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A Comparative Analysis Of Hydrological Variations With The Abundance Of Zooplankton Community During Different Season Intervals From Yelabara Location Of Waghadi River Near Ghatanji Region Dist. Yavatmal, Maharashtra (M.S)

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Abstract:
Hydrological parameters indicate the health of aquatic habitat, as the climatic condition changes the ecosystem diversity pattern also shows fluctuation. Zooplanktons are the important intermediate species in aquatic ecosystems which serve the major role in the food chain. The total investigation is carried out from Waghadi river in Yelabara region during March to December 2023 during present study we reported 10 different zooplanktons species with seasonal variations out of which 3 species from Rotifers, 2 species from Copepoda,3 species from Cladocera and 2 species from Ostracoda. Along with this we analyze different hydrological parameters i.e. temperature, p H, Transparency alkalinity, dissolve oxygen, and phytoplankton abundance during different season intervals i.e. summer, monsoon and winter.

Keywords: Diversity, Zooplankton, Hydrological parameters, Abundance, Aquatic ecosystem

Introduction:

The organization of aquatic ecosystems, including zooplankton, is determined by the presence of various environmental conditions. Zooplankton are microscopic organisms that consume other plankton. Zooplankton play a crucial role in the freshwater ecosystem's food web which is involved in connecting autotrophs and heterotrophs. Zooplankton are the food source for creatures at higher trophic levels. The organization of aquatic ecosystems, including zooplankton, is determined by the presence of various environmental conditions The distribution of zooplankton community depends on a complex of factors such as, change of climatic conditions, physical and chemical parameters and vegetation cover (Rocha et al., 1999; Neves et al., 2003). Zooplankton are also beneficial indicators of alterations in the environment because of climate change or pollution so, understanding seasonal changes in zooplankton community structure and distribution patterns is extremely valuable in assisting research on ecosystem dynamics and the possible effects of climate change. Some hydrological parameters of aquatic ecosystems exhibit changes in abundance patterns. Variations in water volume and velocity have a substantial impact on the distribution and abundance of zooplanktons. Temperature directly influences zooplankton metabolic rates, reproduction, and species composition. Changes in water clarity affect zooplankton feeding and predator-prey interactions. Seasonal variations in nutrient availability affect phytoplankton growth, which serves as a primary food source for zooplankton. The relationship of

zooplankton and phytoplankton is dependent on interaction of these species as the phytoplankton are microscopic, plant-like organisms that perform photosynthesis, converting sunlight and nutrients into energy. They form the base of the aquatic food web, producing organic matter that sustains other organisms and zooplanktons that feed on phytoplankton. They act as the link between primary producers and higher trophic levels, such as fish. Zooplankton grazing on phytoplankton controls phytoplankton populations. This grazing is a major factor in the flow of energy through aquatic food webs. The balance between phytoplankton and zooplankton populations is crucial for maintaining a healthy aquatic ecosystem.

Material Method:

Study Area: Yelabara is a village in Yavatmal District of Maharashtra State, India. It belongs to Vidarbha region. It belongs to the Amravati Division. It is located 29 KM towards East from district headquarters Yavatmal. 26 KM from Yavatmal. Ghatanji are the nearby towns to Yelabara having road connectivity to Yelabara. Waghadi river in Yelabara region located at Latitude/Altitude: 20.2634854°N 78.3078003°E. Waghadi river is one of the most important tributaries of river Painganga, and flows through the cities of Kelapur, Ghatanji and Yavatmal Also river covers different villages near these cities. Waghadi river Covers almost 80 Km. There is a Waghadi dam constructed in Yelabara near Ghatanji, Yavatmal district in state of Maharashtra. Waghadi Project and Dam's Official Designation is Waghadi :D-01427. Waghadi Dam was constructed as part of irrigation projects by the Government of Maharashtra in the year 1978.

Sample collection: Assessment of hydrological factors of aquatic medium were taken simultaneously with zooplankton sampling. Water transparency was determined with a Secchi disk and temperature, oxygen concentration, Alkalinity, and pH were measured by standard methods.

Zooplankton sample collection: Zooplankton and phytoplankton samples collected at mostly morning sessions. Plankton hand net made of nylon bolting cloth (mesh size 25µm) was used for sampling purpose. Planktonic networks as a filter, it is the most common method for collection After collection of concentrated plankton samples were fixed and preserved as early as possible in 4% formalin, 2 to 3 drops of glycerin were added to it. A pinch of detergent powder was also added to avoid the aggregation of zooplankton. Samples were collected in separate glass phials with labels containing name of site, date of sampling, time of sampling, Identification of zooplankton was done with the help of a compound microscope. A dissecting microscope is also used for sorting and counting and for identification and its monographs as well as keys which were suggested by APHA (1985); Tonapi (1980); Dodson and Frey (1991) and Williamson (1991). Population density was quantified by Drop count method of Lackey (1938) and was calculated using the formula of Lackey (1938): $N = n \times v / V$

Where, N = Total no. of organisms/ lit of water filtered, n = Number of zooplankton counted in 1 ml plankton sample, v = Volume of concentrate plankton sample (ml), V= Volume of total water filtered through (L).

Observations and Result:

Table A : Season wise comparative analysis of hydrological parameters

Season Hydrological Parameters	Summer (Mar-Apr-May)	Monsoon (Jul-Aug-Sept)	Winter (Oct-Nov-Dec)
Tempreture	26.6	23.5	22.6
Ph	8.65	7.54	7.63
Transperancy	50.23	35.44	46.30
Alkalinity	268	253	240
Dissolve Oxygen	6.7	6.2	6.5
Total Chloride Present	13.36	12.73	12.56
Phytoplankton Abundance (Org/Lit)	120	256	189

Table B: Season wise status of abundancy of zooplankton species (org/lit)

Zooplankton Abundance		Summer (Mar-Apr-May)	Monsoon (Jul-Aug-Sept	Winter (Oct-Nov-Dec)
Family	**Species**			
Rotifers	Branchionus Calycifourus	_	+ +	+ + +
	Branchinous Caudatus	+	+ + +	+ + + +
	Ascomorpha Saltans	+	+ +	++
Cladocera	Ceriodaphnia Laticaudata	_	+ + + +	+ + +
	Nicsmirnovius Eximius	+	+ + +	+ +
	Bosminopsis Deitersi	+ +	+ +	+ + +
Copepods	Acanthocyclops Capillatus	_	+ + + +	+ +
	Oithona Davisae Cyclopoid Copepod	+	-_	+ + +
Ostracods	Centrocypris	++	+ + +	+ + + +
	Candona Faviolata	+	+ + + +	+ + +

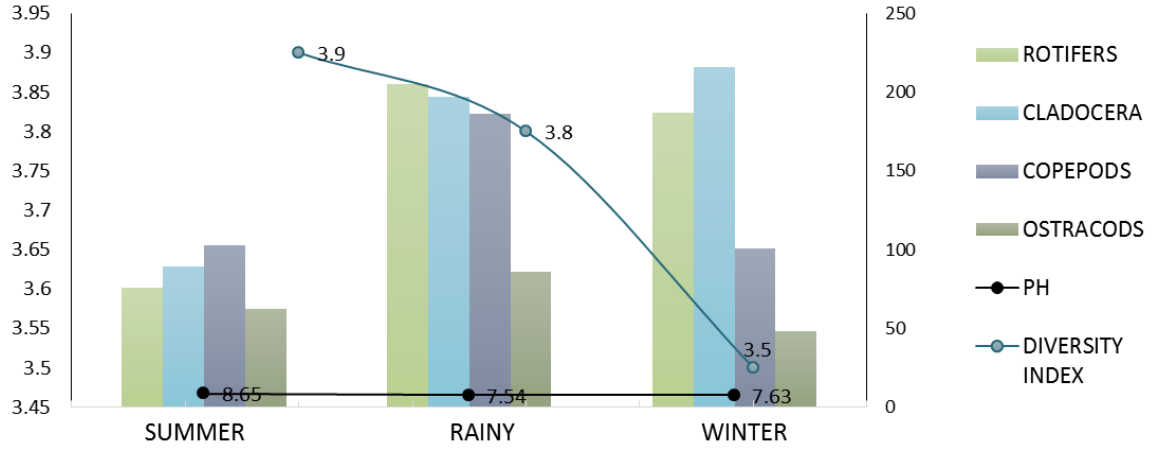
+ + + + Very high species abundance, + + + High species abundance, + + Moderate species abundance, + Low species abundance, - No species abundance

Table C: Season wise distribution of zooplankton families and their diversity index

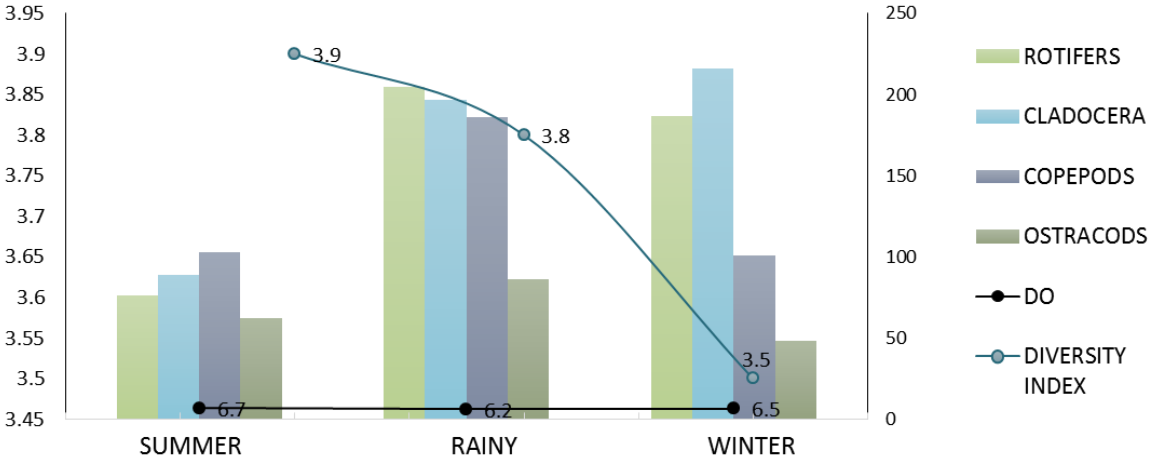
Sr. No.	SEASON	ROTIFERS (org/lit)	CLADOCERA (org/lit)	COPEPODS (org/lit)	OSTRACODS (org/lit)	Total	Diversity Index
1	SUMMER	76	89	103	62	330	3.9
2	RAINY	205	197	186	86	674	3.8
3	WINTER	187	216	101	48	552	3.5
	TOTAL	468	502	390	196		

Comparatve Relationship Of Hydrological Parameter With Zooplankton Diversity

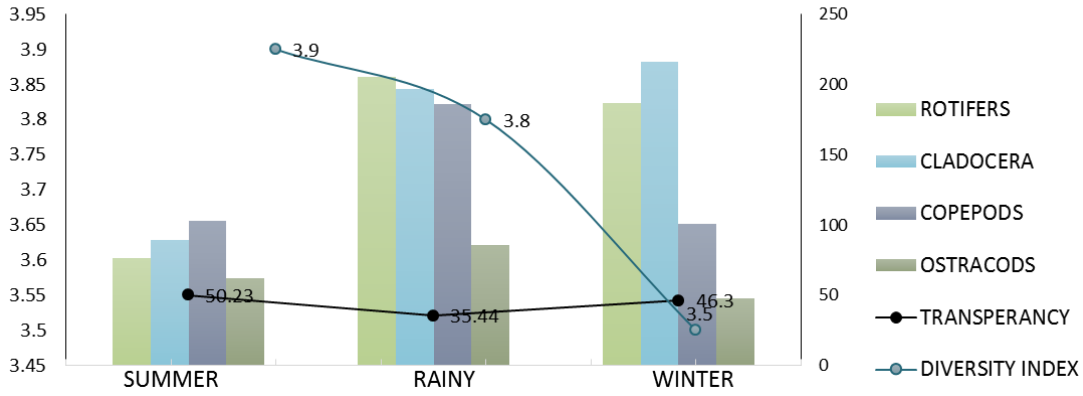
Analysis of zooplankton abundance with water pH



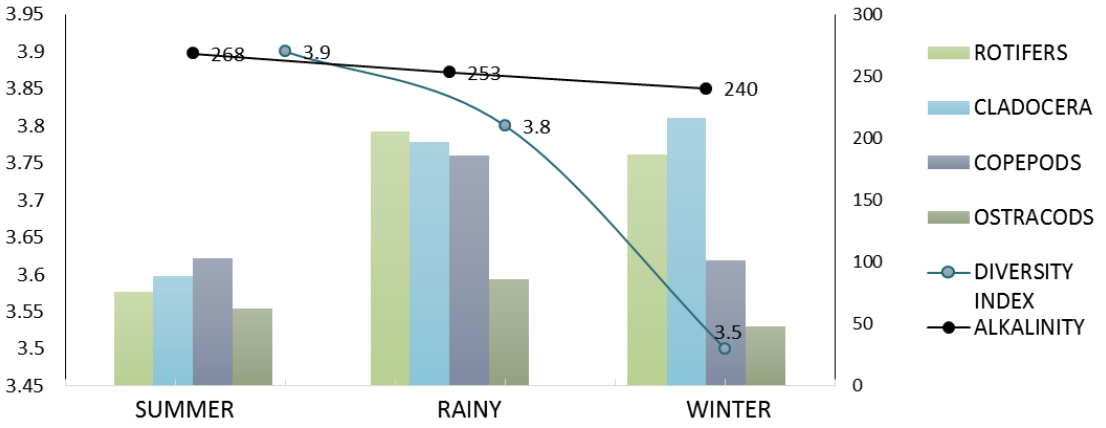
Analysis of zooplankton abundance with water DO



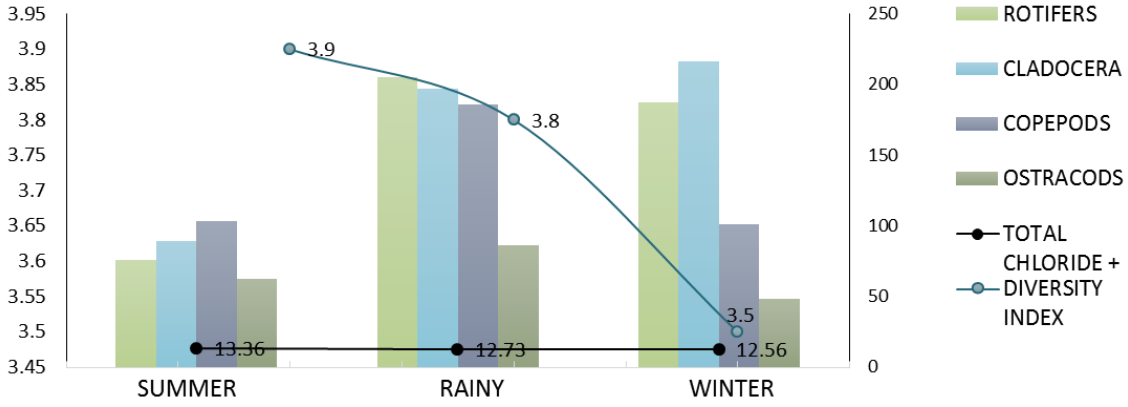
Analysis of zooplankton abundance with water transperancy



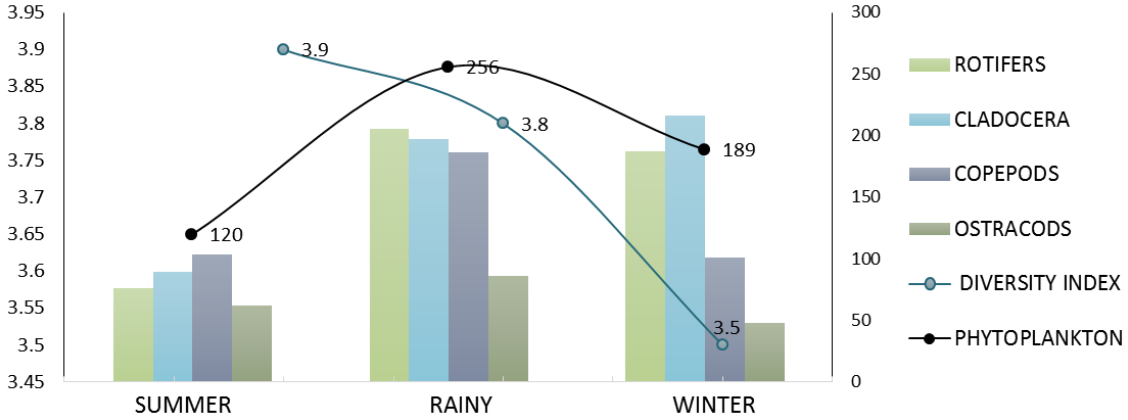
Analysis of zooplankton abundance with water alkalinity



Analysis of zooplankton abundance with total chloride present



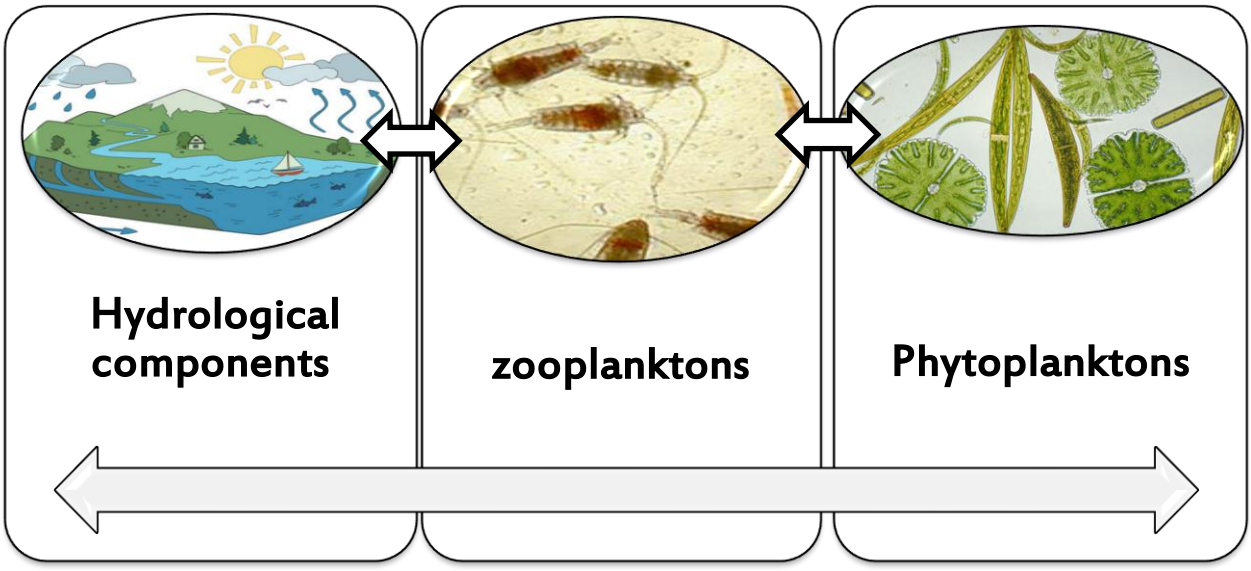
Analysis of zooplankton abundance with Phytoplankton abundance



Above graphs shows that the rainy season is most important season for diversity as well as abundancy of zooplankton and other planktonic species. The abundance of zooplankton species is observed mostly in rainy season that is in (July, August and September) and Least abundancy observed in summer season (March, April and May) and moderate occurs in winter season (Sept, oct and Dec). Given graph indicates that the fluctuation of zooplankton species is high in summer season and least in winter season. The diversity index shows inconsistent distribution of zooplankton species due to

increase in temperature, pH, Dissolve oxygen, water alkalinity during summer and moderately consistent distribution of zooplankton species occurs in winter and rainy season. It indicates that the winter and monsoon season is favorable for distribution of zooplankton species and phytoplankton species. The water transparency declines in monsoon season it restricts the clarity of aquatic medium so it shows negative impact on species interaction. Overall study reveal that the diversity index of zooplankton species is depends on the hydrological component and also depends on interaction with phytoplankton. Total study shows that the most abundant zooplankton species occurs from family Cladocera followed by rotifers, copepods and least abundant are ostracods.

Discussion And Conclusion:



Total study was carried out from waghadi river in yelabara region during march 2023 to December 2023 during present study we reported 10 different species belonging to 4 families these are Branchionus Calycifourus, Branchinous Caudatus, Ascomorpha saltans, Ceriodaphnia laticaudata, Nicsmirnovius eximius, Bosminopsis deitersi, Acanthocyclops capillatus, Oithona davisae cyclopoid copepod, Centrocypris, Candona faviolata. Table B. shows that the status of abundancy of zooplankton species. Present investigation shows that the zooplankton diversity changes according to climatic condition, pattern of water body and all hydrological parameters. the phytoplankton and zooplankton relationship also shows positive as well as negative indication of aquatic ecosystem. pollution has adverse effects on devolvement of aquatic organisms.

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