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Plankton dynamics of Kanke reservoir (Jharkhand, India) in relation to physico-chemical parameters of water

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ABSTRACT

A study was conducted on plankton dynamics of Kanke reservoir in relation to selected physico chemical parameters from 10 September 2020 to 10 July 2021. Total ten sampling stations were chosen based on water characteristics. Overall water quality parameters (Temperature, DO, CO_2, TH, TA, Nitrate, Phosphate and pH) were found in the limits suggested for aquaculture practices except few station like STN 1, 4, and 5 shown poor water quality, this may be due to domestic sewage and organic matter load released from local communities. In the present study, total 50 genera of phytoplankton were identified. Of which 24 genera of Chlorophyceae, 12 genera of Bacillariophyceae, 11 genera of Cyanophyceae, 2 genera of Euglenophyceae and 1 genera of Dinophyceae. The phytoplankton abundance shows sharp increase from January to April (pre-monsoon) with Chlorophyceae as the most dominant group and Euglenophyceae as the least dominant. Similarly, total 13 genera of zooplankton were identified. It included 6 genera of Rotifers, 4 genera of Cladocerans and 3 genera of Copepods. A positive correlation was noticed between temperature and phytoplankton in the Kanke reservoir. All group of zooplankton showed very low abundance during monsoon, however, there was an increase in abundance during pre-monsoon, and highest abundance value was recorded during post-monsoon months. Findings of the present study shows that the water quality of Kanke reservoir is still safe for aquaculture practices except few stations. But the sign of deteriorating water quality is started to appear as algal scam/bloom formation. The findings of this study will serve as a baseline data for further investigations, comparing the future changes in this reservoir and to conserve this ecosystem.

Key words: *Ecosystem, Physico-chemical parameters, Primary productivity, Kanke reservoir*

Introduction

The phytoplankton community form the base of trophic level on which whole aquatic population depends and this community is also largely influenced by the interaction of a number of physico chemical factors. The dynamic characteristics of a Lake like water colour, transparency, trophic state, and zooplankton and fish production fundamentally depend on the phytoplankton diversity and their availability

(Goldman and Horne, 1983). According to Davis (1955) many water quality parameters including biological factors working simultaneously, and those factors must be considered for better understanding of the phytoplankton population dynamics. Karr *et al.* (2000) reported that the biotic community of any water body is product of interaction between the physico-chemical parameters along with geo-morphological characteristics of any water body. According to Cetin and Sen (2004) the distribution and variation of phytoplankton in freshwater lake primarily depend on its environmental parameters. Phytoplankton communities are the primary producer and play a pivotal role in food chain of an aquatic ecosystem (Khan, 2003).

Zooplankton community act as an interlinking chain between the autotrophs and other heterotrophs, occupies the central position and forms an important part in the food-web of a freshwater ecosystem. There are many reports available related to various ecological aspects of zooplankton and have been studied by several workers in India (Somashekar *et al.*, 1994; Annapurna *et al.*, 1999). Pawar and Pulle (2005) suggested that the occurrence and abundance of zooplankton basically depend on its productivity, which in turn, is influenced by the environmental parameters and nutrients availablity in the water body. Zooplankton is considered as one of the most important biotic component of an aquatic ecosystem which influences all functional aspects like food chains and trophic networks, energy flow, and the circulation of matter of that water body. The occurrence and distribution of planktonic community depend on several factors viz., biotic factors, habitat physico-chemical properties, and climate change (Cottenie *et al.*, 2001; Rajagopal *et al.*, 2010; Ahmad *et al.*, 2011; Alexander, 2012). According to Paturej *et al.* (2017) the physicochemical properties of a water body played a key role in forming zooplankton species structure and could also significantly impact on the entire zooplankton population.

The Kanke reservoir (23°23′50"N, 85°18′15"E) is a small and fresh water in nature. It is situated at the base of the Gonda Hills in Kanke town area of Ranchi district, Jharkhand. Its primary source of water inflow is Potpoto River and has water spread area of 100 ha.

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Mainly constructed with the purpose of rain water harvesting and supplying drinking water to Ranchi town area. At same time cage culture technique is much popularized in this reservoir. Excess feeding may lead to deterioration of water quality and other problems like eutrophication, release of obnoxious gases etc. It was also noticed that currently this reservoir is facing problems mainly due to interference of human activities like release of domestic sewage or waste materials, siltation, eutrophication, encroachment of surface area. Many reports are available on the plankton dynamics of reservoir, but it is scanty especially for the the Kanke reservoir of Ranchi (Jharkhand, India) in relation to physiochemical parameters. Therefore, keeping these points in mind the present study was undertaken to understand the relationship of water quality parameters of Kanke reservoir on plankton dynamics.

Materials and Methods

Study was carried out from 10 September 2020 to 10 July 2021. Total ten sampling stations were chosen based on water characteristics. The stations were:; CMPDI Site (Maximum effluent releasing urban side; Lat. 23°242 0.443 N, Long. 85°18247.203 E), Pen Culture Site (Fish culture site; Lat. 23°2423.453 N, Long. 85°18242.383 E), Boating Site (Rock garden side;Lat. 23°24210.993 N, Long. 85°18241.193 E), Idol Immersion Site (Lat. 23°24216.813 N, Long. 85°18234.883 E), Reservoir Gate (Lat. 23°24219.433 N, Long. 85°18227.233 E), Panchsheel Colony (Lat. 23°24216.503 N, Long. 85°18215.283 E), Pandra (Lat. 23°24212.263 N, Long. 85°1828.403 E), DurgaMandir (Lat. 23°2424.263 N, Long. 85°1820.533 E), Misirgonda Alias Pahar (Lat. 23°24257.463 N, Long. 85°18256.933 E) and Middle Site (away from culture site; Lat. 23°2425.593 N, Long. 85°18225.673 E) for study. The co-ordinates were recorded using handheld GPS (Garmin etrex 10x model). Map is prepared using Google Earth and QGIS Desktop 3.10.7 software.Water samples collected on bimonthly basis from all the sampling stations between 9.00 am to 03.00 pm. Temperature and pH were measured at the site itself. For DO estimation 250 ml DO bottles were used, fixed at the site itself and samples brought to the laboratory for estimation of DO concentration. For study of other hydrological parameters like CO, TA, TH, nitrate and phosphate water samples collected separately in wide mouth 500 ml polyethylene bottles following the APHA (2005) guidelines for sample collection and preservation.

Plankton samples were collected using bolting silk cloth plankton net of 20 cm diameter with mesh size 20 micrometer, qualitative and quantitative analysis was performed. Samples were collected in duplicate and concentrated to 50 ml filtering 50 liter of water from the respective stations. After collection of zooplankton samples preserved in 5% formalin and phytoplankton in 4% Lugol's Iodine solution for further qualitative and quantitative analyses (Pennak, 1978). Plankton were observed and identified under different magnifications using the HUND inverted microscope. Photographs of major plankton were captured using Olympus FX100 Microscope. Measurement of morphometric features of plankton was done using Biowizard software. Observed plankton were identified using keys and monographs given by Edmondson (1996), Lund and Lund (1998), Desikachary (1959), Graham *et al.* (2008), Fresh water biology (Ward and Whipple, 1992). Enumeration of plankton was carried out using a Sedgwick-Rafter counting cell method the procedure outlined by Welch (1948). Average of three samples was taken into consideration and the results are given in terms of no/litre.

Results

Physico- chemical parameters

The physicochemical parameters of the reservoir showed spatial and temporal variation in the values of the parameters following a seasonal and site-specific pattern. Detailed information of physicochemical parameter of Kanke reservoir is summarized in Table 1a and 1b. (Station-wise variation) and Table 1c. (Month-wise variation).

In the present study, air temperature ranged from 24.5 to 34.8 °C. Minimum temperature (24.5 °C) was recorded in January at station 1, which coincided with the winter season. Maximum temperature (34.8 °C) was recorded in May at the station 7 indicating the peak of summer season. Spatially, there was an

Table 1a. Station-wise variation in the physico-chemical parameters of Kanke reservoir

	STN 1	STN 2	STN 3	STN 4	STN 5
Air temp. (°C)	24.5*- 29.5	24.7-31.5	25.4-31.5	26.4-32.7	26.6 -32.7
Water temp. (°C)	22.5*-27.5	22.6-29.4	23.6-29.6	25.6-30.5	25.6-30.5
Dissolved oxygen	4.0*-5.5	4.5-6.4	4.6-6.8	4.1-5.6	5.5-7.3
Carbon dioxide	3.5-5.3	3.5-5.1	3.5-4.1	3.4-5.4**	3.3-5.1
Total Alkalinity	120.66*-127.46	121.14-126.87	120.81-129.75	121.97-127.54	121.74-129.94
Total Hardness	72.40-76.84	73.27-76.71	73.49-77.94	51.48*-77.53	73.50-79.85
Nitrate-N	2.84-2.96**	1.62-1.93	1.59-1.96	1.82-2.93	1.96-2.88
Phosphate	1.82-2.14	1.76-2.09	1.77-2.53	1.82-2.32	1.77-2.92
pH (No unit)	6.4*-7.4	6.5-7.6	7.3-7.5	7.0-7.5	7.3-7.7

(*Minimum value between the stations; ** Maximum value between the stations; Units other than mentioned are in mg/l)

Table 1b. Station-wise variation in the physico-chemical parameters of Kanke reservoir

	STN 6	STN 7	STN 8	STN 9	STN 10
Air tempt. (°C)	24.5- 29.5	24.7-34.8**	25.4-31.5	26.4-32.7	26.6 -32.7
Water temp. (°C)	25.6-31.6**	25.6-31.6**	25.4-30.7	23.5-30.7	23.4-29.4
Dissolved oxygen	4.6-7.5	5.1-7.2	4.8-7.2	4.7-6.7	6.1-7.8**
Carbon dioxide	3.3-5.3	3.4-4.5	3.1*-5.1	3.2-5.1	3.3-3.8
Total Alkalinity	122.73-130.42**	122.76-129.82	121.48-128.92	121.30-129.24	122.54-130.23
Total Hardness	72.65-79.75	72.30-80.22	72.62-79.67	72.56-79.56	74.51-80.23**
Nitrate-N	1.66-1.85	1.55-1.96	1.31*-1.86	1.60-1.95	1.60-1.95
Phosphate	1.74-2.83	1.76-3.12	1.74-2.82	1.73*-1.84	1.86-3.15**
pH	7.3-8.3**	7.3-7.7	7.3-7.7	7.3-7.5	7.6-8.2

*Minimum value between the stations; **Maximum value between the stations; Units other than mentioned are in mg/l)

Table 1c. Month wise variation in the physicochemical parameters of Kanke reservoir

	Sept.	Nov.	Jan.	Mar.	May	July
Air tempt. (°C)	27.3-30.6	25.5-28.7	24.5*-27.6	25.3-29.5	29.5-34.8**	28.6-31.7
Water temp. (°C)	25.7-28.5	23.5-26.8	22.5*-24.8	23.5-27.5	27.5-31.6**	26.730.5
Dissolved oxygen	4.1-6.7	5.3-7.8**	4.0*-6.1	5.2-6.6	5.5-7.5	5.4-7.6
Carbon dioxide	3.4-5.3	3.1*-3.5	3.8-5.4**	3.3-4.0	3.3-3.8	3.4-3.8
Total Alkalinity	123.26-127.46	121.49-126.51	120.66*-122.73	122.31-124.45	125.44-129.23	126.73-130.42**
Total Hardness	73.62-75.11	71.50-77.50	51.48*-74.51	73.11-75.63	75.65-78.65	76.81-80.23**
Nitrate-N	1.33-2.96**	1.62-2.93	1.85-2.95	1.31*-2.91	1.71-2.88	1.55-2.92
Phosphate	1.75-1.93	1.74-1.96	1.73*-1.88	1.77-1.95	1.76-2.07	1.84-3.15**
pH	7.1-7.5	7.2-7.7	6.4*-7.6	7.2-7.6	7.3-7.7	7.4-8.3**

* Minimum value between the stations; ** Maximum value between the stations; Units other than mentioned are in

insignificant variation in water temperature however a time specific variation showing an increasing trend from January to May, followed by a significant decrease up to November was noticed. Minimum temperature (22.5 °C) was recorded in month of January at station 1, during winter season and maximum water temperature (31.6 °C) was recorded in the month of May at the station 6 and station 7, during the peak of summer season. A significant variation in the values of DO was also recorded, with minimum value in January at station 1 (4.0 mg/l) and maximum value in November at station 10 (7.8 mg/l). The results followed the general pattern of the inverse relation of DO on temperature where the decrease in temperature increase the DO level due to higher solubility of oxygen at lower temperatures. The concentration of free carbon dioxide varied significantly (3.1 to 5.4 mg/l). There was a significant temporal variation in CO_2 level during different months. Minimum free CO_2 level was recorded in November at station 8 (3.1 mg/l) and maximum in January at station 4 (5.4 mg/l).

The values of total alkalinity showed variations in a wide range of 120.66 to 130.42 mg/l as CaCO alkalinity. The minimum value was recorded at station 1 (120.66 mg/l as CaCO) whereas, the maximum value was noticed at the station 6 (130.42 mg/l as CaCO). Temporally, lowest and highest values for CaCO alkalinity was recorded in January at station 1, and maximum in July at station 6. The values of total hardness varied significantly from 51.48 to 80.23 mg/l as CaCO. The minimum value of was noted at station 4 (51.48 mg/l as CaCO) and station 10 exhibited the highest value during the study months (80.23 mg/l as CaCO). Temporally, the lowest value of total hardness was recorded in January at station 4 and maximum value in July at station 10. The concentration of nitrate-N varied from 1.31 to 2.96 mg/l. The minimum value of nitrate-N was recorded at station 8 (1.31 mg/l) and highest value was measured at station 1 (2.96 mg/l). The values showed a temporal variation. The lowest value of nitrate-N was recorded in March at station 8 and maximum value in September at station 1. The concentration of phosphate showed a significant variation in the rage of 1.73 to 3.15 mg/l. The minimum value of phosphate was recorded at station 9 (1.73 mg/l) however, the maximum value was noticed at the station 10 (3.15 mg/l). Temporally, station 9 exhibited lowest concentration of phosphate in January. Highest vale for this parameter was recorded in July at station 10. The pH value varied significantly from 6.4 to 8.3 during different sampling period in Kanke reservoir. The maximum pH value recorded was 8.3 at stations 6 and minimum value of 6.4 was measured at station 1. Temporal variation in pH are evident from a lower value in January at station 1 and maximum in July at station 6.

Phytoplankton variations

Phytoplankton occupy the base of any aquatic trophic web and considered as primary producers. In present study, total 50 genera of phytoplankton were identified. It included 24 genera of Chlorophyceae, Bacillariophyceae, 11 genera of Cyanophyceae, 2 genera of Euglenophyceae and 1 genus of Dinophyceae.

Abundance of group

Chlorophyceae > Bacillariophyceae > Cyanophyceae > Euglenophyceae > Dinophyceae

Analysis of group-wise contribution of phytoplankton showed that Chlorophyceae formed 48%, Cyanophyceae 32%, Bacillariophyceae 15%,

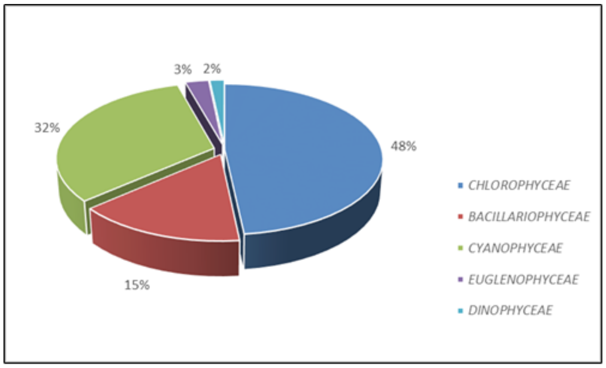

Fig. 1. Percentage composition of phytoplankton group

Euglenophyceae 3% and Dinophyceae 2% of total phytoplankton recorded (Fig. 1).

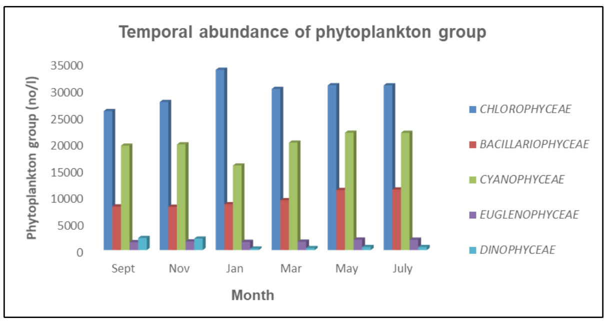

Fig. 2. Temporal abundance of phytoplankton group

Temporal variation in phytoplankton abundance

The phytoplankton diversity and abundance showed a seasonal pattern. The identified species of phytoplankton showed very low abundance during post-monsoon, moderate abundance during monsoon and highest during pre-monsoon months. At the end of winter season which starts from January month, the phytoplankton number also increased. The phytoplankton abundance showed an increase from January to April (pre-monsoon) with Chlorophyceae as the most dominant group, and

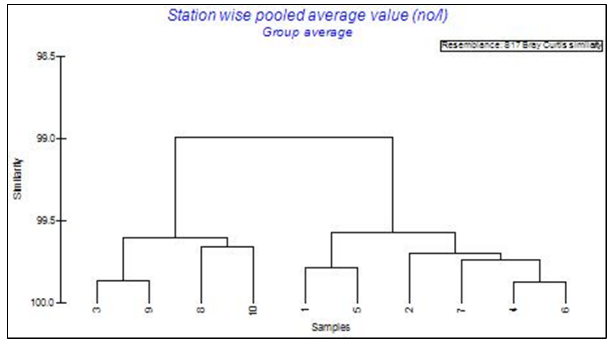

Fig. 3. Dendrogram from Bray-Curtis similarity matrix of stations based on phytoplankton abundance data (with square root transformed)

Euglenophyceae as the least dominant group (Table 2. and Fig. 2).

Bray- Curtis similarity index for phytoplankton

Based on abundance of different genera of phytoplankton Bray-Curtis similarity index was calculate (Fig. 3.) showed that station 4 and station 6 show maximum similarity while station 1 and station 5 show lesser similarity. Station 7 is more similar to station 4 and station 6 compared to station 2. Station 3 showed more similarity to station 4 than other stations (8 and 10). Station 1 and station 6 show maximum extent of dissimilarity.

Zooplankton variations

In any aquatic food web, zooplankton occupy the place next to the base of trophic level (primary producers) and they are considered as primary consumers or secondary producers. In the present study, total 13 genera of zooplankton were identified. It included 6 genera of Rotifera, 4 genera of Cladocera and 3 genera of Copepoda.

Rotifera>Cladocera>Copepoda

Abundance of family

Analysis of group-wise composition of zooplankton

Table 2. Temporal variation in average phytoplankton abundance (no/l) from all stations at Kanke reservoir

Group (no/l)	Pre monsoon (Mar - May)	Monsoon (July- Sept)	Post Monsoon (Nov -Jan)	Total
Chlorophyceae	61037	56882	61486	179405
Bacillariophyceae	20595	19503	16684	56782
Cyanophyceae	42087	41509	35614	119210
Euglenophyceae	3512	3419	3141	10072
Dinophyceae	926	2810	2416	6152

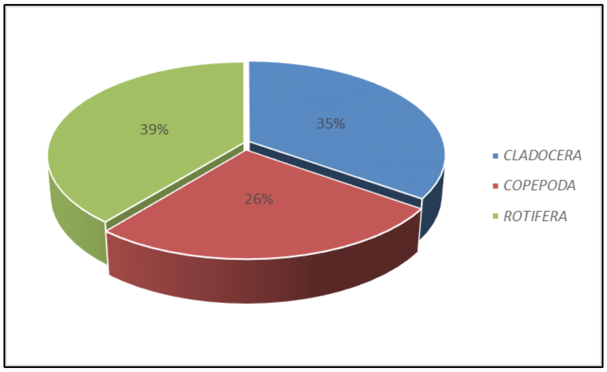

Fig. 4. Percentage composition of zooplankton group

showed that Rotifera formed 39%, Cladocera 35% and Copepoda 26% of total zooplankton recorded (Fig.4).

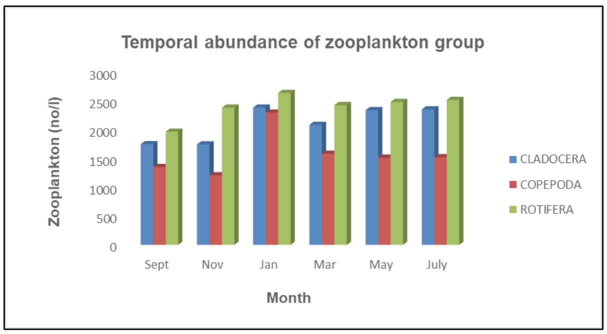

Fig. 5. Temporal abundance of zooplankton group

Temporal variation in zooplankton abundance

The abundance of zooplankton (no/l) showed similar pattern as noticed for phytoplankton. All group of zooplankton showed a comparatively lesser number per ml of water during monsoon, however the number increased during pre-monsoon and reached the highest value during post-monsoon months. At the end of winter season which starts from January month, the zooplankton number also starts to get increasing. The zooplankton abundance shows sharp increase from January to April (pre-monsoon) with Rotifers as the most dominant group and Copepods as the least dominant (Table 3 and Fig. 5).

Bray- Curtis similarity index for Zooplankton

Based on analysis of abundance of different genera of zooplanktonBray-Curtis similarity index was calculate (Fig. 6.), station 4 and station 5 showed maximum similarity, while station 1 and station 5 show lesser similarity. Station 2 is more similar to station 1 than other stations (4 and 5). Station 3, 6 and 7 showed closer similarity among themselves. On the basis of abundance station 8 and station 5 showed maximum dissimilarity.

Interaction between selected physico-chemical water parameters and plankton

The correlation matrix between selected physico-chemical parameters and plankton of the Kanke reservoir showed a significant correlation (Table 4). A significant positive correlation between CO_2, nitrate and phytoplankton is evident from the data. The groups like Dinophyceae, Euglenophyceae and Cyanophyceae showed a significant and positive correlation with phosphorus. Similarly, zooplankton also showed significantly positive correlation with nitrate. A different phenomenon was noticed for Significant positive correlation was also obtained the correlation between Cladocera and Cyanophyceae; with dissolved oxygen, total alkalinity, total hard-

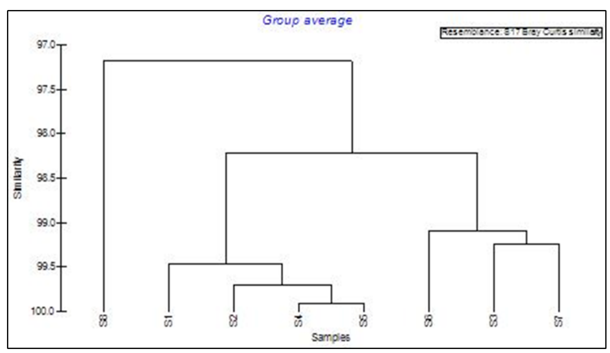

Fig. 6. Dendrogram from Bray-Curtis similarity matrix of stations based on zooplankton abundance data (with square root transformed)

Table 3. Temporal variation in average zooplankton abundance (no/l) from all the stations at Kanke reservoir

Group (no/l)	Pre monsoon (Mar-May)	Monsoon (July-Sept)	Post-monsoon (Nov-Jan)	Total
Cladocera	4417	4094	4123	12634
Copepoda	3093	2870	3500	9463
Rotifera	4900	4476	5014	14390

ness and pH. These water quality parameters showed a significant positive correlation with abundance of Cladocera and cyanophyceanplankters.

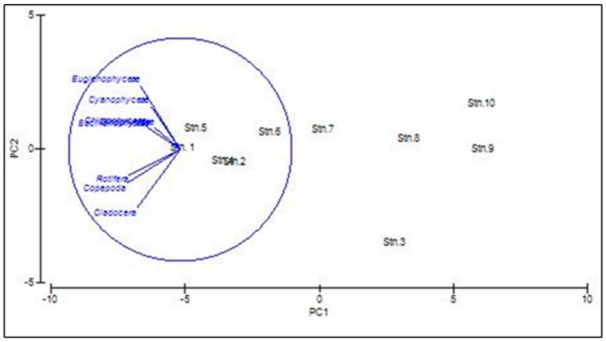

Fig. 7. Principal component analysis of plankton and stations

Principal Components Analysis (PCA) of plankton and stations

The PCA showed that station 1, 2, 4, 5, and 6 were more similar than other stations. The species of phytoplankton and zooplankton showed more similarity at station 1 than other stations. Based on availability of plankton station 3, 7, 8, 9 and 10 showed more similarity to each other (Fig. 1.7.).

Discussion

Overall water quality parameters (Temperature, DO, CO_2, TH, TA, Nitrite, Nitrate, Phosphate and pH) were found in the limits suggested for aquaculture practices except few station like STN 1, 4, and 5 shown poor water quality, this may be due to domestic sewage and organic matter load released from local communities. According to Saini *et al.* (2015) the DO level at the five sampling stations along the Narmada River near Bargi reservoir fluctuated between 3.1-6.5 mg/l and lower value recorded in summer months. Similarly, Ubarhande (2018) reported that dissolved oxygen concentration was varied from 3.5-8.95 mg/l in Vishnupuri reservoir, Nanded, Maharashtra (India). The concentration of free carbon dioxide in Kanke reservoir was varied from 3.1-5.4 mg/l. Similar findings reported by other researchers where the values ranged between 1.75- 5.81 mg/l (Bora and Biswas, 2015), 3.33-9.66 mg/l (Bera *et al.*, 2014). It was noticed that at station 1 and at station 4, the values were comparatively higher than other stations which showed visual signs of pollution with high organic load and weed infestation. Observed pH value in Kanke reservoir fluctuated between 6.4-8.3 during different sampling periods. This may be due to inherent characteristics of the soil and geology of Kanke reservoir.

In the present study, total 50 genera of phytoplankton were identified. It included 24 genera of Chlorophyceae, 12 genera of Bacillariophyceae, 11 genera of Cyanophyceae, 2 genera of Euglenophyceae and 1 genera of Dinophyceae.

Table 4.1. Correlation matrix between selected physiochemical parameters and plankton of Kanke reservoir

	DO	CO_2	TA	TH	Nitrate	Phos	pH	wttp	Chlor	Bacill	Dino	Euglen	Cyano	Clad	Cope	Roti
DO																
CO_2	-0.97															
TA	0.96	-0.90														
TH	0.77	-0.74	0.73													
Nitrate	-0.23	0.08	-0.22	-0.27												
Phos	0.60	-0.56	0.59	0.30	0.19											
pH	0.96	-0.92	0.94	0.61	-0.25	0.66										
Wt. tp.	0.39	-0.35	0.55	0.03	-0.28	0.14	0.54									
Chlor	-0.50	0.59	-0.33	-0.32	0.09	-0.09	-0.43	0.13								
Bacill	-0.59	0.69	-0.41	-0.50	0.14	-0.03	-0.49	0.06	0.95							
Dino	-0.42	0.54	-0.40	-0.18	0.06	0.07	-0.45	-0.41	0.75	0.75						
Euglen	-0.39	0.47	-0.21	-0.25	0.23	0.09	-0.34	0.08	0.94	0.93	0.77					
Cyano	-0.24	0.39	-0.07	-0.27	-0.03	0.21	-0.14	0.25	0.90	0.91	0.76	0.90				
Clado	-0.74	0.80	-0.65	-0.49	0.18	-0.26	-0.67	-0.22	0.79	0.79	0.66	0.63	0.61			
Cope	-0.64	0.72	-0.49	-0.50	0.12	-0.16	-0.52	0.06	0.91	0.89	0.65	0.76	0.78	0.95		
Roti	-0.66	0.75	-0.58	-0.49	0.19	-0.14	-0.60	-0.21	0.86	0.88	0.82	0.77	0.77	0.94	0.93	

(Figures in red colour show significant correlations (p>0.05); DO = Dissolved Oxygen; CO_2 = Carbon di oxide; TA = Total alkalinity; TH = Total hardness; Phos = Phosphate; Wt. tp. = Water temperature; Chlor = Chlorophyceae; Bacill = Bacillariophyceae; Dino= Dinophyceae; Eugle = Euglenophyceae; Cyano = Cyanophyceae; Clado = Cladocera; Cope = Copepoda; Roti = Rotifera)

Similar finding was reported by Ratheesh *et al.* (2012) that is total 34 genera of phytoplankters belonging to Chlorophyceae (16 genera), Bacillariophyceae (7 genera), Dinophyceae (1 genus), Euglenophyceae (2 genera) and Cyanophyceae (8 genera) were observed in Powai Lake. According to Rasal *et al.* (2019) a total of 54 genera were identified from Bargi Dam (Narmada River). Which included 16 genera of Bacillariophyceae, 21 genera of Chlorophyceae and 10 genera of Cyanophyceae, 2 genera by each of Chrysophyceae and Euglenophyceae, whereas 3 genera of Dinophyceae group.

The phytoplankton abundance shows sharp increase from January to April (pre-monsoon) with Chlorophyceae as the most dominant group and Euglenophyceae as the least dominant. This variation in phytoplankton number (high in summer and low in winter) may be due to high temperature. A positive correlation was noticed between temperature and phytoplankton in Kanke reservoir. According to Khare (2005) there was a significant correlation between plankton density and temperature, DO, phosphate and nitrate, respectively. Several researchers have suggested that water temperature plays a pivotal role in algal growth (Ramkrishnaiah and Sarkar, 1982; Verma and Datta Munshi, 1987; Kaushik *et al.*, 1991; Bohra and Kumar, 1999).

In present the study, total 13 genera of zooplankton were identified. It included 6 genera of Rotifers, 4 genera of Cladocerans and 3 genera of Copepods. Similar findings were reported by several researchers Rotifers >Cladocerans> Copepods >Ostracods by Dhanasekaran *et al.* (2017). According to Devi *et al.* (2013) total 17 species of zooplankton identified from temple pond in Virudhunagar Tamil Nadu belonging to four major groups (10 species of Rotifera, 3 species each of Cladocera and Copepoda and 1 species of Ostracoda).

All group of zooplankton showed very low abundance during monsoon, however, there was an increase in abundance during pre-monsoon, the highest level of zooplankton abundance was evident during post-monsoon months. Similar findings reported by Majagi and Vijaykumar (2009), validated that composition of Rotifera population showed higher number during north-east monsoon and summer period, while, it was lower during the month of August. They concluded that this may be due to high organic load, especially dead or decaying vegetation and higher bacterial population. The lowest population noticed in south west monsoon period, concluded this may be due to influence of profuse quantity of rainwater and leads to turbidity, which gets drained into the reservoir.

The data of the present study shows that the water quality of Kanke reservoir is good for aquaculture practices except few stations. But its water quality deteriorating due to high human interferences, pushing this ecosystem towards the process of eutrophication. The findings provide an evidence for the intensified efforts for controlling the discharge of sewage, domestic wastewater and pollutants from various point and non-point sources especially from the thickly populated areas nearby this reservoir. The data and information presented in this paper will serve as a baseline data for further investigations, comparing the future changes in this reservoir and to conserve this ecosystem.

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