ZOOPLANKTON, PHYTOPLANKTONS, AVIFAUNA AND ICHTHYOFAUNA DIVERSITY IN GADCHIROLI LAKE, MAHARASHTRA, INDIA.

Dr.Musilek* and Dr.Julie**

*IHLR&SS, Department of Zoology, Anand Niketan College, Anandwan, Warora.
**Shri Govindrao Munghate Arts and Science College, Kurkheda.
Corresponding Author: bansodsd@gmail.com

ABSTRACT:

The research deals with the zooplanktons species in Gadchiroli lake. Gadchiroli is located in Maharashtra state situated in western part of India. It has longitude 80-81 degrees east region and latitude 19-21 degree in north. And near about 76% area of the district has been covered by forest region. The study has been carried out during the period of January 2021 to December 2021. The Gadchiroli lake is (N- 20° 11‟ 12.0” and N-20° 11‟ 3.6”; E- 79° 59‟ 46.2” and E- 80° 00‟ 5.9”). In present research paper we are focus towards the understanding of planktons diversity, ecology and their importance as fish food they are act as bioindicator of water quality and assess the trophic status of water body. in the present research paper 23 species of phytoplanktons belongs to 4 different families were observe .21 species of zooplanktons belonging to 6 families and 4 different orders were observed .32 species of birds belonging to 24 families and 11 different orders are noted while fish diversity shows 16 different types of species belonging to 9 families and 6 orders where observed in Gadchiroli Lake .

Key words: Gadchiroli Lake, Zooplanktons, Rotifers, Copepods, Cladocera, Ostracoda and Protozoa, phytoplanktons, avifauna and icthyofauna

INTRODUCTION:

Life in water bodies such as lakes and ponds are directly depending upon the physical and chemical nature of water .Zooplanktons are act as connecting link between phytoplankton and fishes. Zooplanktons are also act as food for small fish they are also act as alternative producer in aquatic environment or water growing species Chavhan R.N. (2015). Zooplanktons are strongly affected by environmental condition hence they are also act as Indicator of water quality. They are also given very quick response to changing atmosphere. hence the qualitative study of zooplanktons plays an important role in hydrobiological studies, Surajit Majumder, Rudra Prasad Dhua, Sumantha Kar (2015)

Zooplanktons play an important role in water purification and serves as bio-indicators of water quality, Gannon and Tenberger, (1978), Gajbhiye and Desai (1981). Abundance of zooplanktons depends on the availability of bacteria, planktons and phytoplanktons as food. Zooplankton dynamics in lakes are generally considered to be predictable and Zooplanktons are plying important role in biomonitoring of water pollution zooplankton community fluctuates according to physico-chemicals parameters of environments and abundance and composition of zooplanktons depends upon the characteristics of water bodies driven biologically, Sommer *et al.* (1986), whereas zooplankton dynamics in rivers are largely assumed to be driven by physical processes dictated by hydrological variables, Lair (2006).

The present research paper deals with the study of zooplanktons, Phytoplanktons, birds and fishes diversity across the season. The present study carried out in year of Jan 2022 Dec 2022.

ZOOPLANKTON

Individual zooplankton are usually microscopic but some are larger in size and visible with the naked eye's Plankton consisting of small animals and the immature stage of larger animals is called as zooplankton Zooplankton feeds on bacterioplankton, phytoplankton other zooplankton, detritus and even nektonic organism is a heterotrophic group it is also called as primary consumer components of planktonic society. Phytoplankton, birds, and fish are integral components of lake ecosystems, and their diversity is crucial for maintaining ecological balance and overall lake health.

PHYTOPLANKTON:

These are the primary producers in aquatic ecosystems, converting sunlight into energy through photosynthesis. They form the base of the food web, supporting fish and other aquatic organisms. The community structure of phytoplanktons and distribution can be primarily regulated occurrence and abundance of zooplanktons biomass. the sequence of being eaten and eaten facilitated organic exporter and energy transfer to higher order food chain which shows predator and prey relation of phytoplankton and zooplanktons. Massive variety of carnivorous fishes and fish larvae are depend upon zooplankton density and distribution to serve as food. Phytoplankton diversity and abundance are key indicators of water quality and. Nutrient levels in a lake. Excessive growth of phytoplanktons, often due to pollution, can lead to harmful algal blooms, which negatively affect lake health

AVIFAUNA:

Lakes provide critical habitats for birds, offering food, nesting sites, and resting areas during migration. Gadchiroli Lake carried out at regular interval of three main seasons of the year. The present study was based on the identification of residential birds. Birds are classified under the categories of wetland, earthly and lentic ecosystem avian species. Different 32 species of the birds where observed in Gadchiroli lake. Photographs were identified with the help of standard keys and method. Common names, family sequences and IUCN status were done with the help of bird life international bird diversity reflects the health of the ecosystem, as birds depend on fish, insects, and aquatic vegetation for sustenance. Declining bird populations may indicate disruptions in the lake's food web or habitat degradation.

ICHTHYOFAUNA:

Fish play a pivotal role in maintaining the ecological balance of lakes. They control populations of zooplankton and insects while serving as prey for birds and larger predators.

Fish diversity is a direct measure of the lake's biological health and its ability to support complex food webs.

The interconnection among these groups ensures a dynamic and balanced ecosystem. Healthy phytoplankton populations support robust fish communities, which in turn sustain diverse bird populations. A decline in any of these groups can disrupt the ecosystem, reducing biodiversity and impairing the lake's ecological functions. Protecting the diversity of phytoplankton, birds, and fish is essential for preserving lake health and the ecosystem services it provides.

STUDY AREA:

Gadchiroli Lake (20.188325 N79.997576 E) it is present in the Gadchiroli district headquarter located in main fish market and local market. Increased population, enhance the anthropogenic activity in the lake. The lake is surrounded by large quantity of plastic and other garbage like nirmalya and Idol immersion. Fishing takes place very often.

S1= Gadchiroli lake, Gadchiroli

MATERIALS AND METHODS:

Water samples are collected from already decided sites of each lake. Water bottles of five liter each were used to collect the water sample from the lake. To study dynamics of the zooplankton water sample, Zooplankton and phytoplankton sample are collected with the help of plankton net. Plankton was preserved in 4% formalin and they were observed and identified under the microscope.

Detailed taxonomical identification was carried out by using standard keys from Pennak (1978); Sharma (1988); Sehegal (1988); Edmondson (1959); Dhanapati (2000).Water was filtered (50 Litre) from zooplankton (plankton Net No.120nm). The birds were observed and recorded at various locations research area. Sightings of different bird species were carried out thrice a week during all the months of the year to encounter maximum number of birds in the area. Studies were made twice a day during morning hours (05:15 to 10:00 Am)

and late afternoons (4:15 to 6:30 Pm). Moreover, occasional sightings were also carried out every day at the main spots during the morning and evening hours. The identification of birds and their occurrence were noted using a 10×50 binocular Photographs were taken with appropriate zoom lens of Nikon Digital camera. Fish samples are collected with the help of fisherman and further observation and identification was carried out by using key of Talwar and Jhingaran (1991) DAY (1994) and Jayram (1999)

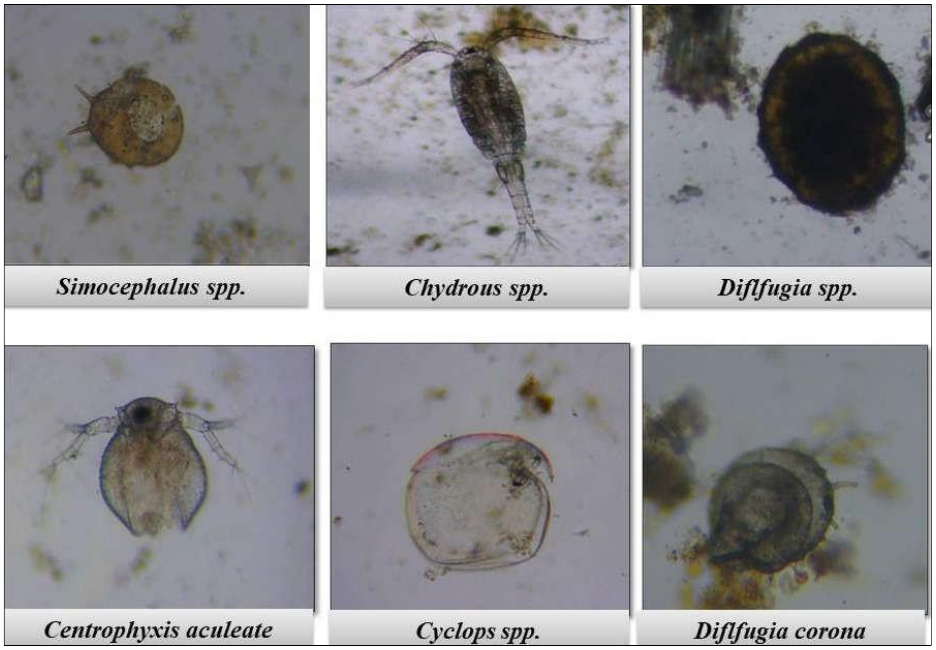

Fig-1 species diversity of zooplanktons in Gadchiroli lake.

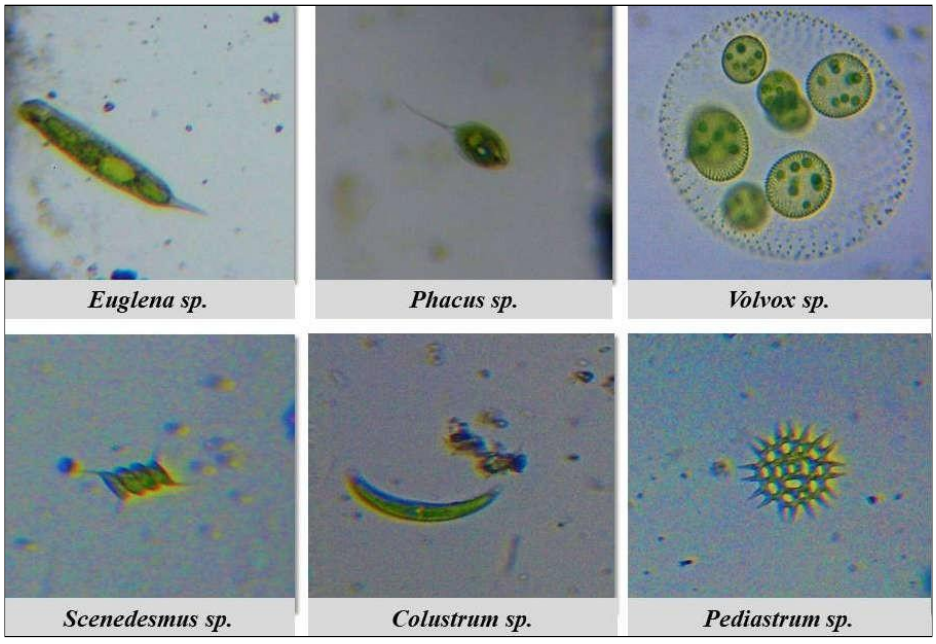

Fig-2 Species diversity of phytoplanktons in Gadchiroli lake

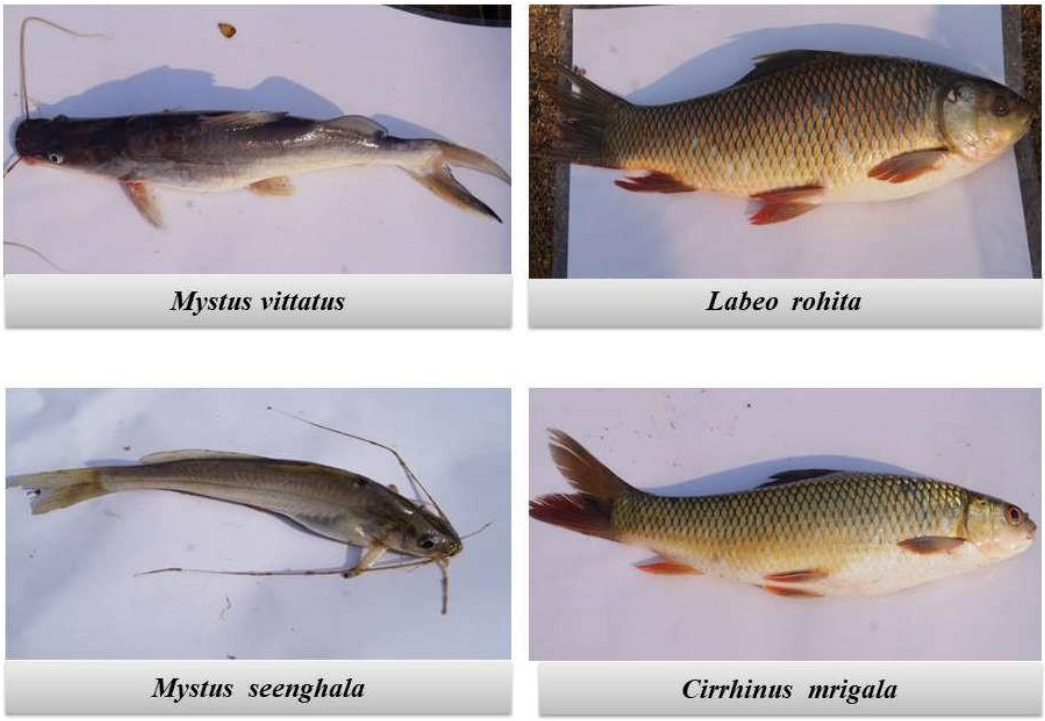

Fig-3 Ichthyofaunal species diversity in Gadchiroli lake

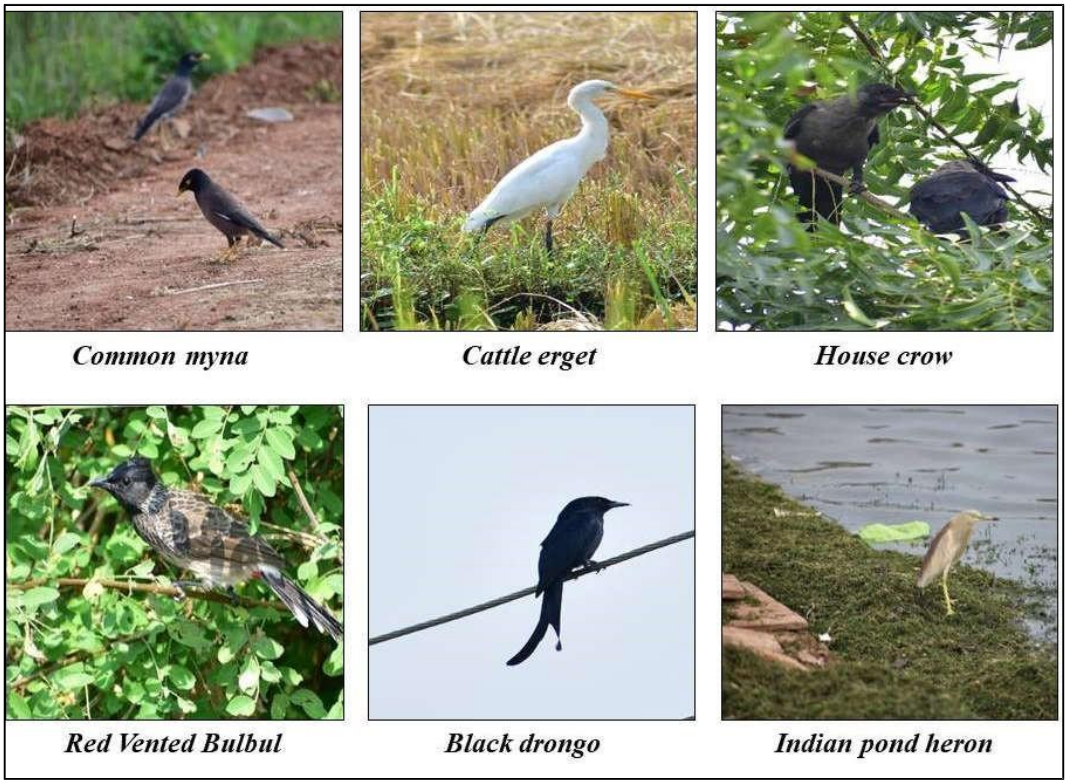

Fig-4 Species diversity of avifauna.

Table-1: Species of zooplanktons observed

Sr. No.	Zooplankton group	Family	Name of species	Summer	Monsoon	Winter
1	Rotifer	Brachionidae	*Brachionus falcatus*	+	+	+
2			*Brachionus caudatus*	+	+	+
3			*Brachionus angularis*	+	+	+
4			*Brachionus calyciflorus*	+	+	+
5			*Brachionus diversicomis*	+	+	+
6			*Brachionus forficula*	+	+	+
7			*Keratella crassa*	+	+	+
8			*Keratella tropica*	+	+	+
9			*Keratella vulga*	+	+	+
10			*Keratella cochleris*	+	+	+
11	Cladocera	Moinidae	*Moina brachiata*	+	+	+
12			*Moina micrura*	+	+	+
13		Sididae	*Diaphanosoma sarsi*	+	+	+
14		Chydoridae	*Bosmina longirostris*	+	+	+
15			*Chydrous sphaericus*	+	+	+
16	Copepod	Diaptomidae	*Nauplius*	+	+	+
17			*Thermocyclopes*	+	+	+
18			*Mesocyclopes*	+	+	+
19			*Undinula valgaris*	+	+	+
20	Ostracoda	Cyprididae	*Stenocypris*	+	+	+
21			*Heterocypris*	+	+	+

Table-2: Species of phytoplanktons observed in Gadchiroli lake.

Family	Name of species	Summer	Winter	Monsoon
Bacillariophyceae	*Navicular sp.*	+	+	+
	Diatom sp.	+	+	+
	Tabellaria sp.	+	+	-
	Pinnularia sp.	+	+	+
	Gyrosigma sp.	+	-	+
Cyanophyaceae	*Nostoc sp.*	+	+	+
	Anabaena sp.	+	+	+
	Spirulina sp.	+	+	-
	Oscillatoria sp.	+	+	-
	Microcystis sp.	+	+	+
Chloriphyceae	*Volvox sp.*	+	+	+
	Chlorella sp.	+	+	-
	Chlymadomonas sp.	+	+	-
	Closterium sp.	+	-	+
	Chloroccum sp.	+	+	-
	Oedogonium sp.	+	+	+
	Pediastrum sp.	+	+	+
Ulotrichaceae	*Zygonema sp.*	+	+	-
	Ulothrix sp.	+	+	+
	Spirogyra sp.	+	+	-
	Scenedesmus sp.	+	+	-
	Phacus sp.	+	-	+
	Euglena sp.	+	+	+

Table-3: Species of avifauna observed in and around Gadchiroli lake.

SR. NO.	ORDER	FAMILY	COMMON NAME
1	Columbiformes	Columbidae	Laughing Dove
		Columbidae	Blue Rock Pigeon
		Columbidae	Yellow Footed Green Pigeon
2	Coraciformes	Alcedinidae	Blue Kingfisher
		Alcedinidae	Common Kingfisher
		Coraciidae	Indian Roller
		Maopidae	Green Bee Eater
3	Ciconiformes	Ardetdae	Indian Pond Heron
4	Charadriiforme	Glaradndae	Red Wattled Lapwing
		Charadndae	Yellow Wattled Lapwing
5	Pelecanifomnes	Ardeidae	Grey Heron
		Ardeidae	Pond Heron
		Ardeidae	Cattle Egret
		Ardedae	Little Egret
		Threskiornithidae	Black Headed Ibis
6	Pasittaciformes	Psittacidae	Rose Ringed Parakeet
		Cuculidae	Greater Coucul
		Cuculidae	Asian Koel
		Pycomtldae	Red Vented Bulbul
7	Passeriformes	Dicruridae	Drongo
		Nectariniidae	Purple Sunbird
		Estrildidae	Scaly-Breasted Munia
		Sturnidae	Common Myna
		Corvidae	Corvus (Crow)
		Passeridae	House Sparrow
		Muscicapidae	Brown Rock Chat
		Muscicapidae	Indian Robin
		Pycnonotidae	Red Whiskered Bulbul
8	Coraciiformes	Alcedinidae	White Throughted Kingfisher
9	Bucerotiformes	Upupidae	Common Hoopoe
10	Columbiformes	Columbidae	Spotted Dove
11	Accipitriformes	Accipitridae	Black Shouldered Kite

Table-4: Species of icthyofauna observed in Gadchiroli lake.

Sr. No.	Orders	Family	Scientific Name	Common Name
1.	Gobiiformes	Gobiidae	*Glossogobius giuris*	Khapra
2.	Siluriformes	Clariidae	*Clarius batracus*	Magur
		Siluridae	*Wallago attu*	Shivada, Daku
		Heteropneustidae	*Heteropneustes fossilis*	Singhur
		Bagridae	*Mystus vittatus*	Tengara
			Mystus seenghala	Shingta
3.	Osteoglossiformes	Notopteridae	*Notopterus chitala*	Chital
			Notopterus notopterus	Pathola
4.	Cichliformes	Cichlidae	*Tilapia mossambica*	Tilapia
5.	Synbranchiformes	Mastacembelidae	*Mastacembelus armatus*	Baam
6.	Cypriniformes	Cyprinidae	*Catla catla*	Catla
			Cyprinus carpio	Common carp
			Labeo rohita	Rohu
			Cirrhinus mrigala	Mrigal
			Hypopthalmichthys molitrix	Silver carp

RESULT AND DISCUSSION:

During the period of research work diversity of zooplanktons where found in Gadchiroli lake in the present research paper 23 species of phytoplanktons belongs to 4 different families Bcillariophyceae shows *Navicula* sp*, Nitzschia* sp*, Fragilaria* sp*, Pinnularia* sp*, Synedra* sp. The members in chlorophyceae are *chlymydomonas* sp*, volvox* sp*, spirogyra* sp. euglenophyceae represented by *Euglena* sp*, and Phacus* sp, while cyanophyceae shows were observe while cyanophyceae shows *Nostoc sp, Anabaenea* sp*, Spirulina* sp. 32 species of birds belonging to 24 families and 11 different orders are noted while fish diversity shows 16 different types of species belonging to 9 families and 6 orders where observed in Gadchiroli lake. 21 species of zooplanktons belonging to 6 families namely and 4 different orders were observed in the existent analysis of zooplanktons be located calculated inferior to four groups namely; Rotifera, Cladocera, Copepoda, and Ostracoda. In the middle of those at entirely on station Rotifera indicated its supremacy through esteem to further zooplanktons.

Cladocerans are order of little crustaceans usually called water bugs (fleas) generally disseminated and have been considered as perhaps the main segments of the nourishment for planktivorous fish and aquatic invertebrate, Balayla and Moss (2004). Cladocerans control

the development of green growth by successful taking care of, consequently, are considered as markers of water quality Rajashekhar *et al.,* (2010).

Copepoda are small aquatic crustaceans are very diverse and are most numerous metazoans in the water community. Fresh water copepods establish one of the major zooplankton groups. Copepoda are mainly denoted by the species of cyclopoids and calonoids. The Zooplankton community is more diverse than phytoplankton as a total of 31 species were recorded in the river Kolar. 16 species in the present study represented Rotifera, the common genera were *Brachionus, Keratella, and Trichocera*. Zooplanktonic diversity in Kolar River, District Nagpur, (M.S.), India. Rotifer diversity in Wainganga River Markandadeo, Tah Chamorshi, District Gadchiroli, Maharashtra (India), Tijare R.V. and Gedekar S.G. (2012). A total of 23 zooplankton species out of which 15 species of Rotifera, 03 species of Cladocera, 04 species of Copepoda, and only 01 species of Ostracoda were recorded Zooplankton diversity concerning the physicochemical Parameter of River Wainganga, near Bramhapuri, District Chandrapur, Chavan A.W. & Murkute V.B. (2007) total 104 zooplankton species out of which 09 protozoa, 49 Rotifera, 35 Cladocera, 06 Copepoda and 05 Ostracoda species were recorded Talodhi Village Lake of tehsil Chamorshi, District Gadchiroli (M.S.), India, with special respect to plankton species diversity, Chavhan R.N. (2015). In all 27 different zooplankton species are found in the river stretch at Pawnar out of which 07 protozoa, 11 Rotifera, 04 Cladocera, 03 Copepoda and 01 Ostracoda species were recorded. At dham river at pawnar in Wardha district of Maharashtra State, Shashikant R. Sitre and Atul K. Pimpalshende (2016).

Ostracoda constitute one of the important group commonly known as Seed or Mussel shrimp. They play a significant role in transferring energy from the producer to the consumer. Total of 40 zooplankton species out of which 02 protozoa, 27 Rotifera, 05 Cladocera, 03 Copepoda, and 02 Ostracoda were recorded in an intermediated position in aquatic food webs by being live food for fishes. An Analysis of zooplankton in a MAMA lake, near Wani Tehsil, District- Yavatmal (M.S.), S.W. Kuchankar *et al.,* (2021).

Total 42 species of zooplankton out of which 03 protozoa, 12 Rotifera, 09 Cladocera, 13Copepoda 05 Ostracoda were recorded. Zooplankton diversity of a freshwater perennial pond in Wani city of Yavatmal District, in Maharashtra, India, Paresh Patel and Reena Laharia (2022).

Investigation of zooplankton Rotifers was found to the zooplankton wealth of the lake noted highest species followed by Cladocerans, Copepoda and Ostracoda. Results compile with the report of Mahesh *et al.,* (2015) had noticed rotifers populayion is recorded high followed by cladocera and copepod separately in Kandlapally lake, Jagtial, Telangana. Density and distribution of zooplanktons can be affected by various abiotic factors such as pH, BOD and DO and the availability of food.

In present investigation phytoplanktos belonging to four major group namely Chlorophyceae (12 Genera), *Eudorina, Oedogonium, Closteridium, Scenodesmus, Cosmarium, Pediastrum, Microspora, Cladophor, Spirogyra, Ulothrix, Volvax, Zygonema,* Cyanophyceae (9 Genera) *Microcystis, Merismopodia, Microcystic, Nostoc, Oscillatoria, Anabena, Arthrospira,*

Lyngbya, Merismopodia. Bacillariophyceae (12 Genera) *Pinnularia, Synedra, Nitzschia, Gomphonema, Cyclostella, Diatoma Navicula, Bacillaria Amphipleura, Fragillaria, Cymbella, Diatomella*. Euglenophyceae (2 Genera) *Euglena and phacus*. To understand the general position of the lake study of phytoplankton must be very useful as well as it can also help to know the physico-chemical nature of the lake. It can also be very useful in assessment of quality of water in different types of lake, M. M. Dhamgaye *et al.,* (2015) 22 genera of algae, 12 genera of diatom among phytoplankton, were identified and recorded in list, which was studied from October 2011 to September 2012 at Nanmangalam lake of Chennai, Tamilnadu, India (Mazher sultana and K. Balamurugan 2016). A total of 35 genera were recorded out of which 15 were Chlorophyceae, 7 Bacillariophyceae, 7 Cyanophyceae and 6 Euglenophyceae, S.E. Shinde *et al.,* (2011). A total 31 species were recorded out of which 14 were Chlorophyceae, 9 Bacillariophyceae and 8 Cyanophyceae. Present study revealed maximum percentage wise composition, the highest number of Chlorophyceae (50%) in lower zone, Bacillariophyceae (35%) in the middle zone I and the number of cyanophyceae (20%), Divya Tyagi and D.S. Malik (2017). The minor change in population of phytoplankton community can have a direct correlation with change of quality of water in any aquatic system.

Ichthyofaunal study is an important aspect in determination of ecological status of lake and the productivity of water body the diversity of fish can be change due to change in geographical condition and limnological status of aquatic ecosystem. In the investigation of one year it is confirm that occurrence of 16 species of fishes belonging to different six orders. In present research paper four species are belonging to Perciformes, Two species are belonging to Osteoglossiformes one species is belonging to Cichliformes, Two species are belonging to Siluriformes Four species are belonging to Synbranchiformes, Three species are belonging to Cypriniformes. 37 Species of 24 different genera, 14 families and 7 orders were recorded. Order Cypriniformes were dominated with18 species, Siluriformes and Perciformes with 8 species each and Osteoformes, Anguilliformes and Cyprinodontiformes with 1 species each. Ichthyofauna diversity of Wardha river and Nirguda river in selected stretch of Wani, Dist. Yeotmal, (MS), India D.B. Khamankar, R.R. Kamdi and A.P. Sawane (2012).

Ichthyofauna belongs to 7 order, 10 families, 19 genus and 21 Species were observed. Cyprinidae family is dominant with 10 species, Channidae and Mastacembelidae with 2 species, Balitoridae, Bagridae, Clariidae, Belonidae, Notopteridae, Cichlidae and Poecilidae contribute one species each.

Study of Freshwater fish fauna & water quality at Paintakli dam from Buldhana District (MS) India (S.B. Ubharhande and Sonwane, S.R. 2012) 51 Species belonging to 7 different orders of 18 families and 35 genera are reported. The dominating group of fish belonging to Cypriniformes (21 Species) followed by Siluriformes (13 Species), Perciformes (12 Species), Osteoglossiformes (2 Species), Anguiliformes (1 Species), Atheriniformes (1 Species) and Synbranchiformes (1 Species). Fish biodiversity of Wainganga River near Bramhapuri, Dist; Chandrapur (MS), Dhamani A. A. *et al.,* (2013). 35 Species of fresh water fish from 11 families, 6 different orders and 23 genera were recorded. Cypriniformes orders dominated. The percentage contribution according to IUCN categories, most fresh water fishes comes under the least concern (LC) category which contribute 85.7% followed by 5.7 % data deficient (DD), 5.7 % nearly threatened (NT), 2.9% are vulnerable (VU).

A Study on Ichthyofaunal diversity of Naleshwar in Sindewahi Tehasil, District Chandrapur State Maharashtra, P.D. Jambhulkar and R. R. Kamdi (2023). Seasonal Ichthyological Diversity in the Bembla Reservoir of Yavatmal District, Maharashtra. 10 Species of fishes belongs to 6 different orders and 7 families were observed. Out of 6 Orders Cypriniformes was dominant with 4 species, Siluriformes 2 species, Anabantiformes 1 species, Osteoglossiformes 1 species and Anguliniformes 1 species and Cichliformes 1 species are observed, Madhuri G. Bhadange and Praveen P. Joshi (2023). In Vidarbha region many researchers worked on fish diversity. Bobdey (2014) had reported ichthyofaunal diversity and its conservation aspects in the lake and river ecosystem of Bhandara District, Sawane *et al.*, (2012) found out total 41 different fishes from Kollar dam, District Nagpur. 32 species of birds belonging to 24 families and 11 different orders are noted while fish diversity shows 16 different types of species belonging to 9 families and 6 orders where observed in Gadchiroli lake. In the present study from Gadchiroli Lake avian fauna total of forty species of birds belonging twenty seven families have been recorded, Ganvir Prachi. M. *et al.,* (2024).

CONCLUSION:

In the present investigation of Gadchiroli lake analysis diverse variety of zooplankton, phytoplanktons, birds and fish has been found out this prove that zooplanktons can play crucial and important role as indicator component and helps to detect trophic status of the lake. Few species are act as pollution indicator hence in monitoring of the status of the lake this fascinating organism can always help the environment.

ACKNOWLEDGEMENT:

Authors thankful to IHLR&SS, department of Zoology, Anad Niketan College Anandwan Warora and Dr. R. G. Munghate, Principal, Shri Govindrao Munghate Arts and Science College, Kurkheda Dist-Gadchiroli for their support and encouragement.

References:

APHA (1991): Standard methods for the examination of water and waste water including bottom sediments and Sludge, 141th ed., *American Public Health Association, New York, USA,* 1193.

Balaya, D. J. and Moss B. (2004): Relative importance of grazing and open water microcrustacea (Cladocera). *Arch.Hydrobiol.,* (161):199-224.

Bhagat, V. B., Meshram, C. B., Bobdey, A. D. & Sawane, A. P. (2010): Diversity of microfauna in Ambadi irrigation dam, of District-Akola (Maharashtra*). Biosci. Biotech. Res. Comm,* 3(1), 104-106.

Bobdey, R. A., Khope, R. U., & Bobdey, A. D. (2020): Effect of water temperature on physico-chemical parameters, in some surface water bodies of Bhandara District, A perspective to save water quality.*IJRBAT,*8 (1): 186-193.

Chaudhary, G. A. and Sitre, S. R (2021): Diversity of avifauna in and around Mandatukum lake of Mul tehsil of chandrapur district. *IJRBAT, Special Issue 17:* 80-86.

Chavan, A. W. & Murkute, V. B. (2020): Diversity of zooplankton with reference to physicochemical parameter of river Wainganga, near Bramhapuri, Dist: Chandrapur. *Int. Res. J. of Science & Engineering.*A (7), 519-529.

Chavan, A. W. & Murkute, V. B. (2020): Diversity of Zooplankton with reference to physicochemical parameter of river Wainganga, near Bramhapuri, Dist: Chandrapur. *Int. Res. J. of Science & Engineering. A (7)*, 519-529.

Chavhan, A. (2017): Community structure and monthly dynamics of zooplankton in high altitude rice fish system in eastern Himalayan Region of India. *International J. of Life Sciences,* 5(3), 362-378.

Chavhan, P. R. & Dhamani, A. A. (2014): Avian diversity in and around Chaprala wild life sanctuary, district-Gadchiroli, Maharashtra, India. *International journal of fauna and biological studies,* 1(6), 90-95.

Chavhan, R. N. (2014): Limnological studies on Talodhi village lake of tahsil Chamorshi, district Gadchiroli (MS), India, with special respect to plankton species diversity. *Special issue,* 6: 104-108.

Dahegaonkar, N. R. (2016): Studies on pollutionalstatus of Lohara Nullahin Chandrapur (Maharashtra), India. *Int. J. Res. Biosci. Agri. and Tech., Special issue,* (13-18).

Datta, T. (2011): Zooplankton diversity and physicochemical conditions of two wetlands of Jalpaiguri District, India. *International Journal of Applied Biology and Pharmaceutical Technology*, *2*(3), 576-583.

Day, G. S. (1994): The capabilities of market-driven organizations. *J. of marketing*, *58*(4), 37-52.

Dede, A. N. & Deshmukh, A. L. (2015): Study on zooplankton composition and seasonal variation in Bhimariver near Ramwadi village, Solapur District (Maharashtra), India. *Int. J. Curr. Microbiol. App. Sci*, *4*(3), 297-306.

Deshmukh, G. D. & Dhamani, A. A. (2018): Bird diversity of agro-forest ecosystem in and around Nagbhid, Maharashtra, India. *IJLSCI, Special Issue A,* 12, 226-234.

Deshmukh, U. B., Shende, M. B. & Rathor, O. S. (2016): Aquatic Macrophytes Biodiversity Assessment FromAsolamendha Reservoir Of Chandrapur District, Maharashtra State (India). *Inter. J. of Applied Research,* 2(1), 293-298.

Dhanapathi, M.V.S.S.S. (2000): Taxonomic notes on the rotifers from India (from 1889-2000). Indian Association of Aquatic Biologists (IAAB), Hyderabad. Publ. 10, pp: 178.

Dhawale, V. R. (2014): Avifaunal Diversity in and Around Katwal Tukum Lake, Tah-Bhadrawati, Chandrapur, Maharashtra. *Inter. J. for Research in Applied Science and Engineering Technology,* 12(8):731-740.

Dhawale, V. R. (2014): Avifaunal Diversity In and Around Katwal Tukum Lake, Tah-Bhadrawati, Chandrapur, Maharashtra. *International Journal for Research in Applied Science and Engineering Technology,* 12(8):731-740.

Divya Tyagi & Malik, D.S. (2017): Status of phytoplankton diversity and biomass in relation To productivity of Ram-Ganga reservoir at Kalagarh (Uttarakhand). *International journal of Fisheries and Aquatic Studies (IJFAS)*; 5(3): 430-434.

Dorlikar A.V. & Thengare, M.R. (2023): Studies on zooplankton composition and A-diversity indices at Thanegaon Reservoir, Maharashtra, India. *International Journal of Zoological Investigations* 9(1):566-571.

Dorlikar, A. V. (2016): Correlation study of zooplankton diversity, species richness and physico-chemical parameters ofGhodazari Lake (Maharashtra). *IJRBAT*, 4 (3): 49-54.

Durge, L.S., Chilke, A. M. & Chavhan, R. N. (2019): Seasonal Variations in the Physico-Chemical parameters of Malgujari pond of Ghugus, District Chandrapur (Maharashtra). *Int. J. Sci. Res. In Biological Sciences 6(1):*240-242.

Durge, L.S., Dhamani, A.A. & Chavhan, R. N. (2018): Physico-Chemical Characteristics of a fresh water pond of Ghugus, District Chandrapur, Maharashtra (India). *International Journal of Scientific Research in Biological Sciences*, 5(3), 59-64.

Fule, U.W., Nimgare, S.S. & Telkhede P.M. (2016): Studies of Macro-Benthos in Sarangpuri Lake, Dist-Wardha (MS).*IJRBAT*, 4 (2), 11-13.

Gajbhiye, S. N., Jiyalalram, M. J., Nair, V. R. & Desai, B. N. (1981): Plankton of the Narmadan Estuary and adjacent creeks. *Mahasagar, Bulletin of National Institute of Oceonography,* 14 (1): 23-31.

Gajbhiye, S. N., Ram, J. & Desai, B. N. (1981): Distribution of copepods from the polluted and unpolluted regions off Bombay. *Indian Journal of Geo-Marine Sciences* 10 (4): 346-349.

Gannon, J.E. and Stemberger, R.S. (1978): Zooplankton especially crustaceans and rotifers as indicators of water quality. Trans. Am. Micros. Soc. 97: 16-35.

Ganvir P. M. Bansod D. S. & Ingale P. P. (2024): Avifauna diversity of two natural lakes in District Gadchiroli, (MS).*India Indian J. Applied & Pure Bio. A Web of Science Journal* 39(3), 1828-1833.

Gedekar, S. G., & Tijare, R. V. (2014): Study of macro-invertebrate as abiological Indicator of pollution in river Wainganga at Markandadeo Village, Tah-Chamorshi, District-Gadchiroli (MS) India. *IJRBAT*, 2(2):126-136.

Gorghate N. D., Raut, M. B. & Ingale, P. P. (2021): Diversity and conservation status of fish Fauna in Chichtola lake, Gondia District, Maharashtra, India. *Intern. J. Zool. Invest,* 7, 16-20.

Hoffmann, M. D. & Dodson, S. I. (2005): Land use, primary productivity, and Lake area as descriptors of zooplankton diversity. *Ecology*, *86*(1), 255-261.

Ingale, P. P., Bobdey, A. D. & Gorghate, N. D. (2018): Comprehensive hydrobiologicalstatus of Bhiwapurlake of Maharashtra, India: An environmental aspect. *Journal of the Chinese Advanced Materials Society,* 6(4), 655-665.

Ingle, J. R., Bobdey, A. D., Sawarkar, B. W., Kutemate, O. G., Bhagat, V. B. & Kutemate, N. B. (2016): Physico-chemical study of river Purna in Daryapurtahasil, district: Amravati (MS*). IJRBAT*, 4(3):3-5.

Jambhulkar, P. D. & Kamdi, R. R. (2023): A study on ichthyofaunal diversity of Naleshwar in Sindewahi Tehsil, District Chandrapur, *IJRBAT, Issue (XI) Vol (I)*:199-205.

Jhingran, V. G. (1991): In: Fish and Fisheries of India, 3rd Ed. Hindustan Publishing Corporation, Delhi, India, 727 pp.

Kuchankar, S. W., Kamdi, R. R. & Patel, P. R. (2021): An analysis of zooplankton in a mama lake, near Wani tehsil, district-Yavatmal (MS). *IJRBAT*, (18): 59-66

Lair, N. (2006): A review of regulation mechanisms of metazoan plankton in riverine ecosystems: aquatic habitat versus biota. *River Research and Applications*, *22*(5), 567-593.

Mahesh, T., Balakrishna, D., Surender, R. K. & Ravinder, R. T. (2015): A Study of zooplankton diversity and their seasonal variation in Kandlapally lake, Jagtial, Telangana. *Int. J. of Sci. & Enging*, *1*(2), 21-25.

Majumder, S., Dhua, R. P., Kar, S., Mishra, T., Mahapatra, S. S., Shit, S., & Patra, A. (2015): Zooplankton diversity influenced by hydro biological parameters in some ponds of south eastern part of Bankura town of WB, India. *International Journal of Advanced Research*, *3*(5), 354-368.

Manjare, S. A. (2015): Qualitative and quantitative study of zooplankton from fresh water tanks of Kolhapur District,(Maharashtra). *Res. J. of Life Sciences, Bioinformatics, Pharmaceuticals and Chemical Sciences,* 1(1), 54-58.

Mazher Sultana & K. Balamurugan (2016): Studies on the diversity, seasonal variation of phytoplankton and zooplankton community of freshwater, Nanmangalam Lake of Chennai, (Tamilnadu), India. *Research Article, Life Science Archives,* 2 (1), 406-419.

Moss, B., Stephen, D., Balayla, D. M., Bécares, E., Collings, S. E., Fernández-Aláez, C. &Villena, M. J. (2004): Continental-scale patterns of nutrient and fish effects on shallow lakes: synthesis of a Pan-European Mesocosm Experiment. *Freshwater Biology*, *49*(12), 1633-1649.

Murkute, V. B., & Chavan, A. W. (2016): Report on rotifer diversity with reference to their role in eutrophication from lentic ecosystem at Bramhapuri, Dist: Chandrapur (MS) India. *International Journal of Researches in Biosciences, Agriculture and Technology*, *16*, 8-12.

Needham, J. G. and Needham, P. R. (1962): A guide to the study of fresh water biology. Fifth edition, Holden-Day, Inc. Sanfrancisco, pp: 327.

Pennak, R. W. (1978): Fresh-water invertebrates of the United States.

Pimpalshende, A. K., & Sitre, S. R. (2022): Water quality assessment of Sataratukum lake of Pombhurna tehsil in Chandrapur district of Maharashtra state with respect to physico-chemical characteristics, *IJRBAT,*10 (2):47-53.

Pimpalshende, A. K., Ambatkar, M. S. & Sitre, S. R. (2021): Study of aquatic weeds in Dongarhaldi village lake in Pombhurna tehsil of Chandrapur district in Maharashtra state. *IJAEM*, 3(6), 2133-2137.

Pravin D. Jambhulkar and R. R. Kamdi (2023): A study on ichthyofaunal diversity of Naleshwar in Sindewahi tehsil, district Chandrapur, state Maharashtra, India *IJRBAT*, Issue (XI) Vol (I): 199-205

Rajagopal, T., Thangamani, A., Sevarkodiyone, S. P., Sekar, M. & Archunan, G. (2010): Zooplankton diversity and physico-chemical conditions in three perennial ponds of Virudhunagar District, Tamilnadu. *Journal of Environmental Biology*, *31*(3), 265-272.

Rajashekar, M. (2010): Zooplankton community in Khaji Kotnoor reservoir Gulbarga Karnataka district. *Proceedings of ICWPSH*, 106.

Rajashekhar, M., Vijaykumar, K. & Paerveen, Z. (2010): Seasonal variations of zooplankton community in freshwater reservoir Gulbarga District, Karnataka, South India. *International Journal of Systems Biology*, 2(1), 6-11.

Rutherford, S. D., Hondt, S. & Prell, W. (1999): Environmental Controls on The geographic distribution of zooplankton. *Nature,* 400(6746), 749-753.

S.E. Shinde., T. S. Pathan & D. L. Sonawane (2012): Seasonal variations and biodiversity of phytoplankton in Harsool-Savangi Dam, Aurangabad, India. *J. Environ. Biol.* 33, 643-647.

Shastrakar, A. J. & Tijare, R. V. (2014): Correlation of crustacean population with physico-Chemical Factors From Asola Mendha Lake, Dist. Chandrapur (MS), India. *International Journal of Research in Biosciences, Agriculture and Technology*, 2 (2):497-505.

Sitre, S. R. & Pimpalshende, A. K. (2016): Zooplankton diversity of Dham River at Pawnar in Wardha District of Maharashtra State. *IJRBAT Special Issue*, 151-153.

Sitre, S. R. & Pimpalshende, A. K. (2024): Analyzing the zooplankton fauna of a polluted rural lake of Village Chorain Bhadrawati tehsil of Chandrapur District. *IJRBAT* 12(3):14-18.

Sommer, U. (1986): The periodicity of phytoplankton in Lake Constance (Bodensee) in comparison to other deep lakes of central Europe. *Seasonality of Freshwater Phytoplankton: A global perspective*, 1-7.

Tembhurne, P. R., Murkute, V. B. & Chavan, A. W. (2023): Ichthyofaunal diversity in the vidarbha Region: A Review Study. *Research Hub,International Peer-Reviewed Multidisciplinary*, 4 (4): 50-62.

Tijare, R. (2020): Qualitative & Quantitative study of phytoplankton of river Wainganga near Markandadeo, Dist. Gadchiroli (MS). *Environment Conservation Journal*, *21*(3), 43-49.

Tijare, R. V. & Kunghadkar, G. E. (2020): Study of limnologicals of Kunghadabandh Lake and Chamorshi Lake, Dist.-Gadchiroli (MS). *International Journal of Researches in Biosciences, Agriculture and Technology.* 8(1): 174-185.

Tijare, R. V. & Kunghadkar, G.E. (2021): Effect of physico-chemical properties of water on population of macrozoobenthos of Kunghadabandh lake, Dist.-Gadchiroli, Maharashtra (India). *International Journal of Environment, Agriculture and Biotechnology*, 6(4):113-122.

Zade, S. B., Sitre, S. R. & Tijare, R. V. (2009): Occurrence of zooplankton in a perennial freshwater reservoir of Wadgaon dam during monsoon season at Nagpur district. *Environment Conservation Journal,* 10(1/2): 81-83.