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Importance and estimation of Physico-chemical properties of fresh water in Wakadi Dam district Jalna (MS), India with references of zooplankton relationship

Jitendra Tulshiram Jagtap
Department of Zoology, Swami Vivekanand Senior College, Affiliated to Dr. Babasaheb Ambedkar Marathwada University, Auranagabad (Sambajinagar), Maharashtra, India

Abstract
Present results showed that the total hardness of water sample highest found in July that was 101 mg/l followed by June, may, Aug., Apr and least in sept.2021-22 respectively. E.C. of water sample highest found in Sept. that was 211 mg/l and followed by Aug., July, June, May and least in April respectively. Also, TDS highest found in July that was 133 mg/l.
D.O (mg/L) and BOD at 5th (mg/L) of water sample were highest recorded in the month of June that was 5.5 mg/l and biological oxygen demand (BOD) 13.1 mg/l. followed by May.
Nitrite (mg/L), Phosphate (mg/L) and Chloride were highest recorded in April that was 0.032, 0.91 and 22.4 in June respectively.
The relationship between growth and distribution of plankton is mainly affected by physico-chemical factors. So, present work focused on physico-chemical properties of Wakadi dam water and it help for further work on biodiversity of zooplankton and their relation to physico-chemicals properties.

Keywords: Physico-chemical properties, D.O, BOD, hardness, Wakadi Dam water and zooplankton etc.

Introduction
Zooplankton is one of the most important biotic elements that impact all functional aspects of aqueous ecosystems including food chains and trophic networks, energy flow, and the circulation of matter and they inhabit all freshwater habitats of the world and its diversity and density refer to variety within the community and also, study of Zooplankton is important as it could be providing ways to predict the productivity of fresh water aquatic system (Morgan *et al.*, 1978; Borgmann *et al.*, 1984). The biodiversity and distribution of Zooplankton in aquatic ecosystem depend mainly on the physicochemical properties of water.
The occurrence and distribution of plankton fauna depend on a number of factors such as climate change, habitat physicochemical properties, and biotic factors (Ahmad *et al*., 2011 [2], Alexander, 2012 [3], Cottenie *et al*., 2001 [4], Rajagopal *et al*., 2010 [12], Richardson, 2008) [13]. Environmental factors are also important elements; for instance, water temperature impacts the growth and development of organisms and can influence their mortality (Hall and Burns, 2001) [7]. Different species show varied tolerances to increases or reductions in temperature ranges, and particularly sensitive individuals are eliminated by them (Andrulewicz *et al*., 2008, Tunowski, 2009).
The relationship between growth and distribution of plankton is mainly affected by physico-chemical factors. The present work is in relation to physico-chemical properties of Wakadi dam water. Studies on the freshwater reservoirs, lakes and rivers in India started in 1933. The important works in this line are those of (Pruthi, 1933) [10], (Sewell, 1934) [14], (Ganapathi, 1943), (Job, 1943-44) [8] and (Choodamani, 1945) [5]. So, present work is carried out physico-chemical properties of wakadi dam water it helps for investigation of diversity of zooplankton and relationship between physico-chemical properties of water and also, occurrence accordingly to season as well as ecological factor of water in Wakadi dam.

Material and methods
Water sample were collected in sterilized sampling bottle from Wakadi Dam located near Kedar wakadi village tehshil Mantha in Jalna District of Maharashtra. The Dam is constructed on river Dudhana. Wakadi Dam situated area between the latitude 19.5311367 and longitude 76.3931107999999 are the geocoordinate of the Kedar Wakadi. Mumbai is the state capital for Kedar Wakadi village. It is located around 380.4 kilometer away from Kedar Wakadi.. Water sample were analysed different physico-chemicals parameter as per previously and modified methods used are as following.
The temperature of water measured immediately on site of water body by using glass thermometer. P^H of water sample also measured on site with help of Digital PH meter and then in laboratory with help of Deluxe P^H meter-101 Model, Conductivity were measured by conductivity meter EQ 660B µp Based model. Turbidity of the water samples were measured using a turbidity meter, Alkalinity of determined by Titration Method, TDS (mg/L) measured by TDS meter and hardness and chloride were determined by titration method and also remaining parameter measured and determined according to APHA, 2012, NEERI, Govt.of India.

Zooplanktons Sample collection
Zooplanktons collections from 50 liters of water samples were filtered by using the 125µ mesh size plankton net and preserved in 4% formalin. Literature was used for taxonomic position and identification of the plankton (Tonapi, 1980; APHA 2005).


Photo 1: sample collection site 1


Photo 2: sample site 2


Photo 3: sample site 3

Results and Discussion

Table 1: Physico-chemical parameter of Wakadi dam water

Sr. No.	Physico-chemical Parameter	Average value in Years 2021-22		
		Sample 1	Sample 2	Sample 3
1	pH at 25°C	07.80	07.90	08.03
2	Electrical conductivity(dS/m)	182.91	183.83	183.33
3	Total dissolved solid(mg/L)	109.08	111.91	116.75
4	Total hardness(mg/L)	77.75	62.18	94.08
5	Alkalinity(mg/L)	90.00	92.16	92.41
6	Calcium as Ca++(mg/L)	18.14	22.19	21.83
7	Magnesium as Mg++(mg/L)	10.15	06.21	05.24
8	Chloride(mg/L)	10.37	09.77	13.63
9	Free CO2	05.30	04.76	04.61
10	Dissolved oxygen (DO) (mg/L)	04.09	04.83	04.15
11	Biochemical oxygen demand (BOD) at 5th (mg/L)	09.62	04.46	06.03
12	Chemical oxygen demand (COD) (mg/L)	54.35	25.77	56.22
13	Free ammonia(mg/L)	00.22	00.55	00.48
14	Nitrite(mg/L)	00.02	00.01	00.02
15	Phosphate(mg/L)	00.36	00.38	00.39

Note: -All results in three replicates

Present water sample of wakadi dam collected from three different site of dam were P^H observed in sample site 1 was 07.80 followed by 07.90.and 08.03 respectively but P^H of all three-sample showed difference within same dam water sample. Also, Electrical conductivity (dS/m) were measured 182.91, 183.83 and 183.33 respectively.

The TDS of all water sample are 109.08, 111.91 (mg/l) and 116.75 and also total hardness of all three-water sample are 77.75, 62.18 and 94.08 (mg/l).

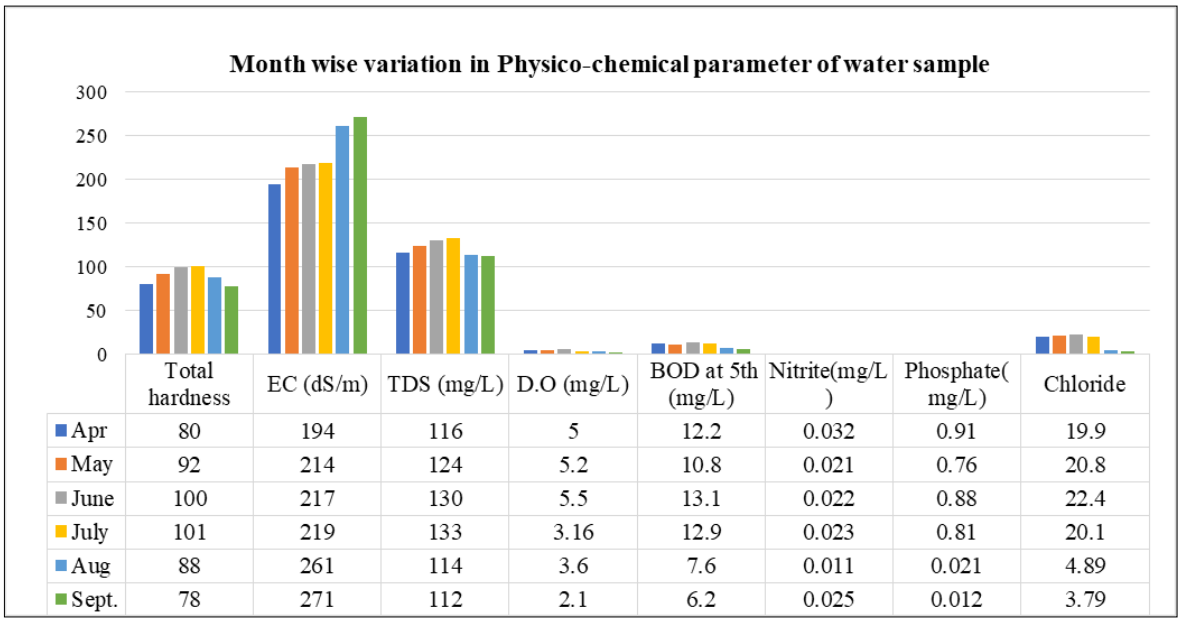
In the present three sample of water Alkalinity were highest recorded in sample site (3) are 92.41 followed by 92.16 and 90.00 mg/l and also Calcium as Ca++(mg/L) were recorded from three sample of water 18.14, 22.19 and 21.83 in which highest recorded in sample site 3.

Dissolved oxygen (DO) (mg/L) also recorded from all three sample of water are 04.09, 04.83 and 04.15 respectively. The highest DO record in sample site 2 mentioned in Table 1. And Biochemical oxygen demand (BOD) at 5th (mg/L) highest recorded in sample site 1.

Abba A. *et al.*, (2016) [1] reported sources of high BOD values at Katsina metropolis, Katsina Nigeria as a result of high rate of decaying of organic matter in the water. Nitrate-Nitrogen and Phosphate-phosphorous concentrations were also higher in May with0.36 ± 0.05 and 0.24 ± 0.02mg/l each.

Table 2: Month wise variation in physico-chemical parameter of water 2021-22

Parameter (Sam.1)	Month wise variation in physico-chemical parameter of water 2017-18					
	Apr	May	June	July	Aug	Sept.
	07.80					
Total hardness	80	92	100	101	88	78
E.C. (dS/m)	194	214	217	219	261	271
TDS (mg/L)	116	124	130	133	114	112
D.O (mg/L)	5	5.2	5.5	3.16	3.6	2.1
BOD at 5th (mg/L)	12.2	10.8	13.1	12.9	7.6	6.2
Nitrite(mg/L)	0.032	0.021	0.022	0.023	0.011	0.025
Phosphate(mg/L)	0.91	0.76	0.88	0.81	0.021	0.012
Chloride	19.9	20.8	22.4	20.1	4.89	3.79



	Total hardness	EC (dS/m)	TDS (mg/L)	D.O (mg/L)	BOD at 5th (mg/L)	Nitrite(mg/L)	Phosphate(mg/L)	Chloride
Apr	80	194	116	5	12.2	0.032	0.91	19.9
May	92	214	124	5.2	10.8	0.021	0.76	20.8
June	100	217	130	5.5	13.1	0.022	0.88	22.4
July	101	219	133	3.16	12.9	0.023	0.81	20.1
Aug	88	261	114	3.6	7.6	0.011	0.021	4.89
Sept.	78	271	112	2.1	6.2	0.025	0.012	3.79

Fig 1: Month wise variation in Physico-chemical parameter of water sample

Present results showed that the total hardness of water sample highest found in July that was 101 mg/l followed by June, may, Aug., Apr and least in sept.2021-2022 respectively.

E.C. of water sample highest found in Sept. that was 211 mg/l and followed by Aug., July, June, May and least in April respectively. Also, TDS highest found in July that was 133 mg/l. (table 2.).

D.O (mg/L) and BOD at 5th (mg/L) of water sample were highest recorded in the month of June that was 5.5 mg/l and biological oxygen demand (BOD) 13.1 mg/l. followed by May.

Nitrite (mg/L), Phosphate(mg/L) and Chloride were highest recorded in April that was 0.032, 0.91 and 22.4 in June respectively.

According to Rajagopal *et al*., (2011) zooplankton plays an integral role and serves as

bio-indicator and it is a well-suited tool for understanding water pollution status.

Mahar (2003) [9] reported factors such as light intensity; food availability, dissolved oxygen, and predation affect the population composition of zooplankton. There were high zooplanktons composition and abundance during the month of June.

According to Abba *et al*., (2016) [1] studies that physico-chemical properties of water possitve impact on the Percentage compositions of Zooplankton indicate that *Copepods* has the highest percentage with 30.54% also the highest number of zooplanktons were recorded in the month of May while the least percentage were recorded in the month of April.

Rotiferans are the second in abundance 20.3% followed by *Cladocerans* with 19.6% in which their highest percentage were recorded in the month May and lowest in April and protozoans identified was 79 which account for 13.78% of the total Zooplankton identified; the highest number was recorded in the month of May while the lowest was in April.

The total number of *Cladocera* identified during the period of the study was 138, which accounted for the 19.60% of the total Zooplankton identified during the period of the study. Total number of Crustacean identified was 111 which account for 15.76% of the total Zooplankton identified; the highest number was recorded in the month of June while the lowest was in September. The zooplankton composition and abundance vary with month, which may be due to fluctuation of physic-chemical parameters and reduction in abundance of phytoplankton, which are the primary producers.

Conclusion

Zooplankton communities are highly sensitive to physico-chemical parameters variation and It plays an active role in the modification and remineralization of the particulate organic matter in the water. Also, these physico-chemical parameters help for further studies of zooplankton diversity and correlation with its parameter of dam water according to season Hence, they are effective tools in the studies of zooplankton.

References

1. Abba A, Ibrahim S, Ugya AY. Physico-chemical Evaluation of Wastewater in Katsina Metropolis, Katsina Nigeria, Bayero Journal of Pure and Applied Sciences,2016:10(1):312-314. ISBN 2006-6996.
2. Ahmad U, Parveen S, Khan AA, Kabir HA, Mola HRA, Ganai AH. Zooplankton population in relation to physico-chemical factors of a sewage-fed pond of Aligarh (UP), India BLM,2011:3(SI2):336-341.
3. Alexander R. Interactions of zooplankton and phytoplankton with cyanobacteria Univ. Nebraska (diss.), 2012.
4. Cottenie K, Nuytten N, Michels E, De L. Meester Zooplankton community structure and environmental conditions in a set of interconnected ponds Hydrobiologia,2001:442(1-3):339-350.
5. Choodamani NV. Report of Madras Rural Pisciculture Scheme for 1944-4.5, Madras Government Press, 1945.
6. Ganapati SV. An ecological study of a garden pond conlaining al~undant zooplankton," Prec. Ind. Acad. Sci.,1943:17:41-58.
7. Hall CJ, Burns CW. Effects of salinity and temperature on survival and reproduction of *Boeckella hamata* (*Copepoda: Calanoida*) from a periodically brackish lake J. Plankton Res.,2001:23(1):97-103.

8. Job TJ. Report on Madras Rural Piscicultural Scheme, Madras Government Press, 1943, 44.
9. Mahar MA. Ecology and Taxonomy of Plankton of Manchhar Lake (Distt. Dadu), Sindh, Pakistan. Unpublished PhD. Thesis University of Sindh, Pakistan. Retrieved from: http://usindh.edu.pk.mukhatiar.ahmadlD essertation_mukhatiar, 2003.
10. Pruthi HS. Studies on the bionomic, s of freshwater in india--I. Seasonal changes in the physical and chemical conditions of the waters of the tank in the Indian Museum Compound," htternat. Rev. Ges. Hydrobiol-u. Hydrograph.,1933:28:46-67.
11. Rajagopal T, Thangamani A, Sevarkodiyone S, Sekar M, Archunan G. Zooplankton Diversity and physicochemical Conditions in three Perennial Ponds of Virudhunagar District, Tamilnadu. Journal of Environmental Biology,2010:31:265-272.
12. Rajagopal T, Thangamani A, Sevarkodiyone SP, Sekar M, Archunan G. Zooplankton diversity and physico-chemical conditions in three perennial ponds of Virudhunagar district, Tamilnadu J. Environ. Biol.,2010:31(3):265-272.
13. Richardson AJ. In hot water: zooplankton and climate change ICES J. Mar. Sci.,2008:65(3):279-295.
14. Sewell RBS. Studies on the bionomics of freshwater in India," lnternat. Rev. Ges. Hydrobiol-u Hydrograph.,1934:31:203-38.