

Hydrobiological Studies and Zooplankton Diversity of Sagar Talao District Bhandara Maharashtra

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Abstract: Air, water, land, flora and fauna are the natural resources of any ecosystem. Water is very important for existence of life. It is the medium, which gave birth to first primitive living molecules, as the living organisms found in water are reliable indicators of water quality. The distribution and diversity of zooplankton in aquatic ecosystem depends mainly on the physico-chemical properties of water. For the study of water quality, the limnological observation is needed. Most of the organisms are being extensively used as indicators of water pollution. The biological indicators provide a direct clue and quick information of the aquatic systems. In present study, the zooplankton of the Sagar Talao was studied for a period of one year with its physico chemical factors. In present study total of 09 species of zooplanktons belonging to Rotifera, Ostracoda Cladocera, Copepoda, were present..

Keywords: Flora, Fauna, Zooplankton, Limnological

I. INTRODUCTION

The availability of pure and clean water is now a burning topic everywhere in the world. Ensuring that water quality in aquatic environment remains within natural ranges is essential for maintaining viable, abundant and diverse communities of organisms. The addition of excessive levels of naturally occurring or synthetic compounds, such as oil and grease, pesticides, mercury and other trace metals, and non metallic toxins can harm aquatic life and people that depend on these aquatic resources. As the flowing water is able to carry a load of sediment proportional to its flow, many excess is deposited in riverbeds, lakes and reservoirs and on food plains, this shortens the life of the individual water bodies Welcomme R. L. (2007). The assessment of biological communities present in an aquatic environment reflects the quality of the ecosystem; biological communities integrate the effects of different stressors and thus provide a broad measures of their aggregate impact.

Zooplankton constitutes one of the most fascinating groups of microorganisms found in the aquatic environment Kabra et al.(2016). They play a key role in transference of energy at the secondary tropic level in the aquatic ecosystem. The prevalence and abundance of zooplankton depends on the productivity, which in turn is influenced by the physical and chemical parameters and the level of nutrients in the aquatic ecosystem. Further, changes in the season indirectly influence the physico-chemical conditions of freshwater bodies which in turn influence the dynamics of the plankton (Kumar *et al.*, 2007). The knowledge of zooplankton abundance, species diversity and specific distribution is helpful in understanding the tropic progression of water bodies Verma and Dutta Munshi (1987). Since, the zooplankton in the aquatic food chains are consumed by variety of secondary consumers including economically important groups of crustaceans such as prawns, lobsters, crabs and fishes, hence they play a key role in indicating the presence and absence of various species of such freshwater bodies. Srivastava *et al.*, (2006).

Therefore, to monitor the water quality and diversity of zooplankton the present investigation attempt on Sagar Talao of Bhandara Dist. Bhandara during study period of one year.

II. MATERIAL AND METHODS

2.1 Collection of Water Samples for Physic– Chemical Analysis

The present study carried out for one year from January 2020 to December 2020. The main aim of present study was that to assess the water quality and zooplankton diversity. The water samples were collected from four different sites during morning hours between 10.30am to 11.30am in different 5 lit. Plastic cans.

All the parameters like Temperature, pH, DO, CO₂, BOD, COD, Phosphate, Nitrate were analyzed according to the standard methods (APHA 2005 and Trivedi and Goel 1986).

2.2 Plankton Collection

The physical and chemical characteristics of water affect the abundance, species composition, stability and productivity of the indigenous populations of aquatic organisms. The biological methods used for assessing water quality includes collection, counting and identification of aquatic organisms; biomass measurements; measurements of metabolic activity rates; toxicity tests; bioaccumulation; biomagnifications of pollutants; and processing and interpretation of biological data. Qualitative studies of the zooplankton population were made at the studies as per the standard methodology given in Ruttner (1953) and Wetzel (1983). Plankton samples were collected by standard plankton net made of nylon monofilament screen cloth with a mesh size of 120μ and 60μ.

2.3 Observation

Table 1: Showing Seasonal Variations of Physical and Chemical Parameters of Sagar Talao, District Bhandara

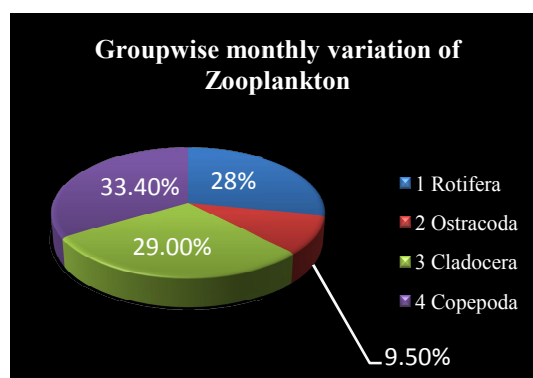
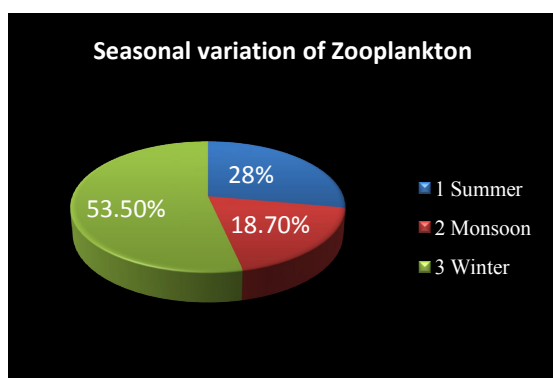
Sr. No	Parameters	Summer	Winter	Monsoon
1.	Temperature	37 ⁰ C	30 ⁰ C	31 ⁰ C
2.	pH	7.7	7.4	7.6
3	DO (mg/lit.)	4.8	5.9	5.0
4.	CO ₂ (mg/lit.)	6.3	5.4	6.1
5.	BOD (mg/lit.)	14.3	11.1	12.1
6.	COD(mg/lit.)	7.8	7.1	7.3
7.	Phosphate (mg/lit.)	24	20	19.7
8.	Nitrate (mg/lit.)	24.6	20.4	18.6

Table 2: Monthly variations of Zooplankton of Sagar Talao, District Bhandara

Sr. No.	Zooplankton	Mar.	Apr.	May	Jun.	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan	Feb.
A)	Rotifera												
1)	Keratella sp.	05	03	02	-	02	01	02	05	06	07	08	07
2)	Asplanchna sp.	03	02	01	00	00	00	02	03	04	03	04	03
3)	B.Fulcatus	03	01	01	01	01	00	02	03	03	04	05	04
B)	Ostracoda												
1)	Cypris sp.	02	03	01	02	01	01	02	03	04	05	06	04
C)	Cladocera												
1)	Moina sp.	06	04	02	01	01	02	02	03	04	06	07	05
2)	Daphnia sp.	07	06	03	04	03	02	01	06	06	07	08	08
D)	Copepoda												
1)	Nauplius	06	05	03	00	00	00	02	04	07	08	09	07
2)	Cyclops sp.	07	06	05	05	04	03	02	03	06	07	08	06
3)	Eucyclops sp.	00	00	00	00	00	00	00	01	02	02	01	01

Table 3: Group wise monthly variation of Zooplankton at Sagar Talao

S.N.	Season	Summer				Monsoon				Winter				Total
		Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	
1)	Rotifera	11	06	04	01	03	01	06	11	13	14	17	14	101
2)	Ostracoda	02	03	01	02	01	01	02	03	04	05	06	04	34
3)	Cladocera	13	10	05	05	04	04	03	09	10	13	15	13	104
4)	Copepoda	13	11	08	05	04	03	04	08	15	17	18	14	120
	Total	39	30	18	13	12	09	15	31	42	49	56	45	
	Seasonal Total	100				67				192				359



III. RESULTS AND DISCUSSION

In present study the temperature fluctuate between 31⁰C to 37⁰C as expected, summer months such as March, April and May recorded high and winter with low temperature. pH fluctuated between 7.4 to 7.7. The minimum pH was recorded in monsoon which was mainly attributed to rain water after a long dry period, and maximum pH was recorded during summer. In the present study Dissolved Oxygen ranged from 4.8 to 5.9 mg/l, it was maximum in winter and minimum in summer Similar observations are done by Vinita Kashyap(2014).

In the present study maximum CO₂ recorded in 6.3 mg/l in summer and minimum in monsoon 5.4 mg/l. Minimum BOD value 11.1 mg/l recorded in monsoon and maximum value 14.3 mg/l recorded in summer. The BOD attended its high peak during summer and low peak inmonsoon.COD value ranges from 7.1 to 7.8 mg/l, the COD variations went on changing with seasons and also with release of chemical substances like sewage.

In present investigation the minimum phosphate recorded in monsoon 19.7 mg/l. and maximum was 24 mg/l. in summer. Nitrates is most important plant nutrient, it is found in associated with fertilizers, human and animal waste and sludge discharge, excess of nitrates cause eutropication. In present investigation It was minimum in monsoon 18.6 mg/l. and maximum in summer 24.6 mg/l similar observations was done by Patil Rahul Shivajiet *al.*, (2015). Zooplankton constitutes one of the most important and fascinating groups of microorganisms found in the aquatic environment. The abundance, species diversity and the specific distribution of zooplankton is helpful in understanding the productivity status of the lake.

In the present study there are four groups of zooplankton are observed i.e. Rotifera, Ostracoda, Cladocera and Copepoda. In Rotifera group, *Keratella sp.*, *Asplanchna sp.* and *B.fulkatus* observed. In Ostracoda only one *Cypris sp.* was seen and in Cladocera there are two sp. of zooplanktons are observed *Moina sp.* and *Daphnia sp.* and the last group is Copepoda in this *Nauplius*, *Cyclops sp.* And *Eucyclops sp.* was observed similar observation was done by Jayabhaye (2010).

IV. CONCLUSION

This study would help the water quality monitoring and management in order to improve the quality of water with maintaining better sustainable management. The water quality can be improved by creating awareness in local public about the degrading status of water bodies, by making people understand about proper use of fertilizers, pesticides and dumping sewage in water bodies and also formulating action plan to save the water bodies from drastic degradation. The present investigation reveals that the diversity of zooplankton plays very important role in the functioning of freshwater ecosystem. In present investigation 09 species of zooplanktons were recorded, the diversity and population of zooplanktons in water provided significant information about the available sources for supporting life and for fishery development of any water body. Now a day because of water pollution and human interference, conservation of every aquatic organism is essential to maintain the biodiversity on earth.

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