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"STUDIES ON MACROZOOBENTHIC FAUNA OF THE BISAIDHA DAM, SIDHI DISTRICT (M.P.)"

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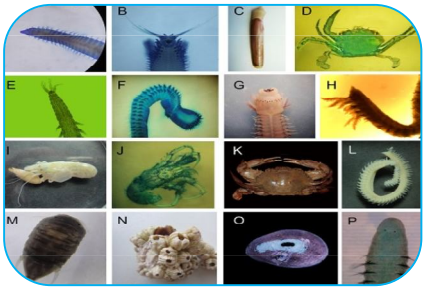
ABSTRACT:

Bisaidha Dam, situated in the Sidhi District of Madhya Pradesh, represents a crucial freshwater habitat within the region. This study investigates the macrozoobenthic fauna inhabiting the sedimentary substrate of the Bisaidha Dam, aiming to provide a comprehensive understanding of the benthic community structure, biodiversity and ecological significance. The research employs robust sampling techniques, taxonomic analyses and ecological assessments to elucidate the dynamics of macrozoobenthos in this aquatic ecosystem.



KEYWORDS: Macrozoobenthic fauna, Bisaidha Dam and Sidhi District.

INTRODUCTION:

The aquatic ecosystems of dams are intricate environments, harboring diverse assemblages of organisms crucial to the ecological balance of these water bodies. Among these organisms, macrozoobenthic fauna, residing in the sediments at the bottom, play pivotal roles in nutrient cycling, sediment dynamics, and overall ecosystem health. This introduction outlines the rationale and objectives of the study focused on the macrozoobenthic fauna of the Bisaidha Dam in the Sidhi District of Madhya Pradesh.

The Bisaidha Dam, a prominent water reservoir in the Sidhi District, serves multiple purposes, including irrigation, water supply, and fisheries. Understanding the biodiversity and ecological dynamics of this dam is essential for effective management and conservation. Macrozoobenthic fauna, comprising various invertebrate taxa like insects, mollusks, and crustaceans, are integral components of aquatic ecosystems. Their activities influence nutrient cycling, sediment structure, and serve as indicators of environmental health.

The limited knowledge on the macrozoobenthic fauna of the Bisaidha Dam necessitates a comprehensive investigation. This study aims to bridge this gap by assessing the composition, distribution, and ecological roles of macrozoobenthos in the dam, providing valuable insights into the overall biodiversity and functioning of the aquatic ecosystem.

The use of invertebrates as bio-indicators have been advocated by several researchers (Adakole and Annune, 2003; Edokpayi et al., 2010). Macro-invertebrate organisms form an integral part of aquatic environment. They maintain various levels of interaction between the community and environment. The structure of the benthic macroinvertebrate community provides precise and local information on recent events (Marques et al., 2003). The benthic macrofauna resides on or inside the

deposit of bottom soil and feed on debris. They play a vital role in the circulation and recirculation of nutrients in aquatic ecosystem by accelerating the breakdown of decaying organic matter into simpler inorganic forms (Idowu and Ugwnmba, 2005). They also serve as food for a wide range of fishes.

MATERIALS AND METHODS :

Macrobenthos organisms were identified upto genus level (Michael,1977; Barnes et al., 1988). Shannon's diversity index (H), Simpson's index of dominance (C), Evenness index were calculated respectively as per methods of Shannon and Weiner (1964), Simpson (1949) and Pielou (1966). Water samples were collected 30 cm below the surface water twice monthly for six months i.e. from November to April and water parameters like DO, CO2 , alkalinity, total hardness, chloride, organic carbon were analyzed following the standard methods of APHA (2005). Water temperature was determined with the help of thermometer (range 0º – 60ºC) while pH of water was determined using pH meter (HANNA, model no. HI 98107).

RESULTS AND DISCUSSION :

The results and discussion provide valuable insights into the macrozoobenthic fauna of the Bisaidha Dam, offering a foundation for informed decision-making in conservation and management practices. The study contributes not only to the understanding of this specific dam ecosystem but also to the broader knowledge of freshwater benthic communities in similar habitats.

At this site S_1, maximum 16 species of macrozoobenthos were collected in the month of May 2022, whereas minimum 02 species were recorded in month of August 2022. Maximum density of individuals (33 ind./sq. feet) was observed in May 2022 and minimum (03 ind./sq. feet) in Aug. (Table-1).

This site was represented by 04 species of oligochaeta, 04 species of Diptera, 03 species of Coleoptera, 02 species of Ephemeroptera, 01 species of Hemiptera and 02 species of Mollusca during the year 2021 and 2022 (Table-1).

Group oligochaeta was represented by four species namely *tubifex tubifex*, *Chaetagaster limnaei, Branchiura sowerbyi*, *Aulophorus tonkinnnsis*. Density of these species collected in different months is shown in (Table-1).

The maximum oligochates were encountered (07 ind./ sq. ft.) during Sept. and Dec. 2021 and (07 ind./sq. ft) in June 2022. The minimum Oligochaetes were encountered (01 ind./sq. ft.) in July to October 2022 respectively.

Diptera was represented by 4 species, namely *Chironomus tentans, Tipula* sp., *Culicoides sp.* and *Psychoda sp*. The highest densities of Dipteran larvae were recorded (9 ind./sq. ft.) in May during 2022 respectively. The minimum density of Dipteran larvae were recorded (01 ind./sq. ft.) in November 2021 and (01 ind./sq. ft.) in September and November 2022 respectively (Table-1).

Coleoptera had three representative species at this site. Name of species and their monthly densities are given in (Table-1). Maximum numbers of Coleopteran larvae (06ind./sq. ft.) were collected in May 2022 and minimum (01 ind./sq. ft.) in month of October, November during the year 2021 and February 2022 respectively.

Group Ephemeroptera had two representative species at this site (Table-1). *Stemonema* sp. and *Ameletus* sp. were the Ephemeropteran species occurred during the course of study at this site. The maximum number of *Ephemeroptaran* sp. (05 ind./sq. ft.) were collected in May 2022. The minimum number were collected (02 ind./sq. ft.) in July During 2021 and April, August, September, November 2022 respectively (Table-1).

Notonecta sp. a *Hemipteran* species occurred in small numbers at this site (Table-1). The maximum number of *Notonecta* sp. (03 ind./sq. ft.) were collected in May 2022.

Mullusca had two species at this site (Table-1). The species densities of Mollusca were collected. The highest species density of mollusca recorded were (05 inds./sq. ft.) in April during 2022. Minimum species density of mollusca recorded were (01 inds.sq. ft.) in July during the year 2022 respectively.

Table–1 : Monthly population density and percent (%) composition of different macrozoobenthos (per sq. feet) of Bisaidha Dam

S. N.	Name of Macrozoo-benthos	Numbers, months and year 2021						Numbers, months and year 2022											
		July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	**2**	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	**Oligocheates :**																		
	Tubifex tubifex	1	2	2	1	-	3	1	1	1	1	2	2	-	-	-	-	-	1
	Chaetogaster limnaei	1	2	1	2	1	1	1	1	2	1	2	2	-	-	-	-	-	1
	Branchiura sowerbyi	-	1	3	-	1	2	1	1	1	1	1	1	-	-	1	1	1	1
	Aulophorus tonkinensis	1	-	1	1	2	1	1	2	1	-	1	2	1	1	-	-	3	1
	Total	3	5	7	5	4	7	4	5	5	3	6	7	1	1	1	1	5	4
	Percentage (%)	27.27	41.67	58.33	55.56	57.14	31.82	23.53	29.41	27.78	13.64	18.18	58.33	25	33.33	25	11.11	35.71	26.26
2	**Diptera :**																		
	Chironomus tentans	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-
	Tipula sp.	1	1	1	-	-	3	2	1	1	3	3	-	-	-	-	1	-	1
	Culicoides sp.	-	2	1	1	1	-	1	2	1	2	3	-	1	-	-	1	1	1
	Psychoda sp.	2	-	-	1	-	2	1	1	2	1	2	-	1	-	-	1	-	-
	Total	3	3	2	2	1	5	4	4	4	7	9	-	2	-	1	3	1	2
	Percentage (%)	27.27	25	16.67	22.22	14.29	22.73	23.53	23.53	22.22	31.82	27.27	-	50	-	25	33.33	7.14	13.33
3	**Coleoptera:**																		
	Enochrus sp.	2	-	2	1	1	1	1	-	2	2	2	-	-	-	-	-	-	-
	Gyrinus sp.	-	2	-	-	-	1	1	-	-	2	2	-	-	-	-	1	1	1
	Htydrophilus sp.	-	-	-	-	-	3	1	1	1	1	2	-	-	-	-	1	1	1
	Total	2	2	2	1	1	5	3	1	3	5	6	-	-	-	-	2	3	3

	Percentage (%)	18.18	16.67	16.67	11.11	14.29	22.73	17.65	5.88	16.67	22.73	18.18	-	-	-	-	22.22	21.43	20
4	Ephemeroptera :																		
	Stemonema sp.	2	-	-	-	-	2	1	2	1	2	2	-	-	2	2	1	1	2
	Ameletus sp.	-	-	-	-	-	1	2	1	1	-	3	-	-	-	-	2	1	1
	Total	**2**	**-**	**-**	**-**	**-**	**3**	**3**	**3**	**3**	**2**	**5**	**-**	**-**	**2**	**2**	**3**	**2**	**3**
	Percentage (%)	**18.18**	**-**	**-**	**-**	**-**	**13.64**	**17.65**	**17.65**	**16.67**	**9.09**	**15.15**	**-**	**-**	**66.67**	**50**	**33.33**	**14.29**	**20**
5	Hemiptera :																		
	Notonecta sp.	1	2	1	1	1	1	1	1	-	-	2	3	-	-	-	-	1	1
	Total	**1**	**2**	**1**	**1**	**1**	**1**	**1**	**1**	**-**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**1**	**1**
	Percentage (%)	**9.09**	**16.67**	**8.33**	**11.11**	**14.29**	**4.54**	**5.88**	**5.88**	**-**	**-**	**6.06**	**25**	**-**	**-**	**-**	**-**	**7.14**	**6.66**
6	Mollusca :																		
	Lymnea acuminata	-	-	-	-	-	1	1	1	1	2	2	2	1	-	-	-	1	1
	Thiara lineate	-	-	-	-	-	1	1	2	2	3	3	-	-	-	-	-	1	1
	Total	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**3**	**3**	**5**	**5**	**2**	**1**	**-**	**-**	**-**	**2**	**2**
	Percentage (%)	**-**	**-**	**-**	**-**	**-**	**9.09**	**11.76**	**17.65**	**16.67**	**22.73**	**15.15**	**16.67**	**25**	**-**	**-**	**-**	**14.29**	**13.33**
	T. no. of indv.	11	12	12	9	7	22	17	17	18	22	33	12	4	3	4	9	14	15
	T. no. of sp.	8	7	8	7	6	13	15	14	14	13	16	6	4	2	3	7	12	13
	Sp. Diversity index	2.91	2.75	2.91	2.72	2.52	3.81	3.85	3.61	3.38	3.68	3.89	2.52	2.00	0.91	1.50	2.94	3.25	3.38

CONCLUSION:

In conclusion, this study underscores the importance of macrozoobenthic fauna as integral components of freshwater ecosystems and emphasizes the need for their conservation in the face of ongoing environmental changes in the Sidhi District. The findings reveal a diverse assemblage of macrozoobenthic organisms, including various taxa of aquatic insects, oligochaetes, mollusks, and crustaceans. Taxonomic identification and abundance assessments contribute to the establishment of a baseline for the macrozoobenthic fauna in the Bisaidha Dam. The study also investigates the influence of environmental variables, such as sediment composition and water quality parameters, on the distribution and abundance patterns of macrozoobenthic organisms. The ecological roles of key macrozoobenthic species in nutrient cycling, sediment stability, and their interactions within the food web are explored. Additionally, anthropogenic impacts, such as dam construction and land use changes, are considered in evaluating their effects on the macrozoobenthic community. The significance of this study lies in its contribution to the understanding of the Bisaidha Dam ecosystem's health and resilience. By unraveling the intricacies of the macrozoobenthic fauna, this research provides valuable insights for aquatic resource management, conservation, and sustainable development in the Sidhi District.

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