

Assessment of Zooplankton diversity in the Dhamoi Pond Jhabua, India

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Abstract

The present have a look at offers with the assessment of zooplankton range in within the Dhamoi Pond Jhabua, India. A complete of 31 species of zooplankton has been determined. Preliminary observe of this vicinity shows wealthy zooplankton diversity in recognize to 15 families and 8 Order are recorded from this Pond. Biomass of this genera come to be inside the order of Arthropoda > Rotifera > protozoa > different. Arthropoda have been three Order, 6 family, & 12 species along with Rotifera were 2 Order, four households & 12 species and Protozoa were 3 Order, five households & 7 species are recorded individually. Qualitative and quantitative evaluation of zooplankton resources observed that the slight productivity of this Pond. The zooplankton parameters indicated the suitability of Dhamoi Pond for fishery purposes. The determined zooplankton parameters of Dhamoi Pond were legitimately slight. The only of a type parameters discovered that the Dhamoi Pond is suitable for fisheries. Density of zooplankton turned into recorded maximum inside the summer time month, whilst minimum in wintry weather and monsoon was recorded.

Key words: zooplankton, Dhamoi Pond, Jhabua, fisheries.

Introduction

Zooplankton is microscopic, heterotrophic organisms that play a crucial role in freshwater ecosystems by consuming phytoplankton, regenerating nutrients, and transferring energy to higher trophic levels. They are essential components of aquatic food webs, contributing significantly to secondary production. As they drift with water currents, they serve as a vital food source for fish, particularly larvae, influencing fish survival and growth. Zooplankton aided in nutrient recycling and energy cycling, making them fundamental to the balance and productivity of freshwater ecosystems. Zooplankton is a respectable indicator of versions in water great due to the fact it's miles strongly tormented by environmental conditions. Zooplankton groups respond to a huge variety of disturbances which includes nutrient loading, acidification and sediment input etc. It responds quickly to changes in bodily and chemical conditions in addition to environmental conditions.

Water is covers 70% of the earth surface. In phrases of the total volume of water, around 97% of the world's water inside the sea is saline, because of this that much less than 3% of the water volume in the international is clean water. Water is a crucial component within the life of all aquatic species. The phrase 'The fire of lifestyles burn inside the water' honestly depicts the integral function of this substance within the beginning, composition and maintenance of residing organisms in terrestrial and aquatic ecosystems. Presently India is the second biggest fish generating and 2nd largest aquaculture country in the world. India is also a prime manufacturer of fish through aquaculture and ranks 2nd within the international after China (Yadav *et.al.* 2019). The distribution and diversity of zooplanktons in aquatic ecosystems depend mainly on the physicochemical parameters of water (Saba and Sadhu, 2015). It is a well- suited tool for understanding water pollution status (Contreras *et al.*, 2009). Methodical studies on the Indian zooplankton began more than a century ago (Edmondson, 1959; Battish, 1992). Extensive regional diversity of zooplankton in freshwater environment is still deficient. Some workers have been done study on zooplankton diversity from different parts of India (Sharma, 1998; Khan, 2003; Kar, 2007; Sharma and Sharma, 2008).

The present study aimed to assess the diversity of zooplankton in the Dhamoi Pond, Jhabua, India. Given the limited literature on zooplankton diversity in this region, this research was conducted to contribute valuable data. While some studies have been reported from the Anas River, there is a need for more extensive research on

freshwater bodies across Jhabua. This study serves as an effort to document and enhance knowledge regarding zooplankton diversity in the Dhamoi Pond, providing a foundation for future ecological studies in the area.

Methodology

Zooplankton sampling became conducted for a period of 365 days from July 2023 to June 2024. Zooplankton has been sampled weekly from the site following the same old methods of Battish (1992). Then the pattern had been filtered and positioned in Tarson (a hundred ml) box and constant without delay in Lugol's solution and saved in cool and dark location. For reading the range of Zooplankton sample were taken in a Sedgwick-Rafter counting chamber and observed underneath a light microscope beneath prerequisite magnification (10 X to begin with than followed by using forty X) and the specimens have been identified following well-known literature of Edmondson (1959); Sharma (1998); Sharma and Sharma (2008).

Results and discussion

During the entire study period of year, a total of 31 zooplankton species was recorded belonging to 8 orders. The diversity of zooplankton in the Dhamoi Pond consisted mainly of Arthropoda, Rotifera, Protozoa. During the whole study period, zooplankton diversity Arthropoda > Rotifera > protozoa are recorded. It was observed that, zooplankton population was represented by Arthropoda group followed by Rotifera & protozoa. Density of zooplankton was recorded Maximum in the summer month, while minimum in winter and monsoon was recorded. In the present study, it was found that the abundance was high in summer due to lower water level. Here as due to increase in water intake in monsoon, zooplankton found to be low. The data are present in Table - 1. Arthropoda have been 3 Order, 6 family, & 12 species are recorded namely *Bosmina longirostris*, *Cerradaphnia sp.*, *Chydoran sp.*, *Cyclops sp.*, *Cypris sp.*, *Daplotia similes*, *Merocyclops sp.*, *Mesocyclops hyaltma*, *Moina micrura*, *Nauplius larvae*, *Stenocypris malcomsont*, *Thermocvelops sp.* Rotifera have been 2 Order, 4 families & 12 species are recorded namely *Asplanchna brightwelli*, *Amiraeopsis fissa*, *Brachionus angularis*, *Brachioms bidentata*, *Brachtonus falcatus*, *Brachianus quadridentatus*, *Brachionus diversicomis*, *Keratella tropica*, *Lecane bulla*, *Lecane luna*, *Lecane lunaris*. Protozoa have been 3 Order, 5 families & 7 species are recorded namely *Arcella sp.*, *Arcella discoides*, *Centropysts constricta*, *Diffflugia sp.*, *Paramoecium sp.*, *Paramoecium caudatum*, *Vortecella sp.*

Discussion

Zooplankton Composition in the Dhamoi Pond. The study identified three major groups of zooplankton:

1. Arthropoda – The most dominant group, with 12 species recorded, including *Bosmina longirostris*, *Cyclops sp.*, and *Moina micrura*.
2. Rotifera – Represented by 12 species, including *Brachionus angularis*, *Keratella tropica*, and *Lecane lunaris*.
3. Protozoa – The least abundant group, with 7 species, including *Arcella sp.*, *Paramoecium caudatum*, and *Vorticella sp.*

In the present investigation, diversity of zooplankton in Dhamoi Pond, has been identified, which belong to 3 group Arthropoda, Rotifera & Protozoa was dominated group among all zooplankton found in Dhamoi Pond. The study recorded a total of 31 zooplankton species from 8 orders in the Dhamoi Pond, Jhabua, India. The zooplankton community was primarily composed of Arthropoda, Rotifera, and Protozoa, with Arthropoda being the most dominant group, followed by Rotifera and Protozoa. The density of zooplankton was highest in summer due to lower water levels and lowest during monsoon due to increased water intake. Arthropoda: 3 orders, 6 families, 12 species (e.g., *Bosmina longirostris*, *Cyclops sp.*, *Moina micrura*). Rotifera: 2 orders, 4 families, 12 species (e.g., *Asplanchna brightwelli*, *Brachionus angularis*, *Keratella tropica*). Protozoa: 3 orders, 5 families, 7 species (e.g., *Arcella sp.*, *Paramoecium caudatum*, *Vorticella sp.*).

The study highlights the seasonal variation in zooplankton abundance in the Dhamoi Pond, Jhabua, with significant fluctuations observed throughout the year. The results indicate that zooplankton diversity and density were highest during the summer months and lowest during the monsoon and winter seasons.

Seasonal Variations in Zooplankton Abundance

1. Summer (Highest Zooplankton Abundance & Diversity)

During summer, the density and diversity of zooplankton were at their peak. This increase can be attributed to the following factors:

Lower Water Levels: Reduced water levels in summer result in a higher concentration of zooplankton, making their presence more prominent.

Increased Temperature: Higher temperatures promote the growth and reproduction of zooplankton, leading to an overall increase in their population.

Higher Nutrient Availability: Due to evaporation and reduced water volume, nutrients become more concentrated, enhancing the productivity of phytoplankton, which serves as a food source for zooplankton.

2. Monsoon (Lowest Zooplankton Abundance)

During the monsoon season, zooplankton abundance was found to be at its lowest. The primary reasons for this decline include:

Increased Water Volume: Heavy rainfall leads to an influx of freshwater, diluting the concentration of zooplankton and dispersing them over a larger area.

Turbidity and Water Flow: Increased water movement and turbidity due to rain disrupt the zooplankton community, washing them away and reducing their overall numbers.

Decrease in Water Temperature: Cooler temperatures slow down the metabolic and reproductive rates of zooplankton, leading to a decline in their population.

3. Winter (Moderate to Low Abundance)

In winter, zooplankton diversity remained low but showed a slight increase compared to monsoon months. The contributing factors include:

Lower Temperature: Cold conditions slow down the reproductive cycle of zooplankton, leading to reduced population growth.

Stable Water Conditions: Unlike monsoon, winter waters are more stable, which helps in maintaining some zooplankton presence, although not at summer levels.

Significance of the Study

This research provides valuable insights into the zooplankton diversity of the Dhamoi Pond and its seasonal variations. Understanding these patterns is crucial for:

Aquatic Ecosystem Management: Seasonal changes in zooplankton populations influence fish survival, productivity, and overall aquatic health.

Fisheries and Aquaculture: Since zooplankton is a primary food source for fish, their seasonal abundance plays a key role in fish breeding and growth.

Freshwater Biodiversity Conservation: Documenting zooplankton diversity helps in maintaining ecological balance and can serve as an indicator of water quality.

Conclusion

Overall, the study highlights the seasonal variation in zooplankton abundance, with summer showing the highest diversity and density. This research provides valuable insights into the zooplankton diversity of the Dhamoi Pond and contributes to the broader understanding of freshwater biodiversity in Jhabua. The study reveals that summer supports the highest zooplankton diversity and density due to favorable conditions such as high temperature and nutrient concentration, whereas monsoon experiences the lowest abundance due to increased water volume and turbidity. This research adds to the existing knowledge of freshwater biodiversity in Jhabua and emphasizes the need for continued monitoring and conservation efforts to sustain aquatic ecosystem health.

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Table 1: The diversity of zooplankton in the Dhamoi Pond, Jhabua, India.

SN	Phylum	Order	Family	species
1	Protozoa	Arcellinida	Arcellidae	<i>Arcella sp</i>
2			Arcellidae	<i>Arcella discoides</i>
3			Centropxyidae	<i>Centropysts constricta</i>
4			Difflogiidae	<i>Difflogia sp.</i>
5	Rotifera	Peniculida	Parameciidae	<i>Paramoecium sp.</i>
6			Parameciidae	<i>Paramoecium caudatum</i>
7		Sesillida	Vortecellidae	<i>Vortecella sp.</i>
8		Ploima	Asplanchnidae	<i>Asplanchna brightwelli</i>
9			Brachionidae	<i>Amiraeopsis fissa</i>
1			Brachionidae	<i>Brachionus angularis</i>
1			Brachionidae	<i>Brachioms bidentata</i>
1			Brachionidae	<i>Brachtonus falcatus</i>
1			Brachionidae	<i>Brachianus quadridentatus</i>
1			Brachionidae	<i>Brachionus diversicomis</i>
1			Brachionidae	<i>Keratella tropica</i>
1		Flosculariaceae	Lecanidae	<i>Lecane bulla</i>
1			Lecanidae	<i>Lecane luna</i>
1			Lecanidae	<i>Lecane lunar is</i>
1			Testudinellidae	<i>Testudinella patina</i>
2	Arthropoda	Cladocera	Bosminidae	<i>Bosmina longirostris</i>
2			Daphniidae	<i>Cerradaphnia sp.</i>

2		Daphniidae	<i>Daplotia similes</i>
2		Chydoridae	<i>Chydoran sp</i>
2		Moinidae	<i>Moina micrura</i>
2	Copepoda	Cyclopidae	<i>Cyclops sp</i>
2		Cyclopidae	<i>Mesocyclops hyaltma</i>
2		Cyclopidae	<i>Merocyclops ap</i>
2		Cyclopidae	<i>Thermocvelops sp.</i>
2		Cyclopidae	<i>Nauplius larvae</i>
3	Ostracoda	Cyprididae	<i>Cypris sp</i>
3		Cyprididae	<i>Stenocypris malcomsont</i>