LL/1
Euglenophyceae
6%
Cyanophyceae
18%
Chlorophyceae
45%
Bacillariophyceae
27%

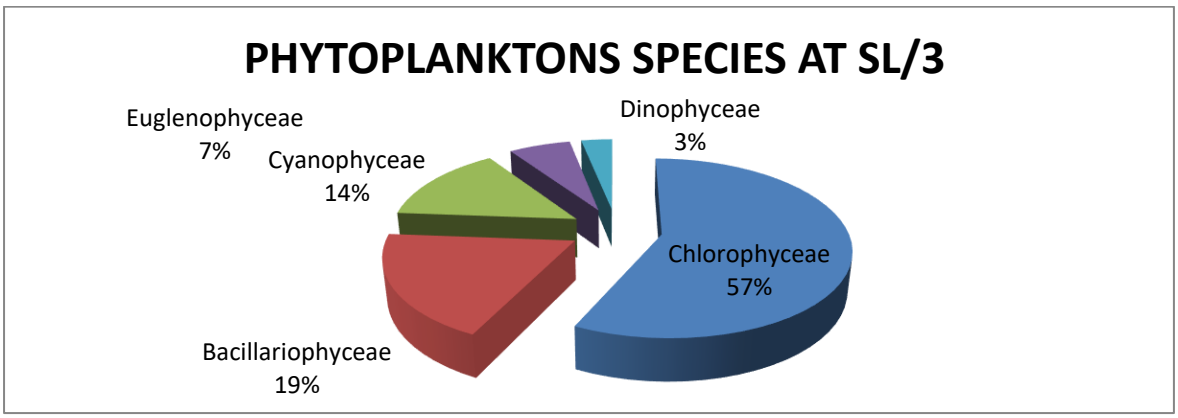

PHYTOPLANKTONS SPECIES AT LL/2
Euglenophyceae
7%
Dinophyceae
4%
Cyanophyceae
7%
Chlorophyceae
50%
Bacillariophyceae
32%


PHYTOPLANKTONS SPECIES AT LL/3
Euglenophyceae
5%
Dinophyceae
2%
Cyanophyceae
16%
Chlorophyceae
37%
Bacillariophyceae
40%


PHYTOPLANKTONS SPECIES AT LL/R
Chlorophyceae
16%
Cyanophyceae
36%
Bacillariophyceae
48%


PHYTOPLANKTONS SPECIES AT SL/1
Dinophyceae
4%
Euglenophyceae
7%
Cyanophyceae
14%
Chlorophyceae
49%
Bacillariophyceae
26%


PHYTOPLANKTONS SPECIES AT SL/2
Euglenophyceae 6%
Dinophyceae 3%
Cyanophyceae 19%
Chlorophyceae 49%
Bacillariophyceae 23%


PHYTOPLANKTONS SPECIES AT SL/3
Euglenophyceae 7%
Dinophyceae 3%
Cyanophyceae 14%
Chlorophyceae 57%
Bacillariophyceae 19%

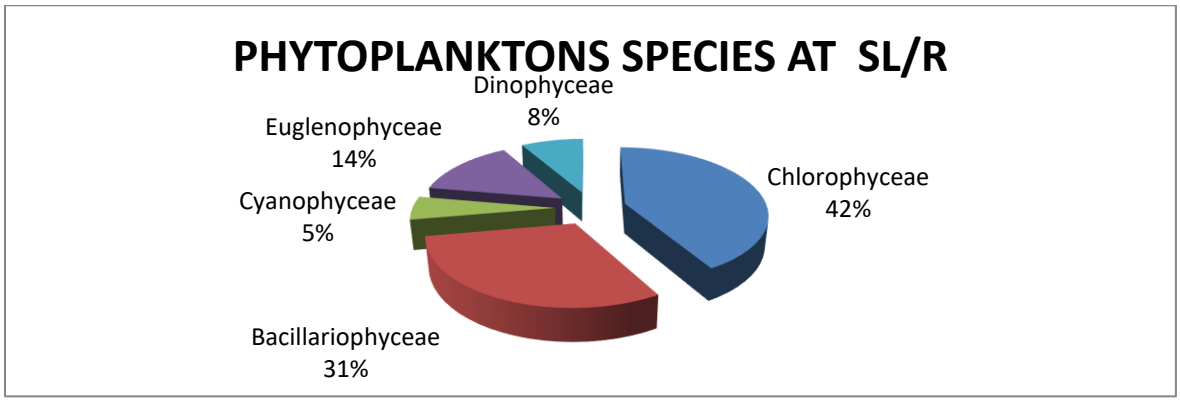

PHYTOPLANKTONS SPECIES AT SL/R
Dinophyceae 8%
Euglenophyceae 14%
Chlorophyceae 42%
Cyanophyceae 5%
Bacillariophyceae 31%

Table 3: Description of number of Zooplankton species collected from all the three lakes (Qualitative Analysis)

S.No	ZOOPLANKTON		UPPER LAKE				LOWER LAKE				SHAHPURA LAKE			
	CLASS	Species	UL/1	UL/2	UL/3	UL/R	LL/1	LL/2	LL/3	LL/R	SL/1	SL/2	SL/3	SL/R
1	Protoza	Arcella vulgaris	+	+	+	+	+	-	+	+	+	+	-	+
		Arcella discoides	+	+	-	-	-	-	-	+	+	+	-	-
		Centropyxis aculeata	-	+	+	+	+	+	+	+	+	+	-	+
		Ciliates sp.	+	+	+	-	+	+	+	+	+	+	+	-
		Centrophyxis species	+	+	+	-	+	+	-	+	+	-	+	+
		Difflugia sp.	-	-	+	+	-	+	+	+	+	-	-	+
		Euglypha sp.	-	-	+	-	+	+	-	+	+	+	-	+
		Paramecium sp.	+	+	+	-	-	+	+	+	+	-	-	-
2	Rotifera	Asplanchopus sp.	-	-	-	+	-	+	-	+	+	-	+	+
		Brachionus calyciflorus	+	+	+	-	+	+	+	-	+	-	-	-
		Brachionus falcatus	+	+	+	-	-	+	-	+	+	+	+	+
		Brachionus caudatus	+	+	+	-	+	+	+	-	-	+	-	+
		Brachionus patalus	-	+	+	-	-	-	+	+	+	+	+	+
		Brachionus bidentata	-	-	+	+	+	+	+	+	-	+	-	-
		Filina sp.	+	+	-	-	+	-	+	+	+	+	+	+
		Filina longistata	-	-	-	+	+	+	-	-	-	-	-	-
		Keratella tropica	+	+	-	+	+	+	+	+	+	+	-	+
		Keratella cruzi	-	+	-	-	+	-	-	+	+	-	+	+
		Keratella cochlearis	+	-	-	+	-	+	+	+	+	+	+	+
		Lecane sp.	+	+	-	-	+	+	-	-	+	-	+	-

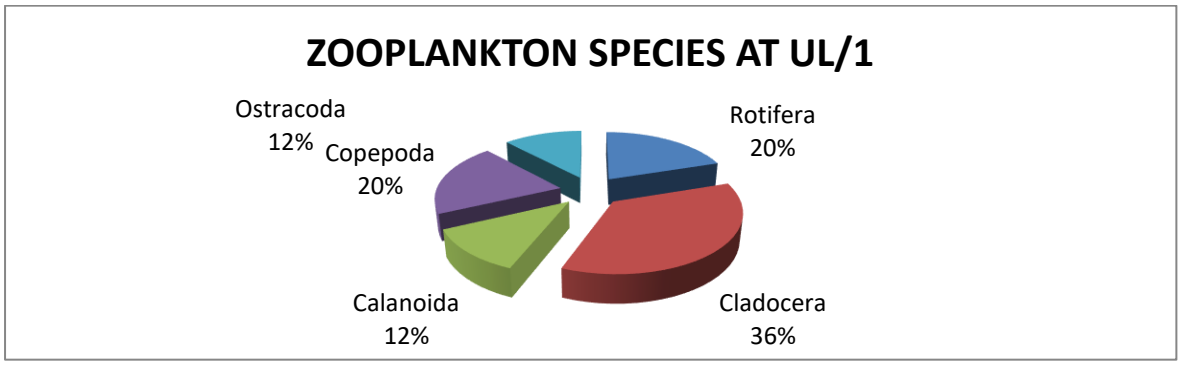
		Lepadella.sp.	-	+	-	+	+	-	+	+	+	+	-	+
3	Cladocera	Alona sp.	+	-	+	+	+	-	+	+	+	-	-	+
		Bosmina sp.	-	+	+	-	+	+	+	-	+	+	+	+
		Ceriodaphnia sp.	-	+	+	+	+	-	-	+	+	+	-	+
		Chydorus sp.	-	-	+	-	+	-	+	+	+	-	+	+
		Daphnia sp.	-	+	+	+	+	+	+	-	+	-	-	-
		Ceriodaphnia sp.	-	-	-	-	+	-	+	+	+	+	-	+
		Moinodaphnia sp.	+	+	+	-	+	+	+	+	-	+	+	+
		Macrothrix sp.	-	+	-	-	-	-	-	-	+	+	-	+
		Moina sp.	+	+	+	-	-	+	+	+	+	+	-	+
4	Copepoda	Cyclops sp.I	+	-	+	-	+	+	-	-	+	+	-	+
		Cyclops sp.II	+	+	+	-	-	+	-	-	+	-	+	-
		Cyclops viridis	+	+	+	-	+	+	-	+	+	+	+	-
		Eucyclops sp.	+	+	+	+		-	+	-	+	+	+	-
		Mesocyclops sp.	+	+	-	+	-	-	+	-	+	+	+	-
5	Ostracoda	Centrocypris sp.	+	+	-	+	+	+	+	-	-	-	+	-
		Cypris sp.	+	+	+	-	+	-	+	+	+	+	+	+
		Stenocypris sp.	+	+	+	-	-	+	+	+	+	+	-	+

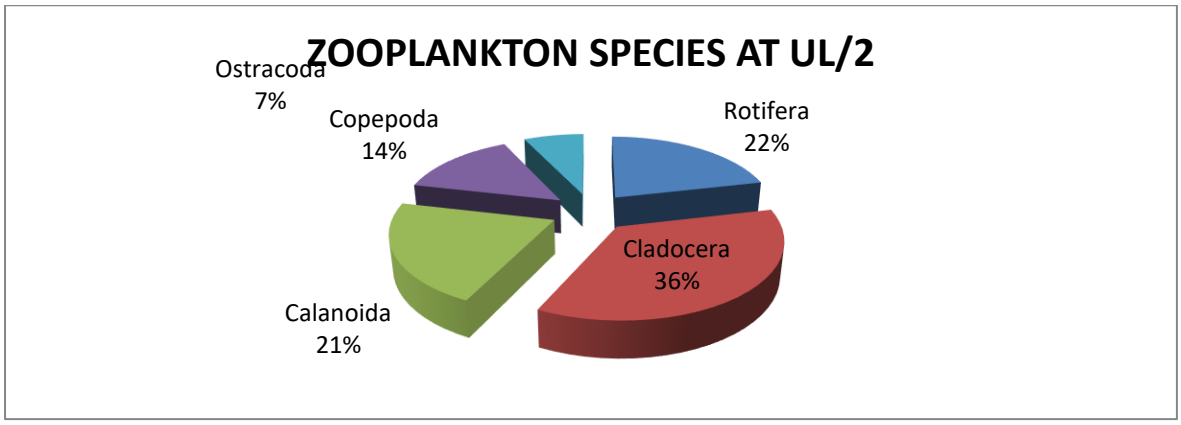
Table 4: Description of number of Zooplankton species collected in three the lakes (Quantitative Analysis)) in µg/ml

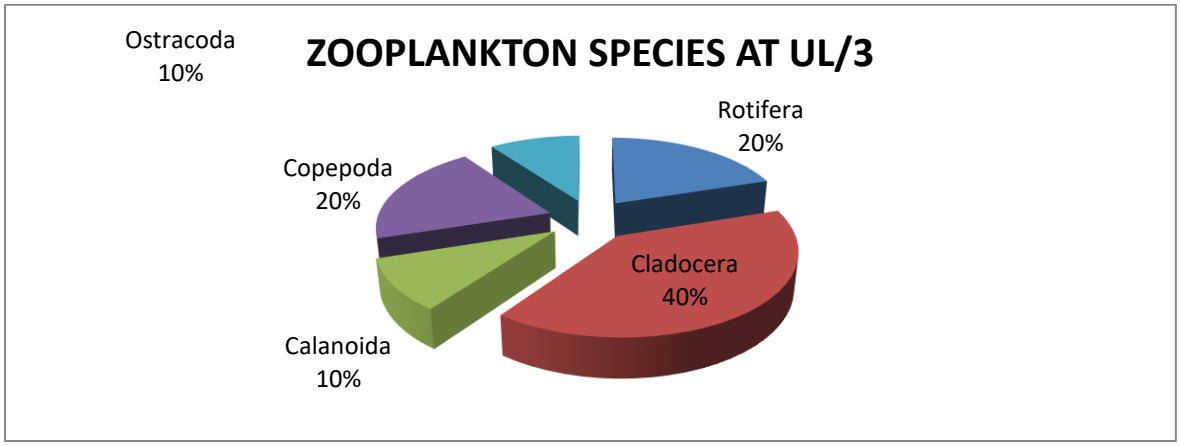
S.No	ZOOPLANKTON	UPPER LAKE				LOWER LAKE				SHAHPURA LAKE			
	CLASS	UL/1	UL/2	UL/3	UL/R	LL/1	LL/2	LL/3	LL/R	SL/1	SL/2	SL/3	SL/R
1	Rotifera	5	6	4	3	5	6	5	4	7	5	6	4
2	Cladocera	9	10	8	6	12	11	8	6	10	11	8	7

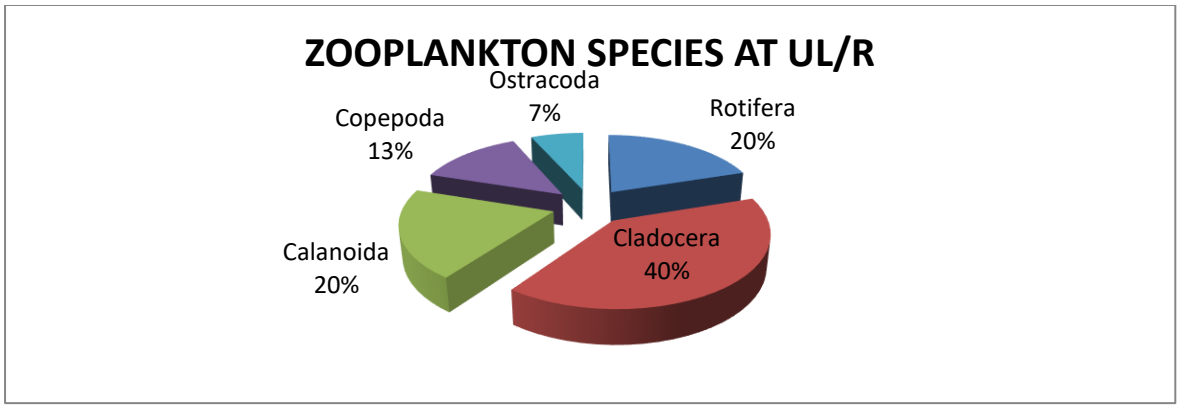
3	Calanoida	3	6	2	3	8	4	7	5	8	8	6	5
4	Copepoda	5	4	4	2	2	3	2	1	5	5	4	2
5	Ostracoda	3	2	2	1	3	2	3	2	3	3	2	2
	Total sp.	25	28	20	15	30	26	25	19	33	32	36	20

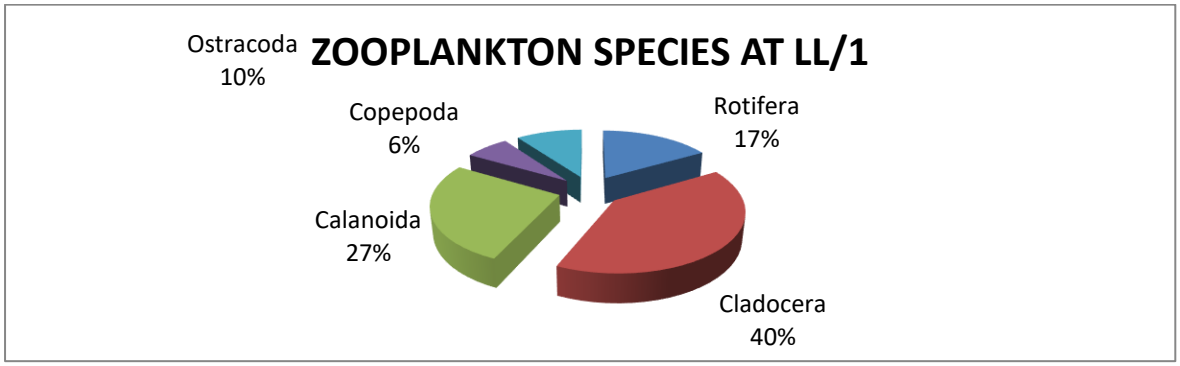
6. Graphs of Variations in Zooplankton Species at various sample stations

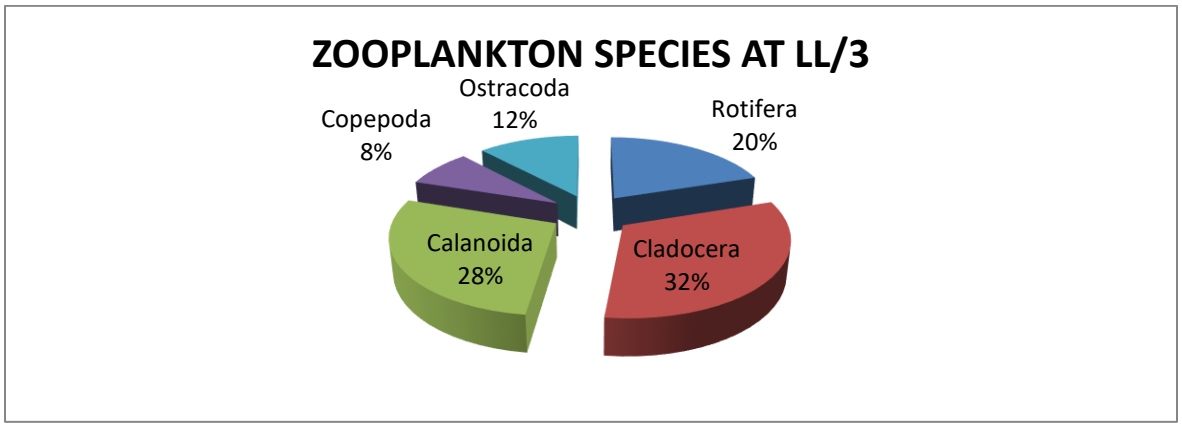


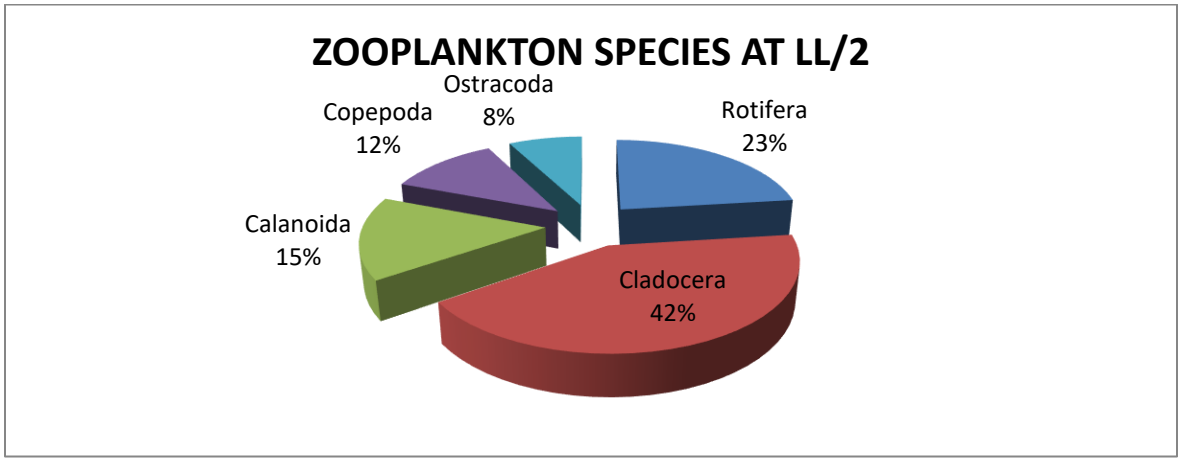


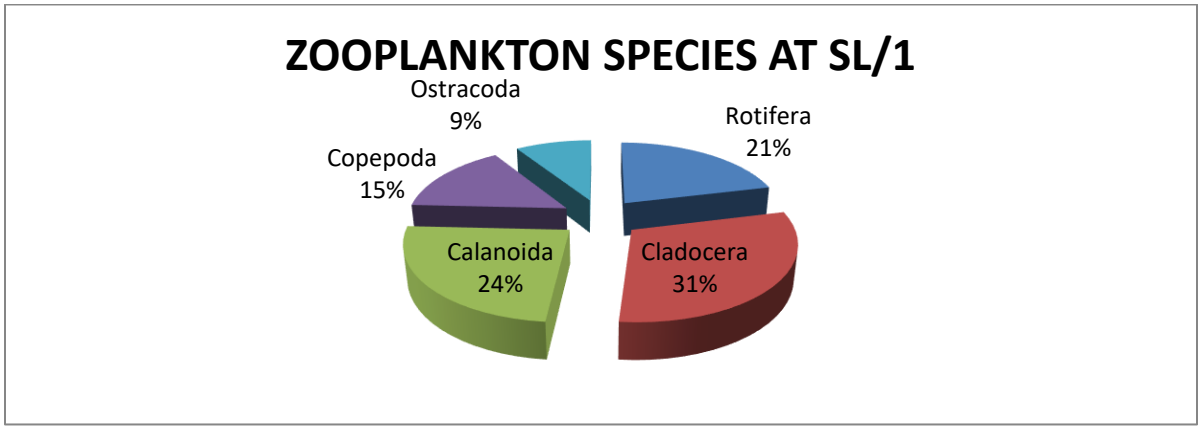


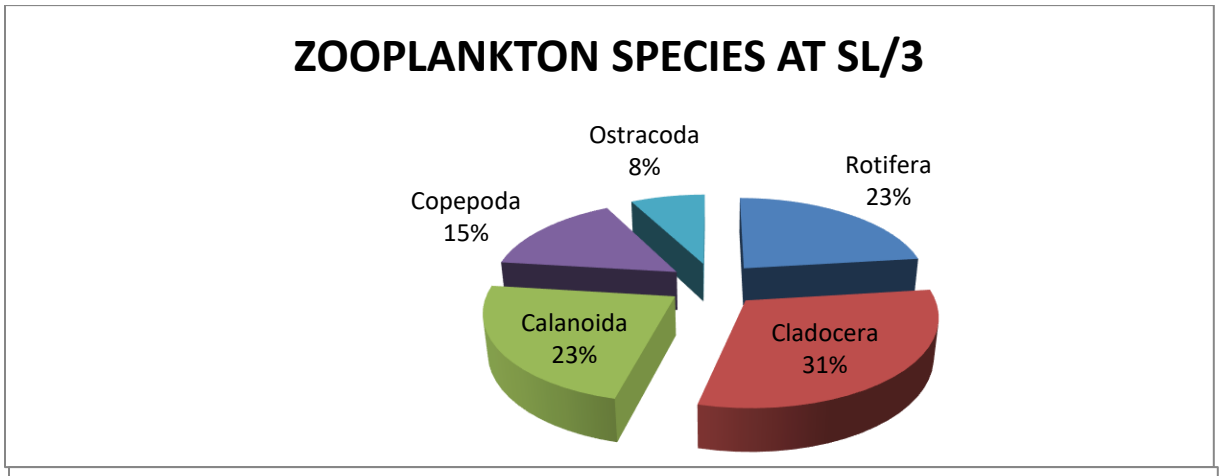

ZOOPLANKTON SPECIES AT UL/R
Ostracoda 7%
Copepoda 13%
Rotifera 20%
Calanoida 20%
Cladocera 40%

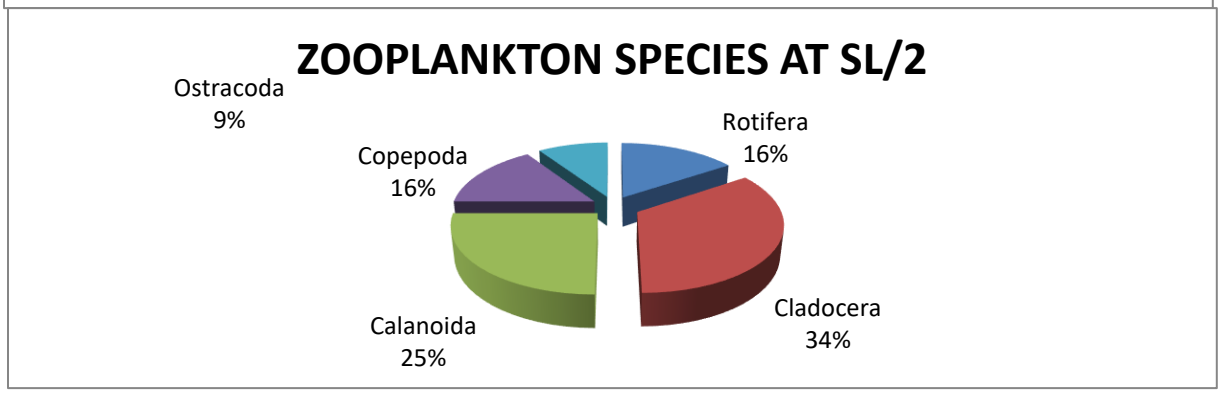

ZOOPLANKTON SPECIES AT LL/1
Ostracoda 10%
Copepoda 6%
Rotifera 17%
Calanoida 27%
Cladocera 40%

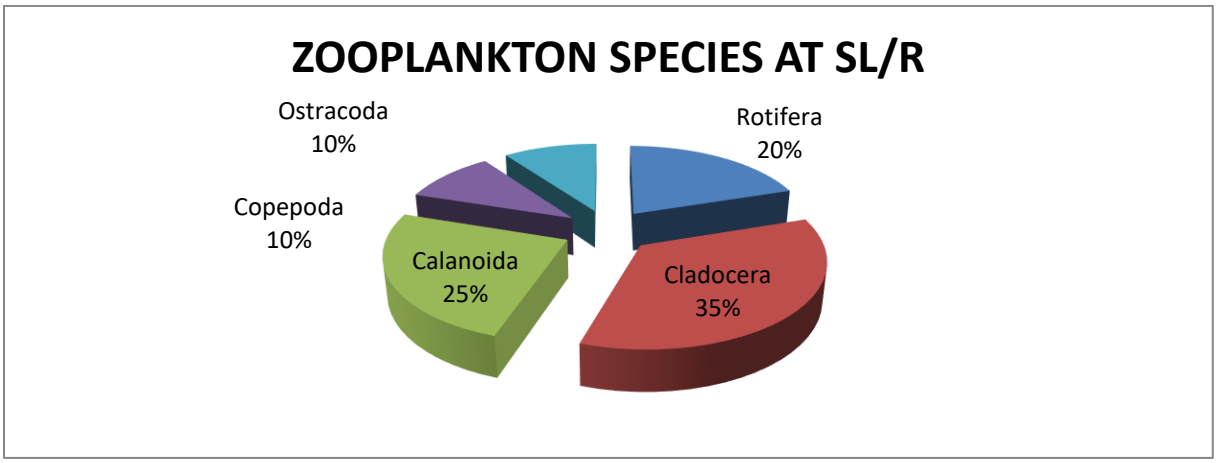

ZOOPLANKTON SPECIES AT LL/3
Ostracoda 12%
Copepoda 8%
Rotifera 20%
Calanoida 28%
Cladocera 32%

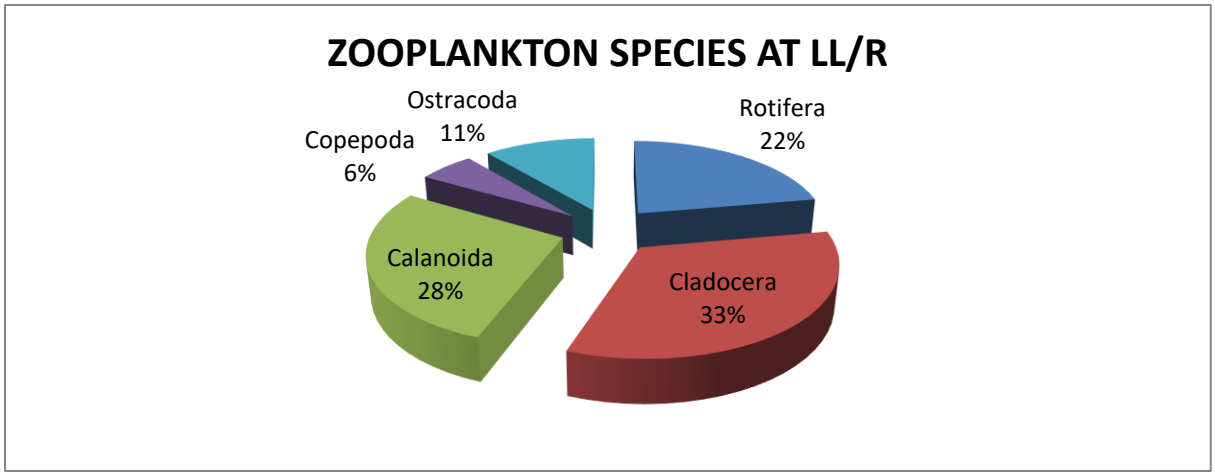

ZOOPLANKTON SPECIES AT LL/2
Ostracoda 8%
Copepoda 12%
Rotifera 23%
Calanoida 15%
Cladocera 42%


ZOOPLANKTON SPECIES AT SL/1
Ostracoda
9%
Rotifera
21%
Copepoda
15%
Calanoida
24%
Cladocera
31%


ZOOPLANKTON SPECIES AT SL/3
Ostracoda
8%
Rotifera
23%
Copepoda
15%
Calanoida
23%
Cladocera
31%


ZOOPLANKTON SPECIES AT SL/2
Ostracoda
9%
Rotifera
16%
Copepoda
16%
Calanoida
25%
Cladocera
34%


ZOOPLANKTON SPECIES AT SL/R
Ostracoda 10%
Rotifera 20%
Copepoda 10%
Calanoida 25%
Cladocera 35%


ZOOPLANKTON SPECIES AT LL/R
Ostracoda 11%
Rotifera 22%
Copepoda 6%
Calanoida 28%
Cladocera 33%

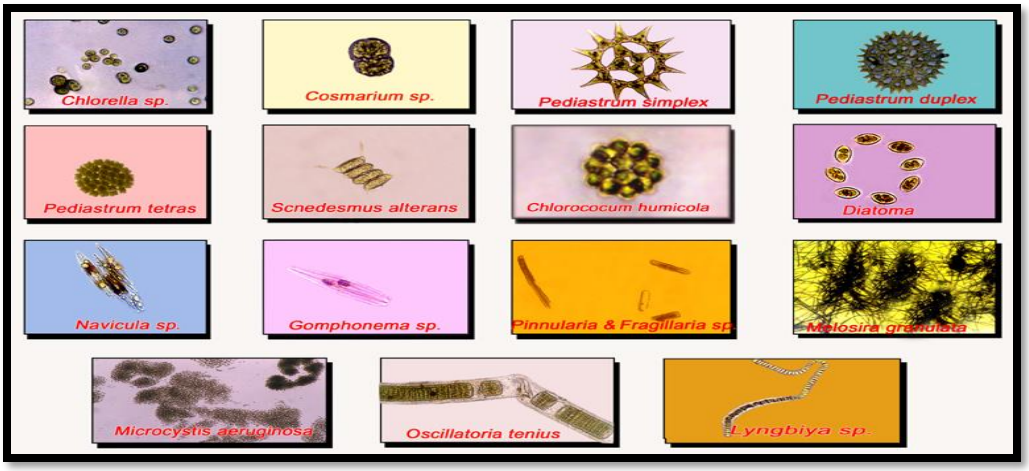


Figure 2: Species Of Phytoplankton's Collected From Upper Lake And Lower Lake samples

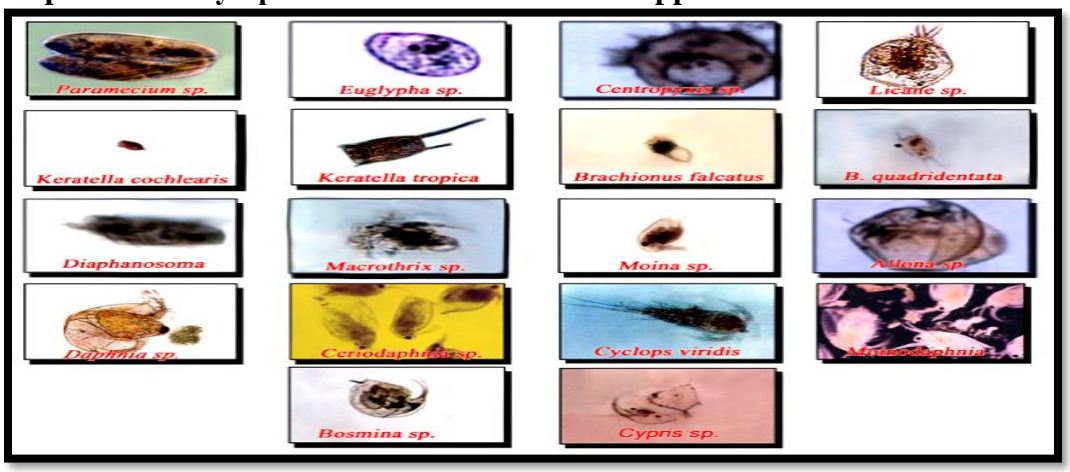


Figure 3: Species of Zooplakton Collected From Upper Lake and Lower Lake Samples

7. Discussion

Phytoplankton is the base of most lake food webs and fish production is linked to phytoplankton primary production (Ryder *et. al.*, 1974). Phytoplankton assemblages respond rapidly to changes in their environment with concomitant changes in overall abundance, growth rates and species composition, changes in physical and chemical water quality can thus have a rapidly changed species composition (Charles & Smol, 1994; Dixit *et. al.*, 1992). In most the lakes Zooplankton are the central trophic link between primary producers and fish. Zooplankton are ubiquitous in all lakes and are quickly and easily sampled in the field (Bajpai *et. al.*, 2001). Many zooplankton species found in north temperate lakes that are cosmopolitan or wide ranging in their distribution (Hutchinson, 1967). Zooplankton species richness in reduced under chemical stresses (Baker & Christensen, 1991). Lakes and reservoirs deteriorate through excessive addition of plant nutrients, organic matter and silt, which combines to produce increased algae and rooted plant biomass, reduced water clarity, and usually decreased water volumes (Harper, 1992). Nutrient pollution especially with phosphorus but also with nitrogen coming from urban runoff and sanitary sewer systems can lead to the eutrophication of the receiving water bodies (Stevens, 2003). The most common, obvious and persistent water quality problem is that of the so-called eutrophication (Mason, 1991; Salas & Martino, 1990). The excessive loading of phosphorus and nitrogen results in high algal biomass, dominance by aquatic bacteria and loss of macrophytes (Jana & Das, 1995). During the decomposition of water blooms, deoxygenation of waters is observed which can affect the ability of aquatic animals to survive. In this condition water bodies lose much of their attractiveness for recreation, and their usefulness and safety as industrial and domestic water supplies. As a consequence water eutrophication can bring about economic losses in the form of decreased property values, high cost treatments of raw drinking water, illness, depressed recreation industries, expenditures for management and restoration, and ultimately the need to build new reservoirs.

The Cyanophyceae groups are characteristic ofeutrophic environments which have high concentrations of nutrients. Consequently, theserepresented the second most dominant group in the phytoplanktonic community. The Bacillariophyceae also had an increase number ofindividuals since they adapt better to more stable environments during aeration. The Euglenophyta group was represented by few species which is very common in these environments. The mechanical aeration caused the dominance of the Chlorophyta with greater species diversity. Misra *et. al.* (2001) reported 94 phytoplankton species of above mention group in Upper lake and 88 species in Lower lake.

Ganai et al. (2010) recorded a hierarchy of Bacillariophyceae > Chlorophyceae > Cyanophyceae > Euglenophyceae while Hosmani and Mruthunjaya (2012) reported a hierarchy of Cyanophyceae >Bacillariophyceae > Euglenophyceae > Chlorophyceae > Dinophyceae in various water bodies of India. Thus it is clear that each water body has its own composition of algal population. Nevertheless, as mentioned by Wetzel (1983) the outstanding feature of phytoplankton communities is the coexistence of a number of algal species. The present investigation also suggests that each algal group appeared to choose a particular period to show increased counts. With regard to the variation in thephytoplankton population, Hutchinson (1967) suggested that they oscillate temporarily in abundance dominating for a period and then become extremely rare while Tilman (1982) reported that temperature, salinity and nutrient concentration play an important role influencing phytoplanktonic community andChellappa et al.

(2009) recorded that phytoplankton growth and development are mainly steered by available solar energy input, hydrodynamic forces such as stratification and mixing in the resulting levels of nitrogen and phosphorus.

8. Conclusion

In general, among the various groups of phytoplanktons, in terms of class count, Chlorophyceae appeared to dominate followed by Bacillariophyceae,Cyanophyceae , Euglenophyceae and Dinophyceae.

The percentage composition of each group of Phytoplankton in Upper lake sample is as follows-
In UL/1 Medical college sample was as follows: Chlorophyceae(38.1%), Bacillariophyceae (30.1%), Cyanophyceae (19%), Euglenophyceae (8%) and Dinophycae (6%).
In UL/2 khanugaon sample was as follows: Chlorophyceae (38.1%), Bacillariophyceae (32.1%), Cyanophyceae (15%), Euglenophyceae (9%) and Dinophycae (6%).
In UL/3 Kamla park sample was as follows: Chlorophyceae (31%), Bacillariophyceae (28%), Cyanophyceae (24%), Euglenophyceae (12%) and Dinophycae (5%).
In UL/R was as follows: Chlorophyceae (50%), Bacillariophyceae (27%), Cyanophyceae (10%), Euglenophyceae (7%) and Dinophycae (7%).

The percentage composition of each group of Phytoplankton in lower lake samples were as follows-
In LL/1 khatlapura sample was as follows: Chlorophyceae (45%), Bacillariophyceae (27%), Cyanophyceae (18%), Euglenophyceae (6%) and Dinophycae (4%).
In LL/2 karishma park sample was as follows: Chlorophyceae (50%), Bacillariophyceae (31%), Cyanophyceae (7%), Euglenophyceae (7%) and Dinophycae (4%).
In LL/3 bhoipura sample was as follows: Chlorophyceae (37%), Bacillariophyceae (40%), Cyanophyceae (16%), Euglenophyceae (5%) and Dinophycae (2%).
In LL/R was as follows: Bacillariophyceae (48%), Cyanophyceae (36%), and Dinophycae (16%).

The percentage composition of of Phytoplankton in Shahpura lake samples were as follows-
In Manisha market inlet station (SL/1) Chlorophyceae (49%), Bacillariophyceae (26%), Cyanophyceae (14%), Euglenophyceae (7%) and Dinophycae (4%)
.In PCB Station (SL/2) Chlorophyceae (49%), Bacillariophyceae (23%), Cyanophyceae (19%), Euglenophyceae (6%) and Dinophycae (3%).
In Kolar line station (SL/3) Chlorophyceae (57%), Bacillariophyceae (19%), Cyanophyceae (14%), Euglenophyceae (7%) and Dinophycae (3%).
In Reference (SL/R) Chlorophyceae (42%), Bacillariophyceae (31%), Cyanophyceae (5%), Euglenophyceae (14%) and Dinophycae (8%).
.
Among the various groups of Zooplanktons, in terms of class count, Cladocera appeared to dominate followed by Rotifera, Copepoda , Calanoida and Ostracoda,
The percentage composition of each group of Zooplankton inUpper Lake samples-
In UL/1 Medical college sample Cladocera(36%), Rotifera (21%), Copepoda (20%), Calanoida (12%) and Ostracoda (20%)

.In UL/2 khanugaon sample was Cladocera (36%), Rotifera (21%), Copepoda (14%), Calanoida (21%) and Ostracoda (7%)
In UL/3 Kamla park sample was Cladocera (40%), Rotifera (20%), Copepoda (20%), Calanoida (10%) and Ostracoda (10%)
In UL/R was Cladocera (40%), Rotifera (20%), Copepoda (20%), Calanoida (10%) and Ostracoda (7%)

The percentage composition of each group of Zooplankton in lower lake samples were as follows-
In LL/1 khatlapura sample was Cladocera (40%), Rotifera (17%), Copepoda (7%), Calanoida (27%) and Ostracoda (10%)
In LL/2 karishma park sample was Cladocera (42%), Rotifera (23%), Copepoda (12%), Calanoida (15%) and Ostracoda (8%)
In LL/3 bhoipura sample was Cladocera (32%), Rotifera (20%), Copepoda (8%), Calanoida (28%) and Ostracoda (12%)
In LL/R was Cladocera (33%), Rotifera (22%), Copepoda (6%), Calanoida (28%) and Ostracoda (11%)

The percentage composition of each group of Zooplankton in Shahpura lake samples were as follows-
In Manisha Market Inlet (SL/1) khatlapura sample Cladocera (31%), Rotifera (21%), Copepoda (15%), Calanoida (24%) and Ostracoda (9%)
In PCB station (SL/2) khatlapura sample was Cladocera (34%), Rotifera (16%), Copepoda (16%), Calanoida (25%) and Ostracoda (9%)
In kolar station (SL/3) khatlapura sample was Cladocera (31%), Rotifera (23%), Copepoda (15%), Calanoida (31%) and Ostracoda (8%)
In Reference (SL/R) khatlapura sample was Cladocera (35%), Rotifera (20%), Copepoda (10%), Calanoida (25%) and Ostracoda (10%)

Genera of phytoplanktons representing four taxonomic groups *viz*. Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae were recorded. Relative approximate abundance of these four groups in further study showed maximum of Chlorophyceae, followed by Bacillariophyceae then Cyanophyceae and lastly Euglenophyceae. The dominancy of chlorophyceae members is due to the fact that they can adapt to any type of water environment due to their photosynthetic pigments. In both lakes Presence of Microcystis, , *Oscillatoria,etc* are certain sp which are pollution tolerant species clearly indicates organic pollution. Rotifers predominated in two studied lakes upon cladocera and copepoda, both in richness and density. The most important step to prevent degradation of lake ecosystems is to maintain its biological integrity and health. The present study reveals that Upper and Lower lakes are rich in micro as well as macro flora and fauna. The distribution of aquatic macrophytes in Bhoj Wetland explains that both lakes are rich in planktonic biodiversity. This knowledge emphasizes biodiversity and straightens a necessity of conservation in aquatic ecosystems.

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