

ABUNDANCE OF ZOOPLANKTON AND PHYSICO-CHEMICAL PROPERTIES OF KAMAREDDY TOWN LAKE, TELANGANA

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. Author PAK designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors DB and OPJ managed the analyses of the study. All authors read and approved the final manuscript.

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ABSTRACT

In the present investigation water physico-chemical [parameters (Atmospheric Temperature (AT), Water Temperature (WT), Transparency (Trans), pH, Total Dissolved Solids, Electrical Conductivity (EC), Dissolved Oxygen (DO), Free Carbon Dioxide (CO₂), Total Alkalinity (TA), Total Hardness (TH), Chlorides (Cl), Phosphates (P) and Biological Oxygen Demand (BOD)) and four major of Zooplankton species (Rotifera, Copepoda, Cladocera and Ostracoda) were analyzed during the period of February 2018 to January 2019. The physico-chemical parameters were fall within the permissible limits of APHA, BIS. Temp. both ambient and water, Trans, pH, EC, DO, CO₂ and TA values were highest recorded in summer season. The total dissolved solids results highest recorded in rainy season is due to blending of sediments in to the lake. A total of fifteen number of zooplankton species were observed, out of which eight species of Rotifers (*Brachionus falcatus*, *Brachionus angularis*, *Brachionus caudatus*, *Lecane luna*, *Keratella tropica*, *Keratella cochlearis*, *Filinia longiseta* and *Cephalodella gibba*), three species of Copepods (*Mesocyclops hyalinus*, *Mesocyclops leukarti* and *Paracyclops fimbriatus*), three species of Cladocerans (*Ceriodaphnia cornuta*, *Diaphanosoma sps* and *Moina macrocopa*) and one species of Ostracod (*Heterocypris*) were observed. The dominance group was Rotifera and followed by Copepoda, Cladocera and Ostracoda, respectively.

Keywords: Zooplankton; physico-chemical parameters; Kamareddy lake; Rotifera.

1. INTRODUCTION

The present study is aimed to analyze the various physical and chemical parameters and Zooplankton species in the Kamareddy town lake. The number of fresh water habitats is represented by large rivers to small streams and big lakes to small wetlands. The total six percent of the land is covered by fresh water

wetlands and these are maintained by the air and water quality including nitrogen, sulphur and carbon dioxide cycles on the earth, hence the wetlands are considered as the kidneys of landscape. Lakes, ponds and rivers are essential life supporting systems and play an important role in controlling the water cycles and cleaning the environment. Little amount of fresh water is available on the earth and this little amount of

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water is using for 10-12% is drinking, 22-25% is for industry and 68-72% is for agricultural purposes. At present many wetlands in our country is to be polluted with human population pressure such as plastic deposits, chemically coated idol immersions and soaping activities etc. During the last decade the importance of the studies on physico chemical factors in regulating the various biological parameters like primary production and plankton diversity sediment analysis is very remarkable. Many hydrobiologists like Vijaykumar et al. [1], Balakrishna et al. [2] and Rajashekar et al. 2009 gives fruitful contribution in this area of research work in Andhra Pradesh and Karnataka states.

Most commonly the zooplankton is free living, transparent and small sized water invertebrates. Mostly zooplankton organisms living in surface water area. Study of zooplankton by various aquatic biologists is due to these are most abundant species on the water and as well as these were play a critical role in aquatic food chain as primary consumers. Some of the researchers of this field consider that the zooplankton is the secondary producers in aquatic food chain. This because of that they are the main food source to the many aquatic animals in the habitat [3].

2. METHODOLOGY

Kamareddy district is newly formed district by the Telangana government under the districts reorganization act and it is situated at northern region of Telangana state. The selected lake is situated at 2 kms distanced about kamareddy town (18°18' 27" N longitude and 78°19'14" E latitude).

The present study was conducted for the period of one year from February 2018 to January 2019. Water samples were collected on monthly basis on specific date and time of every month from 2 different sites by using a clean plastic container for the study of various physico-chemical and biological parameters. All the sample collection and observation were made in the morning time and some of the parameters like temperature, pH, transparency, dissolved oxygen and free carbon dioxide is calculated at the collection point and other parameters were estimated by titrimetric method with addition of prescribed solutions in between 06:00 am to 08.00 am in the lab throughout the study period. Standard methods for estimation of water and waste water were referred for estimation of parameters [4].

Zooplankton collections were done by a modified Haron-Trantor net with a square metallic frame of area 0.0625 m² area. Collected samples were filtered

and transferred to 100 ml collection bottles containing 4% formalin. The collected bottles were fixed with lugol's solution and stored in room temperature. The qualitative estimation of zooplankton communities was carried out in the laboratory. Samples were kept for staining for a period of 48 hours. The samples were transferred on to Sedgwick-Rafter cell and planktonic organisms numerically counted and identified. The identification of zooplankton species was done by the Zoological Survey of India, Kolkata and the same was confirmed through the works of Needham and Needham [5], Pennak [6], Tonopi [7], Battish [8], Sharma (1998) and Dhanapathi [9].

3. RESULTS AND DISCUSSION

The physico-chemical parameters results were depicted in the Tables 1 and 2. The physical parameters like the atmospheric temperature was recorded highest in the summer season and lowest values recorded in the north east monsoon season. Highest value shows in the month of May 2018 and lowest value recorded in the month of December at both the stations during the study period. Water temperature also shows similar trend with the atmospheric temperature. The both atmospheric and water temperature fluctuations is due to the solar radiation. Transparency values shows highest in the summer season and lowest in south west monsoon season. Highest value recorded in the month of May 2018 and lowest value the month of August 2018 at both the station. The reason for highest values in summer season is that the lake water remains constant, while in the rainy season much sediment will blends in the lake water [10].

In the present investigation hydrogen ion concentration values shows highest in the month of April 2018 of summer season and lowest value recorded in the month of August 2018 of south west monsoon season at both the stations. Temperature will shows influence on the alkalinity of the lake, for this the highest value recorded in the summer season. During the study period total dissolved solids highest values recorded in the month of June 2018 at station I and July 2018 at station II of south west monsoon season and lowest values recorded in the month of November 2018 at station I and December 2018 at station II respectively. A highest value in the rainy season is the mixing of dissolved solids through the rain water. Electrical conductivity is nothing but the pass the electric charge through the water. Highest values recorded in the July 2018 and the lowest values recorded in the month of January 2019 at both the stations throughout the study period. Similar results were observed by Kumara Satya and Chandrashekar Narayan [11].

Table 1. Monthly variation of physico-chemical parameters of Kamareddy Town Lake during the year 2018-19 at station I

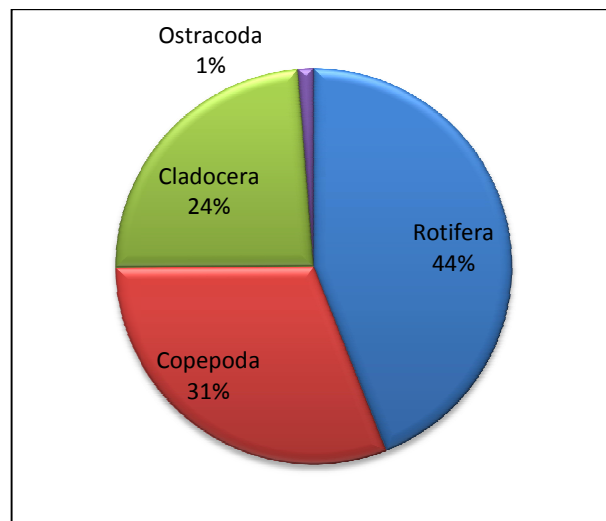
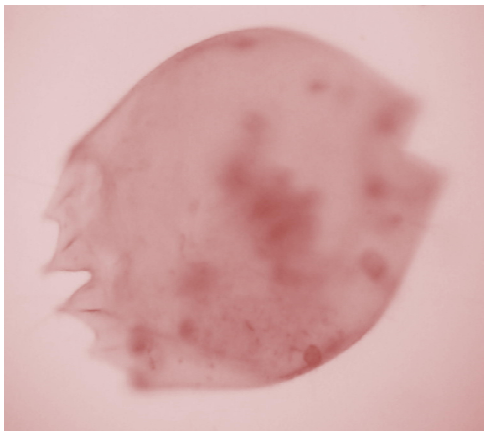
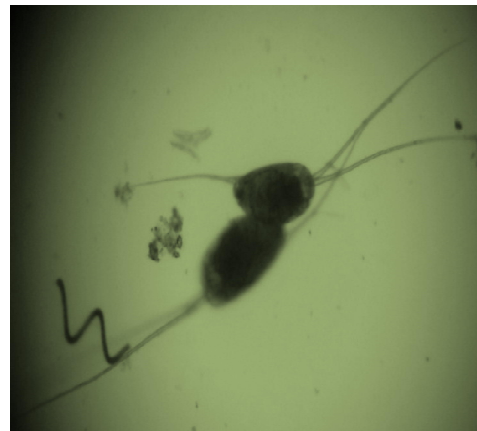
	Month	AT (°C)	WT (°C)	Trans (Cms)	PH	TDS (mg/lit)	EC (µmho)	DO (mg/lit)	CO ₂ (mg/lit)	TA (mg/lit)	TH (mg/lit)	CL (mg/lit)	P (mg/lit)	BOD (mg/lit)
Summer	18-Feb	23.1	20.1	45	7.3	480	482.1	7.9	6.3	143	108.1	49.6	1	3.2
	18-Mar	24	22.1	48.2	7.8	520	499.6	8	6.9	153	113.6	48.2	0.98	2.9
	18-Apr	24.6	23.1	46.2	7.9	540	522.3	8.5	4.2	147	114.4	46.2	0.78	3.6
	18-May	26	24.2	46.8	7.8	580	551.2	8.3	0	140	115.3	48.6	0.56	3.9
Swm	18-Jun	25.2	23.2	29.4	6.9	680	562.8	4.2	0	132	146	68.9	0.36	2.2
	18-Jul	25.4	24	31.2	7	660	610.2	3.8	0	92	130	69.5	0.58	2.1
	18-Aug	23.4	22.3	22.4	6.9	540	402.4	4.9	0	80	122	66.2	0.52	2.6
	18-Sep	23.2	22.8	24.2	7.1	360	410.6	4	0	72	124	61.2	0.89	2
Nem	18-Oct	22.4	21.9	26.6	7.8	380	420.2	7.2	3.6	128	136	78.2	1.18	3.6
	18-Nov	22.4	20	28.9	7.7	360	450.6	6.4	3.6	162	118	74.2	1.28	3.8
	18-Dec	21.3	19.1	32.1	7.1	380	423.2	6.5	4.3	158	91.4	69.3	1.21	3.5
	18-Jan	21.9	19.9	34.5	7.3	410	410.8	7.3	5.3	149	91.7	52.3	1.1	3.9

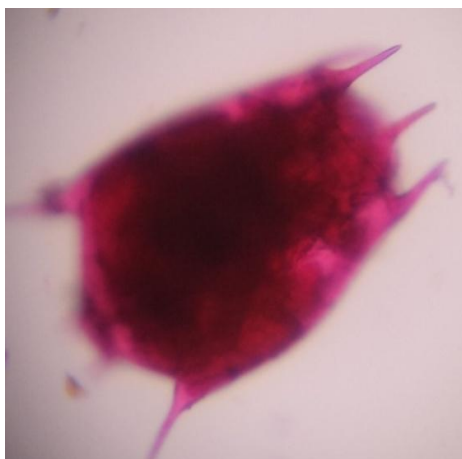
Table 2. Monthly variation of physico-chemical parameters of Kamareddy Town Lake during the year 2018-19 at station II

	Month	AT (°C)	WT (°C)	Trans (Cms)	PH	TDS (mg/lit)	EC (µmho)	DO (mg/lit)	CO ₂ (mg/lit)	TA (mg/lit)	TH (mg/lit)	CL (mg/lit)	P (mg/lit)	BOD (mg/lit)
Summer	18-Feb	23.5	20.1	45.3	7.4	490	492.6	8.1	6.4	139	107	50.2	1	3.3
	18-Mar	24.2	22.2	48.9	7.8	540	510.6	8.2	7	158	115.6	49.6	0.99	2.9
	18-Apr	24.8	23.2	47.5	7.9	560	546.3	8.6	3.6	136	117.1	47.6	0.7	3.6
	18-May	26.1	24.3	46.9	7.8	580	556.9	8.3	0	142	116.9	48.9	0.59	4.1
Swm	18-Jun	25.1	23.9	32.6	6.9	650	563.1	4.8	0	142	138	58.4	0.42	2.1
	18-Jul	25.4	24.1	32.8	7	660	618.6	3.9	0	102	130	66.7	0.6	2.2
	18-Aug	23.5	22.3	23.2	6.9	530	410.6	4.9	0	86	128	62.6	0.6	3
	18-Sep	23.3	22.9	24.8	7	380	421.4	4.2	0	82	130	63.1	0.92	2.1
Nem	18-Oct	22.4	22	26.8	7.8	390	422.2	7.4	3.4	112	132	74.2	1.2	3.8
	18-Nov	22.5	19.9	28.9	7.8	380	458.4	6.6	3.8	154	124	76.1	1.32	3.8
	18-Dec	21.4	19.2	33.5	7.2	370	428.5	6.8	4.9	152	94.2	71.2	1.23	3.3
	18-Jan	22.1	19.9	35.2	7.3	400	423	7.5	5.6	146	90.3	51.6	1.1	4

Table 3. Seasonal variation of zooplankton species in Kamareddy Town Lake during the year 2018-19

Zooplankton	Season	No. individuals
Rotifera	Summer	986
	SWM	879
	NEM	624
Total		2489
Copepoda	Summer	648
	SWM	594
	NEM	502
Total		1744
Cladocera	Summer	526
	SWM	421
	NEM	398
Total		1345
Ostracoda	Summer	40
	SWM	22
	NEM	10
Total		72

**Fig. 1. Composition of zooplankton species in Kamareddy Town Lake during the year 2018-19***Brachionus sp.**Filinia longiseta*



Brachionus calyciflorus



Ceriodaphnia sp.

Plate 1. Zooplankton pictures

The chemical parameter like dissolved oxygen is important parameter, because all the aquatic fauna is depends on the dissolved oxygen content in of the water. During the study period the highest dissolved oxygen vales recorded in the month of April 2018 of summer season and the lowest values recorded in the month of July 2018 of south west monsoon season at both the stations. The highest free carbon dioxide value recorded in summer season and the lowest values recorded in the south west monsoon season. In the present investigation the total alkalinity values recorded highest in north east monsoon season and lowest values recorded in south west monsoon season. Similar results were made by Puspha Singh et al. [12].

The total hardness is nothing but the presence of calcium and magnesium. The highest values of total hardness was recorded in the month of June 2018 of south west monsoon season and the lowest values recorded in the month of December 2018 at station I and January 2019 at station II respectively. The highest chloride values recorded in the month of October 2018 at station I and November 2018 at station II and lowest values recorded in the month of April 2018 at both the stations. During the study period phosphate values recorded highest in the month of November 2018 and lowest values recorded in the month of may 2018 at both the stations. The values of total alkalinity, total hardness, chloride and phosphate are very little bit high when compare to normal water. This may be due to chemical activities like soaping, chemical idol immersions were observed during the study period. In the present investigation biological oxygen demand value was recorded highest in the month of December 2018 of north east

monsoon season and the lowest values were observed in the month of September 2018 at station I and June 2018 of south west monsoon season. The present results are similar to Ojha et al. [13].

3.1 Zooplankton

During the study period the four major groups of zooplankton species were observed and analyzed seasonally. The observed groups are Rotifera, Copepoda, Cladocera and Ostracoda.

In the present study eight species of Rotifers, three species of Copepods, three species of Cladocerans and one species of Ostracods were observed. The observed species of Rotifers are *Brachionus falcatus*, *Brachionus angularis*, *Brachionus caudatus*, *Lecane luna*, *Keratella tropica*, *Keratella cochlearis*, *Filinia longiseta* and *Cephalodella gibba*. During the study period the observed Copepod species are *Masocyclops hylinus*, *Mesocyclops leukarti* and *Paracyclops fimbriatus*. *Ceriodaphnia cornuta*, *Diaphanosoma sps* and *Moina macrocopa* are the Cladocerans and *Heterocypris* is the Ostracoda species. The total 5650 no. of individuals were counted throughout the study period out of them 2489 no. of individuals are Rotifera, 1744 no. of individuals are Copepoda, 1345 no. of individuals are Cladocera and 72 Cladocera are Ostracoda group of zooplankton [14].

The Dominance order of zooplankton in the Kamareddy town lake is Rotifera group and followed by Copepoda, Cladocera and Ostracoda respectively. In the present results the Rotifers highest presence is indicates that the selected lake supports high nutrients with helps in fishery industry [15].

4. CONCLUSION

In the present study all the parameters both physical and chemical parameters results indicates that the lake water is not polluted and the presence of zooplankton is indicates that the selected lake supports high nutrient status and this may be good for aquaculture.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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