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On

Applied Zoology, Profitable Animal Production, and Health: Current Status and Future
Progress (NSAZ-2022) 23rd & 24th September- 2022

Recent Trends in Applied Zoology

Dr.D.S.Rathod
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Associate Editors
Dr. K.S.Raut
Mr.Datta Nalle

National Edited Book

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Recent Trends in Applied Zoology

Edited by: Dr.D.S.Rathod

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Index

Chapter	Chapter/Article Title – Name of Authors	Page Number
Chapter 1	Process Upgradation of Indian Dairy Products Khojare A. S.	1-6
Chapter 02	Review on Important role of Danio rerio in Animal and human vaccination research Datta Ashok Nalle, Dnyaneshwar S. Rathod	7-13
Chapter 03	Effect of Dimethote On Biochemical Changes In Lipid Content During Lethal And Sub Lethal Exposure To The Freshwater Fish, <i>Rasbora Daniconius</i> Lokhande, M.V.¹ and Rathod, D.S.²	14-20
Chapter 04	Analysis of chromosome by Karyotyping, banding, and cryopreservation of gametes in fishes Datta Ashok Nalle, Madhuri Y. Bhande	21-28
Chapter 05	Biological Activities of DHA Schiff Base Ligands Dr. Dhananjay Palke	29-34
Chapter 06	Study of phytoplankton Diversity from Papvinash Lake Latur, in relation to Physico-Chemical Parameters Datta Ashok .Nalle	35-41
Chapter 07	A Review on Importance of DNA Bar-coding in Genomic diversity of Freshwater fish Dhanshree M. Jagtap, Dnyaneshwar S. Rathod	42-47
Chapter 08	Review-based Study on Dandelion (<i>Taraxacum Officinale</i>) biologically Effective Molecules for Animal Health with Special Reference to Diabetes Datta Ashok Nalle	48-58
Chapter 09	Study of Adulteration in common Food Items Dnyaneshwar S. Rathod, Manali Aglave , Jabeen Bagwan, and Vaishnavi bhimale	59-63
Chapter 10	Impact of Detergent Pollution on the Oxygen Consumption Capacity of the Fish <i>Cyprinus carpio</i> P. S. Shete	64-68
Chapter 11	A review of the Nutritional advantages of feeding farm animals <i>Cichorium intybus</i> as a supplement Datta A.Nalle, Abhaysinh R. Deshmukh	69-80
Chapter 12	Correlation of nutritional status of college girl students with hemoglobin level and BMI in Latur, Dist. Latur. Raut K.S., Jamale P.B1, Inamdar A.P.	81-86
Chapter-13	Importance of Mulberry plant in Sericulture Dnyanoba R. Awad	87-94
Chapter 14	Influence of four plant based carotenoids on the coloration of two ornamental fishes, Koi carp (<i>Cyprinus carpio</i>) and Molly fish (<i>Poecilia sphenops</i>). Yadav S.G.	95-100
Chapter-15	Omega -3 fatty acid and its use in fish feed formulation Madhuri Y. Bhande	101-106
Chapter 16	Potential use of <i>Spirulina platensis</i> in combating Malnutrition in India Rajkumar D.Kamble , Pratiksha Patil ,Komal Sawase , Vaishnavi U.Phulari , Aishwarya Samarth , Pranita Rathod	107-110
Chapter-17	Morphological diversity of freshwater fishes in Manjarariver, Bori, Latur, Maharashtra, India Vishal K. Moholkar, Amol S. Patil, Dhanshree M. Jagtap	111-115

Chapter 18	Ethanobotanical Studies OnPiper betle L. among the folk peoples of Vidul, Taluka Umardhed, District Yavatmal ,Maharashtra, India. Eanguwar Srinivas Reddy, Shivraj Kashinath Bembekar Rameshwar Ramchandra Bichewar and Saiprabha Shirsat	116-120
Chapter-19	Preservation of ancestral DNA of salmon and other aquatic species with the aid of biotechnology. Datta Ashok Nalle, Swati Ganesh Swami*	121-124
Chapter -20	Bioinformatics Tools for DNA Barcoding Dnyaneshwar S. Rathod, Dhanshree M. Jagtap	125-129
Chapter -21	Analysis of Seasonal Variation in Water Quality Parameters of Manjara River (Nagzari Dam), Latur city. Waghamare Shailaja, Mushtakh Hashmi	130-139
Chapter -22	Study on Zooplankton Diversity in Manjara River (Nagzari Dam), Latur city. Shaikh Hina, Mushtakh Hashmi	140-147
Chapter -23	Use of Indian natural therapies for animals, affordable, and Eco- friendly Datta Ashok Nalle	148-151
Chapter -24	Survey of Latur fish market present status and marketing strategies. Marathwada region [M.S]. India Kakasaheb .S. Raut	152-155
Chapter -25	Phytochemical analysis of Adhatoda vasica L. Dnyanoba R. Awad, Ankita S. Suryawanshi	156-158
Chapter -26	Animal welfare Laws in India provision for use of animals in experiments and product testing in science Datta A.Nalle	159-162
Chapter -27	Effective Medicinal Plant in Cancer Treatment Dnyaneshwar S. Rathod	163-167
Chapter -28	Effective Medication for Varicella and Herpes Zoster Infection. Swati Ganesh Swami	168-171
Chapter -29	Applications of Biophysics in Animal Research Dayanand V. Raje*, Kakasaheb S. Raut**	172-173
Chapter -30	Survey of bee species, life cycle and Honey purification process at Chakur Dist. Latur Kakasaheb .S. Raut	174-177
Chapter -31	Use of Nanotechnology in fish health and aquaculture management Datta A. Nalle, Divya D.Nagapure	178-183
Chapter -32	Organic Aquaculture- the Sustainable Practice toward aquaculture development and Ecofriendly approaches Jadhav Amit, Dnyaneshwar S.Rathod	184-191
Chapter -33	Freshwater Integrated Multi-Trophic Aquaculture (FIMTA) - An Innovative Approach Jadhav Amit, Tekam Ashvini	192-206

Chapter -22

Study on Zooplankton Diversity in Manjara River (Nagzari Dam), Latur city.

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Abstract:

The variety of the zooplankton in the reservoir of the Manjara River Nagzari Dam (Latur, Maharashtra), India, was investigated. Several factors, including water temperature, pH, and DO, which affect the diversity and production of zooplankton, were investigated. Sampling was done from 2022 to 2023 during the three seasons of rainy, winter, and summer. The analysis of physico-chemical parameters in the chosen reservoir revealed seasonal variations. The highest zooplankton density ever observed in the Nagzari Dam was 782.5 no./100 litre during the summer, 765 no./100 litre during the winter, and 736.5 no./100 litre during the rainy season.

Seven zooplankton species in total, with Cypris sp. being the most prevalent species and the Copepoda order being the most frequently observed, were identified in each of the two seasons. The variations in the reservoir's density and diversity can be linked to changes in its physico-chemical properties, which in turn may be caused by its location and a variety of anthropogenic activities. The goal of the current study is to provide preliminary information on the diversity and productivity of zooplanktons that may be used when developing management strategies to increase the productivity of the reservoir.

Introduction:

The seasonal variation of surface water quality has been investigated in the past using multivariate statistical techniques to assess water quality indices, physicochemical properties, and river toxicity. Since water quality variation is a continuous process, updated data on water quality are necessary for water quality evaluation. As a result, the goal of this study was to evaluate the temporal (mainly seasonal) change of the physicochemical properties of the water in the Nagzari Dam.

5. Water Sample Collection And Processing:

In aquatic environments, zooplankton is a significant part of secondary production and is crucial for the movement of energy from the primary to the secondary levels of the ecosystem. The enormous diversity of zooplankton over both geography and time is its most noteworthy characteristic. As a result, different assemblages of organisms with different species compositions and biomasses may exist in comparable aquatic habitats. In addition, zooplankton species have diverse forms of life histories governed by seasonal variations in abiotic variables,

feeding ecology, and predation pressure despite having convergent characteristics. One of the most crucial ecological factors in determining water quality is zooplankton variety.

When taxonomy information for distinct zooplankton species is available, it can be used to calculate a number of indices, including richness, diversity, and evenness indexes. In any aquatic ecosystem, rotifers, cladocerans, copepods, and ostracods are thought to constitute the most significant zooplankton in terms of population density, biomass production, grazing, and nutrient regeneration. Food availability and good water quality are the key factors influencing their diversity and density. The interaction of a number of physical, chemical, and biological parameters, as well as the organisms' tolerance to alterations in one or more of these conditions, determines the plankton population, on which the entire aquatic life depends directly or indirectly.

The factors that most strongly influence the formation of planktonic biomass are the water quality parameters and the nutritional status of the water. The goal of the current study is to examine the population density and variety of zooplankton in a particular reservoir. This project's primary goal is to describe the zooplankton diversity at Nagzari Dam, which is located close to the village of Harangul in the Maharashtra district of Latur.

6. Materials and Methods:

Water samples are taken at several points along the Nagzari dam latur. The gathered samples were examined under a microscope in a lab setting. Following microscopic examination of the water samples, several species of phytoplankton are identified and their numbers are counted. Three separate dam locations are used for data gathering and observation. Prepared temporary slides are examined under a microscope. Samples for physico-chemical factors like temperature, pH, and DO were taken during the Rainy, winter and summer of 2022 and 2023, respectively, from the fixed sites. A Celsius mercury thermometer that was calibrated to 0.1°C was used to measure the temperature of the atmosphere and the water in reservoirs. A pH meter was used to determine the pH of the water samples. Winkler's titrimetric technique was used to determine the water's dissolved oxygen content. Bolting silk (20 aperture) conical shape plankton nets were used to collect plankton samples from the chosen sites using conventional procedures for the qualitative and quantitative analysis during the winter and summer at each site. The formula was used to calculate the amount of water that actually flowed through the plankton net while it was being towed. The plankton sample thus obtained was kept in 4% formaldehyde for laboratory investigation. Plankton volume was calculated using volumetric methods. Analysis, both qualitative and quantitative, was then carried out in a lab. For the purpose of taxonomic analysis and numerical estimation, the conserved zooplankton samples were diluted to an amount of 80 ml with distilled water. A 1 ml sub-sample of the sample was taken using a pipette while swirling the mixture in a zigzag motion. The species composition and zooplankton density of this sub-sample were then determined by transferring it into a one ml Sedgwick Rafter Counting Cell. Under a compound microscope, all of the zooplankton in the counting chamber was viewed, recognized using common keys and counted.

Throughout the study, fluctuations in air and water temperatures were observed over several seasons (Table 1). Water temperature was directly influenced by the air temperature, which

was almost usually higher. In the summer, the highest air and water temperatures recorded in Nagjhari dam were 31°C, respectively.

Table 1 lists seasonal fluctuations in physicochemical characteristics.

One species of Rotifera, one species of Cladocera, four species of Copepoda, and one species of Ostracoda were all present in Nagzari Dam during the winter and summer seasons, totaling seven species of zooplankton. Several workers reported getting similar results. These researchers provided evidence that the zooplankton community of the Nagjhari Dam matched the species diversity of tropical reservoirs.

The summer was when the zooplankton population peaked overall. Four zooplankton categories were identified during the diversity study: Rotifera, Cladocera, Copepoda, and Ostracoda. In varied densities, nauplii, insect larvae, and insect eggs were also observed. An examination by season showed that during the Rainy, winter and summer seasons, respectively.

7. OBSERVATION TABLE:

Table 1. Seasonal variations in physico-chemical parameters of water in Nagzari Dam.

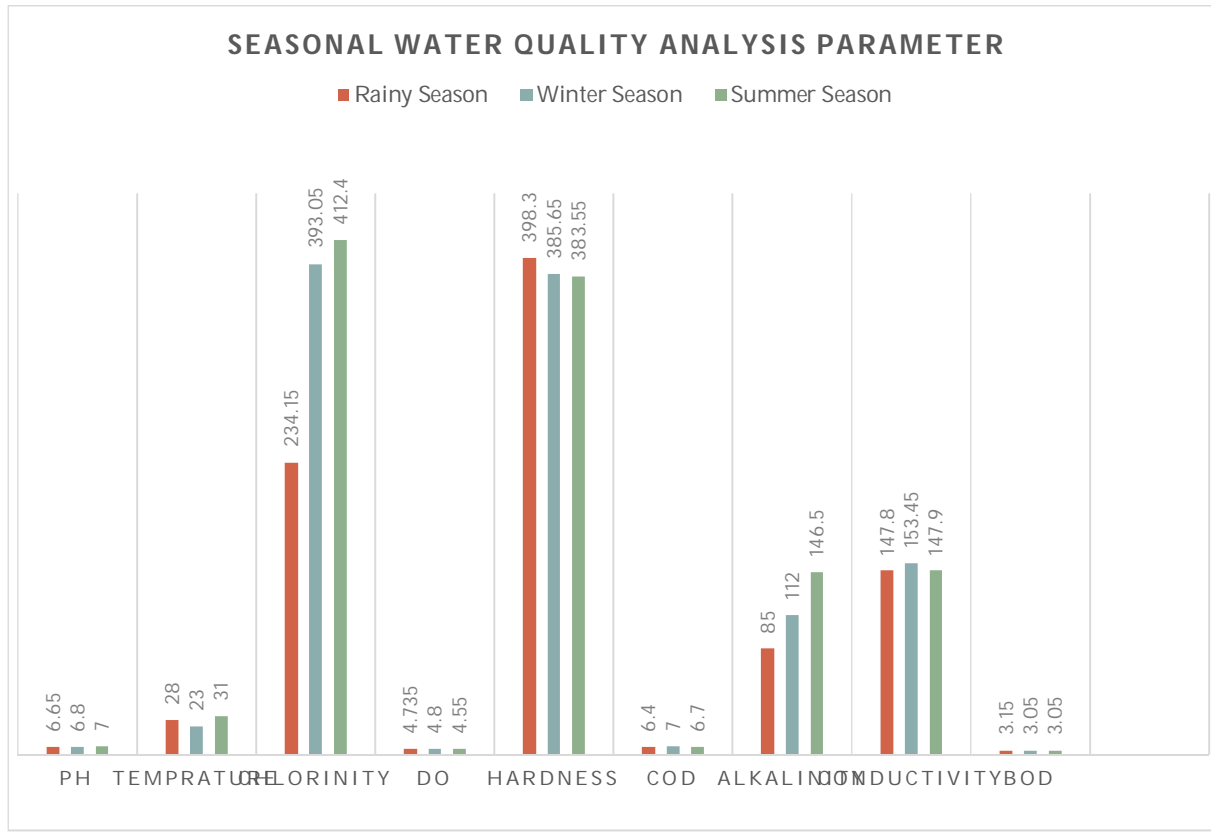
Water Parameter	Quality	Rainy Season (June To September)		Winter Season (November To January)		Summer Season (February To April)	
		SAMPLE A	SAMPL E B	SAMPLE A	SAMPLE B	SAMPLE A	SAMPLE B
• Temperature		28 °C	28 °C	23 °C	23 °C	31 °C	31 °C
• Ph		7.1	6.2	7.5	6.1	7.2	6.8
• Do		5.22 mg/L	4.25 mg/L	5.5 mg/L	4.1 mg/L	5.2 mg/L	3.9 mg/L
• Cod		6.60 mg/L	6.20 mg/L	6.8 mg/L	7.2 mg/L	6.3 mg/L	7.1 mg/L
• Bod		2.5 mg/L	3.8 mg/L	2.9 mg/L	3.2 mg/L	2.8 mg/L	3.3 mg/L
• Hardness		380.2 mg/L	416.4 mg/L	368.8 mg/L	402.5 mg/L	356.6 mg/L	410.5 mg/L
• Alkalinity		68 mg/L	102 mg/L	78 mg/L	146 mg/L	92 mg/L	201 mg/L
• Chlorinity		420.22 mg/L	408.08 mg/L	380.5 mg/L	405.6 mg/L	396.4 mg/L	428.4 mg/L

• Conductivity	144.4 μs/cm	151.2 μs/cm	148.6 μs/cm	158.3 μs/cm	138.6 μs/cm	157.2 μs/cm
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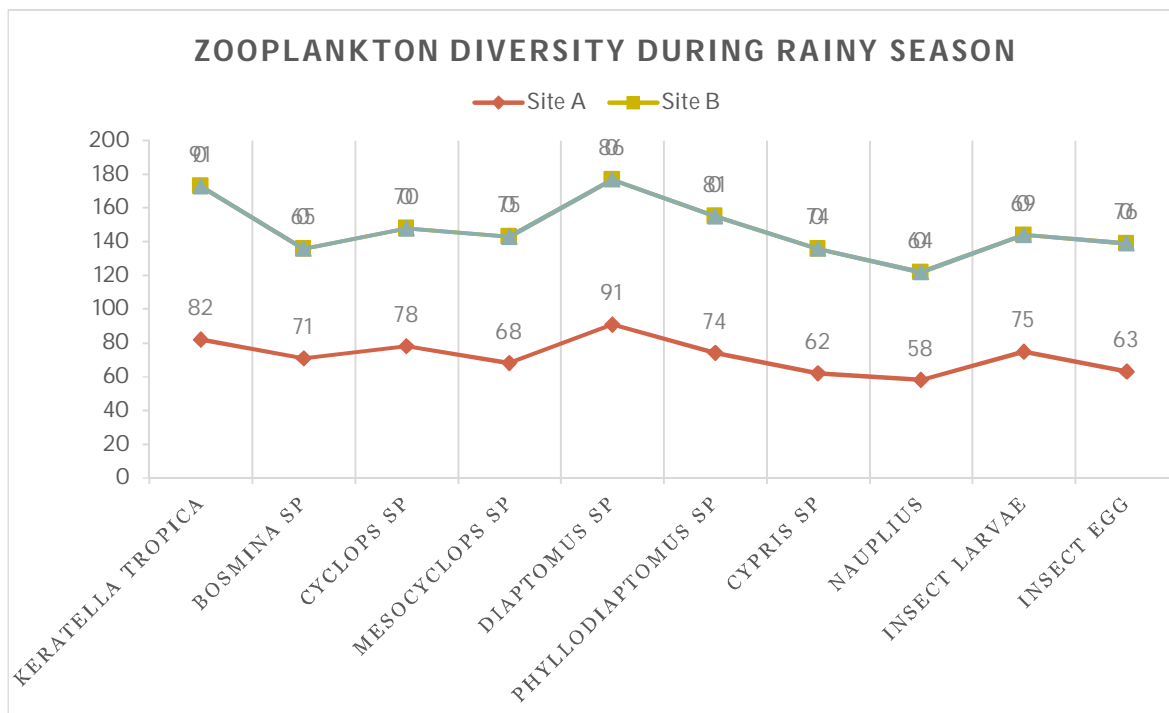
Table 2. Species wise zooplankton density in Nagzari dam during Rainy, winter and summer season.

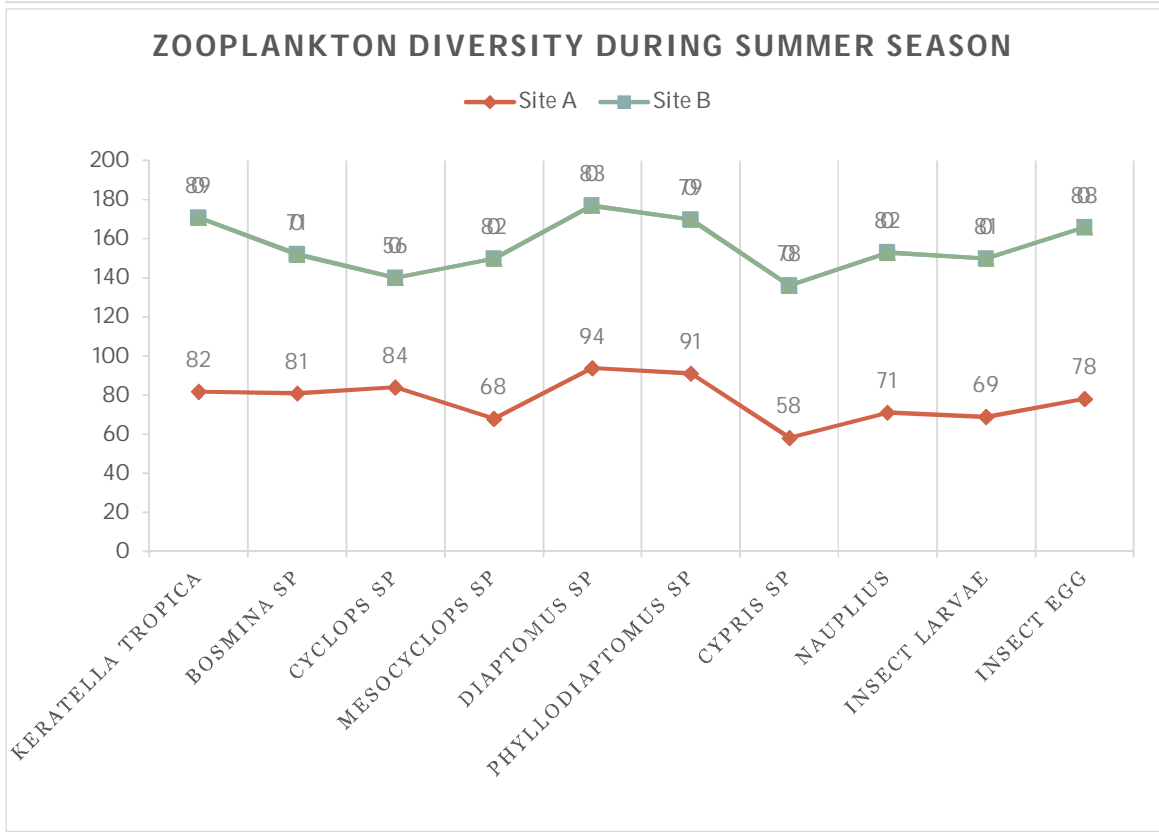
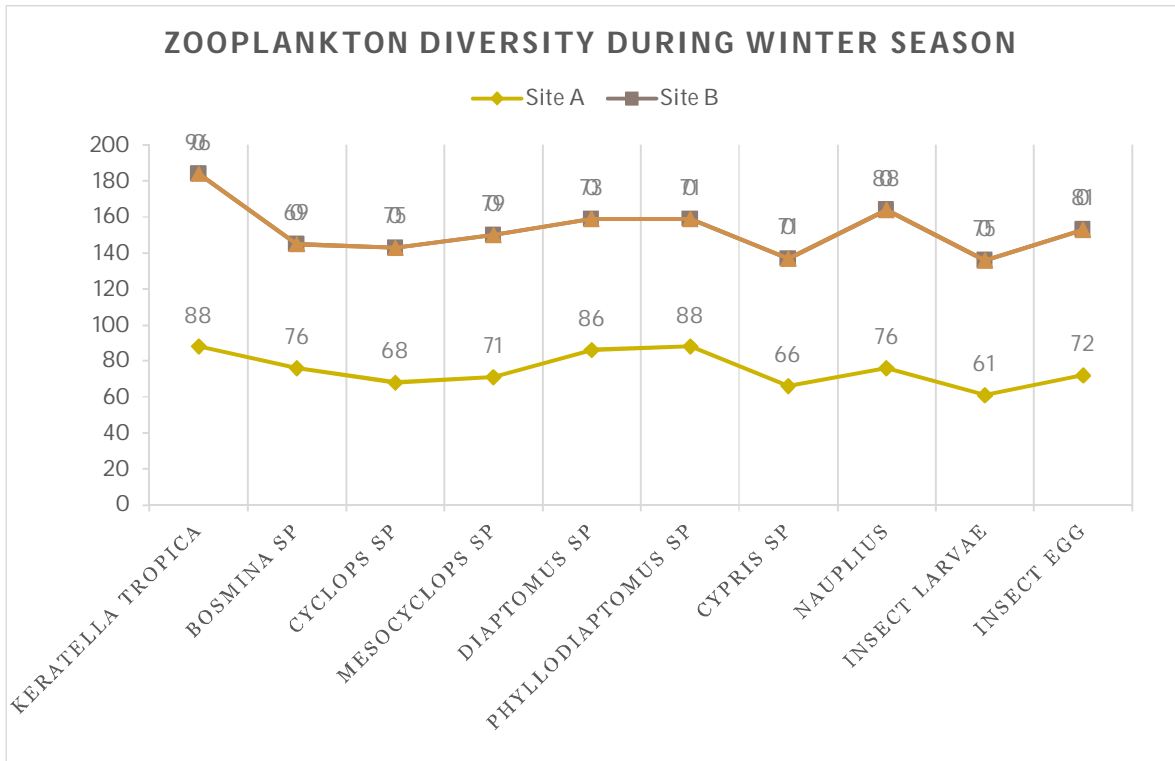
Sr. No.	species name	Rainy Season		Winter Season		Summer Season	
		Site A	Site B	Site A	Site B	Site A	Site B
1.	<i>keratella tropica</i>	82	91	88	96	82	89
2.	<i>bosmina sp</i>	71	65	76	69	81	71
3.	<i>cyclops sp</i>	78	70	68	75	84	56
4.	<i>mesocyclops sp</i>	68	75	71	79	68	82
5.	<i>diaptomus sp</i>	91	86	86	73	94	83
6.	<i>phylloidiaptomus sp</i>	74	81	88	71	91	79
7.	<i>cypris sp</i>	62	74	66	71	58	78
8.	<i>nauplius</i>	58	64	76	88	71	82
9.	<i>insect larvae</i>	75	69	61	75	69	81
10.	<i>insect eggs</i>	63	76	72	81	78	88
	Total	722	751	752	778	776	789
	Grand Total	1473		1530		1565	
	Average	736.5		765		782.5	

**4. OBSERVATION:
SEASONAL WATER QUALITY ANALYSIS PARAMETER (JUNE TO APRIL)**



Seasonal Zooplankton Diversity Analysis:





RESULT:

The primary food source for aquatic organisms is zooplankton. It was essential to almost all fish throughout the larval stages, and some of them only ate planktons. Zooplankton species' monthly variations were shown in a table. 2. Copepods, Cladocera, Ostracods, Protozoa, and Rotifera make up the observed zooplankton pollution.

Zooplankton composition and density vary on a monthly basis. The concentration of zooplankton used in this study was measured in the months of August, December and March, with maximum and minimum concentrations of zooplankton per litre being observed in December and March, respectively. Zooplankton showed a generally higher density during the summer. The primary zooplankton population's species diversity index showed monthly change as well. Each zooplankton group's composition and abundance changed from season to season and were influenced by the limnological features of the water body. In Nagzari Dam, there were Protozoa, Rotifer, Copepod, and Cladocera species of zooplankton. Table 2 shows that rotifera predominate among zooplankton, indicating the contaminated quality of the lake water.

CONCLUSION:

The current study will provide some basic understanding of the variety, productivity, and causes of variation in the zooplankton in the Nagzari Dam. The creation of management solutions to raise dam productivity can make use of this knowledge. A focus has been placed on identifying different plankton species as indicators of specific types of water pollution since diversity of zooplankton exhibits a major biotic component of an aquatic environment. biological surveys are crucial for tracking changes in water quality, which depend on the qualitative and quantitative makeup of the aquatic population. The enrichment of nutrients and overall abundance of algae species are the two factors that have the most impact on organism pollution in a water body. Rotifera zooplankton were reliable measures of water quality.

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