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Zooplankton diversity from Girija dam, near khultabad dist. Aurangabad (MS).

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Abstract

This study was carried out to analyse the quality of the Girija Dam Khuldabd District Aurangabad. Planktons are the basic food source of an aquatic ecosystem. Zooplankton diversity is one of the most important ecological indicators for the assessment of water quality. This study was designed to analyse the diversity of Zooplankton of the Girija Dam, relation to from the period of January to December 2022, and the results were recorded periodically. The results revealed that the diversity of Zooplanktons are great good indicators for the river ecosystem and influenced by the quality of river water. The Rotifers are the commonly observed and most dominant zooplankton species present in the Girija Dam. The variation in biodiversity of the water body can be related to water quality. Zooplanktons are also very useful as biological indicators of water quality.

Keywords: Zooplankton; Girija Dam; biological indicator; water quality.

Introduction

Girija Dam is an earthfill dam located on the Girija River near Khultabad, District Aurangabad Maharashtra, India. The dam's geographical coordinates are Latitude, 20°-3'-42.22" N and Longitude: 75°-12'-31.88" E. The dam covers the catchment area of - Catchment area: 775 km² (299 sq mi). Water level in the dam depends mainly on the rainfall. Basically this dam was constructed for the purpose of irrigation, Pisciculture and drnking purpose.

Aurangabad district (Maharashtra) has a semi-arid climate under the koppen classification. South-west monsoon season (June to September) the main rainy period. Post-monsoon (October – November) generally dry and winter (December-February) cool and dry. Summer (March -may) hot and dry.

Planktons forms the basic level of food chain. They are microscopic group of organisms including both plants and animals (Sommer, 1994). According to Keller et al., 2008, planktons are important bio-indicators of water quality. They play significant role in biogeochemical cycles like methanogenesis remineralization, nitrification, denitrification and carbon cycle. Planktons play major role in the food chain of many aquatic animals. Planktons are the source of life for most of aquatic organism especially in their larval stages. Many fish species depend on it as a food source after absorbance of yolk sac. It has been professed from long time back that Planktons are the major resource of nourishment for fish larvae. Planktons play vital role in the energy transmission at secondary level in any aquatic ecosystem.

Zooplanktons community includes Rotifera, Copepoda, Cladocera and Ostracoda. The relative abundance of each other is influential over community structure, which depends upon the relative range of tolerance towards changing seasonal physic-chemical properties of water as well as relative abundance of resource available. Planktons feeding on same resource in a homogenous environment cannot co-exist because of competitive exclusion (Hutchinson 1961). Planktons are bioindicators of the pollution. Abundance of Rotaria and Asplanchuna in water is indicator of water pollution (Gholap, 2014). Few members of rotifer when present in abundant number is indication of eutrophication of lakes, they are Brachionus forficula, Brachionus nilsoni, and Trichocercasp (Azma Hanim Ismail et al, 2016). In a study of lake Parque Atalaia in America, Rotifera diversity was markedly low during dry season under the influence of pollution of water by inlet of domestic sewage (Neves et al., 2003).

Materials and Methods

For the current review, water tests were gathered from four unique destinations of Girija dam haphazardly. The water samples were gathered by norms and method for assessment of water and waste water American Public Health Association (APHA1989) and Test (Physical and Chemical) for water. Temperature and pH of water was recorded at the time of sample collection. Temperature is measured with help of glass thermometer. Temperature is recorded after two hours of sunrise concurrently with water sample collection. Test water collection time is retained unchanged throughout the year. Other physico-chemical parameters like turbidity, TDS (Total Dissolved Solids), OD, BOD etc. were analysed in the laboratory. The water samples containing planktons were carefully transferred to the bottle and brought to the laboratory without disturbance. Samples were collected twice in a month from all four stations of dam, for period of 12 months from January 2022 to December 2022. The samples were collected during morning hours. Planktons were observed under a light microscope and identified by using standard Key, other literature (APHA, 1998; Dhanpati 2000, Permak 1989).

Results and Discussion

Water temperature was observed highest in May and least in December (Table 1). Turbidity and Electric conductivity (EC) increases with the accumulation of rainfall in rainy season. Therefore both of these parameters are more in month of August and March which correlates with maxima of rainfall (Table 1). pH diminishes with expansion of downpour water rainstorm yet despite the fact that it never reach under 7 or acidic level that is the vacillation is inside the range of fundamental pH. During summer season at hotter temperature the pH is high (Table 1). Turbidity increases in the rainy season showing peak in month of August (Table 1). Dissolved Oxygen (DO) follows the example of consolidated impact of temperature and precipitation. Dissolved oxygen decreases in summer season while the monsoon rain enhances concentration of DO in water (Table 1). Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) however follow a similar example yet too low upsides of BOD over COD demonstrates the degree of natural contamination in the supply from homegrown sewage, human

mediation and that too in summer season when amount of water in repository was relatively less (Table 1). Among zooplanktons Rotifera, Copepoda, Cladocera and Ostracoda are recorded from the study area. In summer season especially in the month of May all the zooplanktons counted highest in number that is organisms per litter. In winter season that is in December organisms count is less (Table 2). Zooplankton count lowered with the arrival of rainfall in the month of June due to influx of rainwater. The quantity of rainfall and the quality of inlet water through agriculture runoff along with temperature are the important factors that directly or indirectly govern all other abiotic factors considered here like total TDS, pH of water and BOD and COD. In summer season Rotifera, Copepoda, Cladocera and Ostracoda predominate in terms of quantity and diversity than other seasons.

Table 1: Physico-chemical Parameters of water samples from Girija Dam.

Month	Temperature	pH	EC	Turbidity	TDS	DO	BOD	COD
January	23.5	**7.9**	461.44	7.7	330	**6.7**	5.6	13.8
February	32.3	8.1	488.17	8.9	350	5.1	5.1	13.5
March	33.2	8.2	552.88	9.3	400	5.2	5.2	13
April	**37.5**	8.3	541.78	805	390	**4.5**	4.8	11
May	35.5	**8.7**	482.62	8.3	350	4.9	**4.4**	**10.4**
June	29.5	8.5	579.21	9.6	420	5.3	5.5	19
July	27.3	8.3	633.72	12.6	460	5.4	7.3	20.1
August	27.8	8.2	769.26	15.6	560	5.6	7.7	21
September	26	8	729.10	15.0	530	5.7	**8.9**	**22.5**
October	25	8.1	695.07	13.6	500	5.9	8.2	18
November	22.5	8.2	646.28	11.7	470	6.1	6.8	16.2
December	**21.5**	8.3	538.50	11.3	365	6.3	6.4	15.9

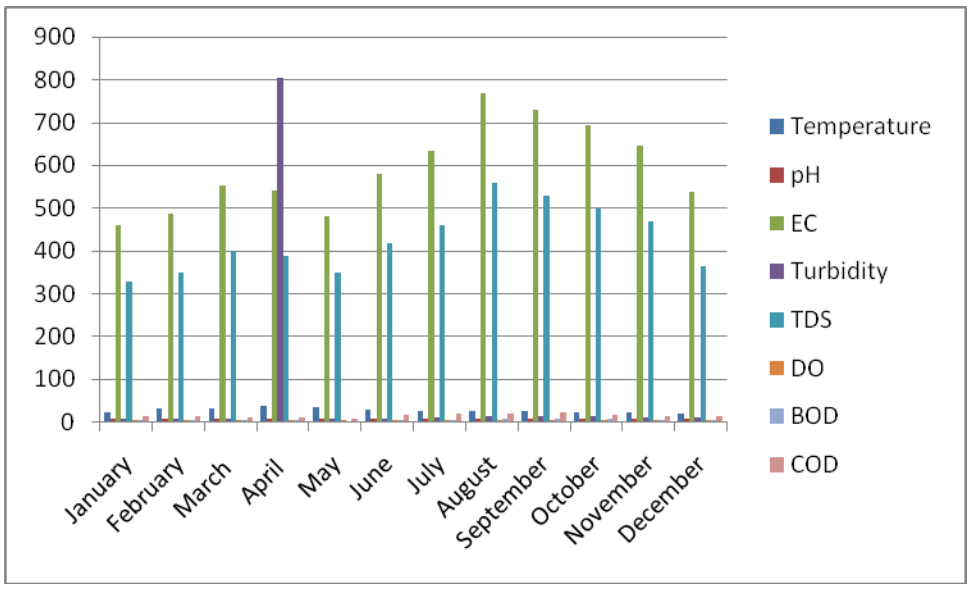
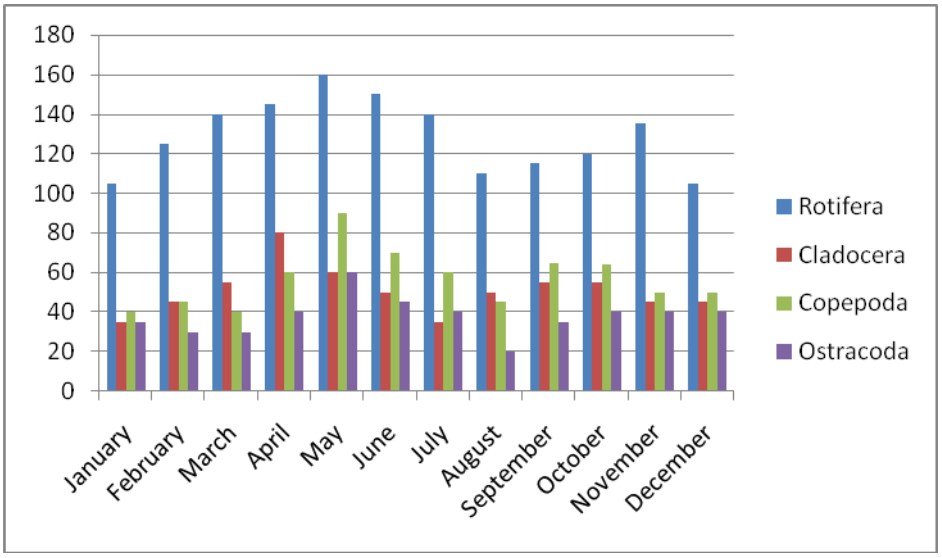


Table 2: Total Count of Zooplanktons recorded from the water samples of Girija Dam (Organisms / Lit.).

Month	Rotifera	Cladocera	Copepoda	Ostracoda
January	105	35	40	35
February	125	45	45	30
March	140	55	40	30
April	145	80	60	40
May	160	60	90	60
June	150	50	70	45
July	140	35	60	40
August	110	50	45	20
September	115	55	65	35
October	120	55	64	40
November	135	45	50	40
December	105	45	50	40



Rotifera dominates the zooplankton community. 10 species of Rotifera are recorded from collected water samples (Table 3). Brachinus species dominate among the Rotifera. Among zooplanktons 08 species of Cladocera (Table 3), 05 Copepodes (Table 3), and 02 species of Ostracoda (Table 3), are recorded from the collected samples. It has been observed that rotifera dominated the community throughout the year pursued by Ostracoda, Copepoda and least is Cladocera. Growth rate of inhabitants may be highest in summer season especially in the month of May which follow high temperature and count is lowest in winter season during November and December. Thus temperature is the significant physical factors that rule the population either directly by affecting the population growth rate or indirectly by affecting other physicchemical parameters. Along with rainfall quality of runoff influx mainly affects the zooplankton diversity in an aquatic ecosystem. Rotaria and Asplanchuna were found relatively abundant in collected water sample which is indicator of water pollution. Eutrophication indicators Brachionus forficula, Brachionus nilsoni, and Trichocerca sp are also recorded from the collected water examples.

Table 3: List of Zooplanktons observed from the water samples of Girija Dam.

Rotifers	Cladocera	Copepoda	Ostracoda
Asplancha priodonta	*Cerodaphnia corunuta.*	*Anostrac sp.*	*Cypris sp.*
Brachionus calyciflorus	*Cerodaphnia macrura*	*Calanoid noupli*	*Stenocypris sp.*
Brachionus diversicornis	*Cerodaphnia sp.*	*Cyclop sp.*	
Brachionus falcatus	*Diphanosoma sp.*	*Mesocyclop hyalinus*	
Brachionus forficula	*Moina brachiata*	*Mesocyclop sp.*	
Brachionus havanaensis	*Moina sp.*		
Brachionus sp.	*Sida sp.*		
Filina longiseta	*Alona sp*		
Platyias polyacanthus			
Pompholyx sulcata			

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