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Research Article

FIRST REPORT OF FRESHWATER MOLLUSCA (GASTROPODS AND BIVALVIA) IN JOHILLA RIVER AT UMARIA DISTRICT (M.P)

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A B S T R A C T

Freshwater molluscs play a pivotal role in the freshwater ecosystem. Mollusca diversity of Johilla River was studied during August 2022 to September 2023. In present study, attempts have been made to collect, classify and identify Mollusca in river Johilla in Madhya Pradesh. The first report of Mollusca from the Johilla River in Umaria District has been investigated. This paper gives an updated nomenclature with a Checklist/Status of 25 species from 11 families of Mollusca (13 Species are belonging to Class Gastropoda and 12 Species to Class Bivalvia) were found in this zone of the river. The Shannon's Index of Mollusca H=2.871538658 and Simpson C=0.068555235 was determined. For the first time, a comprehensive catalogue of Mollusca recorded from the Umaria district's Johila river area is presented. More research is needed to examine sources and a much wider geographic area.

INTRODUCTION

The second-largest phylum is Mollusca. The world's most diversified environment is aquatic. In the entire animal kingdom, mollusca have the second-largest and richest fauna behind insects. Molluscan species are widely distributed in freshwater, marine waters, and on land. The phylum mollusca is divided in seven classes, of which only five are represented in India while only two are found in freshwater i.e., Gastropoda and Bivalvia. Global estimates number of described living species of mollusca varies from 50,000 to a maximum of 1,20,000 species. A conservative estimate includes 66,535 species for the world. Mollusca diversity in India is 7.62 percent of the total global diversity i.e., 5070 species.

Almost all aquatic ecosystems, including rivers, lakes, streams, swamps, subterranean aquifers, springs, temporary ponds, drainage ditches, and other transitory and seasonal waterways, are home to freshwater gastropods, with the exception of Antarctica. Most aquatic organisms are submerged, and many are adapted to specific ecosystems with aquatic flora, stones, boulders, wood, and other solid surfaces. Some are able to survive without water for extended periods of time (e.g., Ampullariidae), while others can spend extended amounts of time aestivating in soil during dry seasons. Due to extensive anthropogenic activity including changes in land use and environmental degradation, the tropics have experienced a significant loss of biodiversity. Large temporal changes in their environment place severe ecological limitations on natural populations of freshwater gastropods; their viability depends on their physiological ability to withstand these fluctuations (Kalyoncu, 2009). Gastropods typically play a dominating role in freshwater ecology by supplying food for many species and grazing on massive volumes of algae and debris (Agudo-Padron, 2011). According to recent assessments, the tropics are losing biodiversity at an alarming rate (Sodhi, 2008). However, little is known about the magnitude of loss in lesser-known groups, particularly invertebrates. In this work, we highlight the diversity and richness of snails, as well as the importance of snail conservation. The goal of this study is to examine the environment and biodiversity of freshwater Molluscs, as well as to detect the diversity of species in the Umaria region's river Johilla.

MATERIAL AND METHODS

The present research will be carried out in the Johilla River Umaria district. Umaria District lies under Shahdol, division the surface of the district may be divided in to 4 different Physiographic regions, the shale, sandstone, plateaus and Pindaric basic. It is located between 22^0Latitude and $82^0$11'Longitude and is situated on the Vindhyan plateau at elevation of 330m. It is a tributary of the Son River, which itself is a tributary of the Ganges River.

The Johila (23.645°N 81.236°E) originates at a place called Jwaleshwar in Maikal hills, 10 km from Amarkantak in Anuppur district of Madhya Pradesh. It merges with Son River in Manpur tehsil of Umaria district (Map 01). The studies have been done for one year from August 2022 to September 2023. The samples with screened material were washed into a

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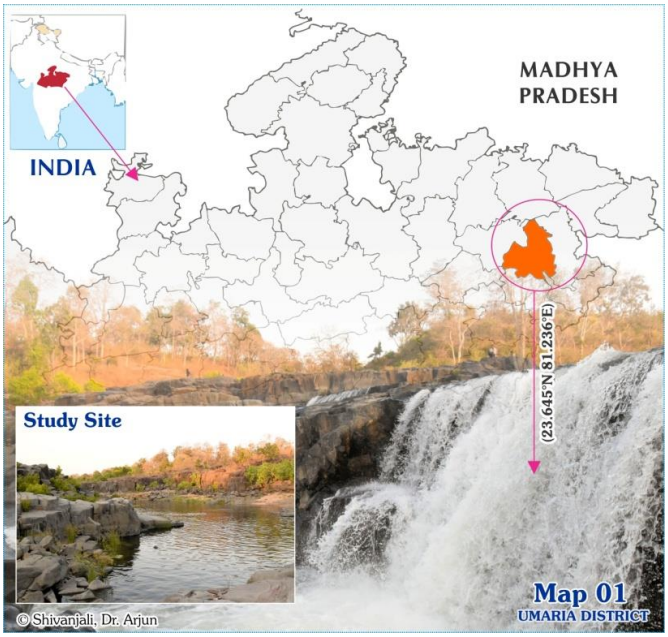


container and fixed the material in a solution of FAA (Formaldehyde, Acetic acid, 70% Alcohol 5:5:90) by Pennak (1989). The collected samples were transferred to be laboratory for identification.

Organisms were identified by using standard keys, such as Tonapi (1980), Adoni *et al* (1985) and SubbaRao (1993).

Common (26-50Sp), R - Rare (11-25Sp), VR - Very Rare (01-10Sp). Shannon-Weiner diversity index (H) was calculated using Shannon-Weiner equation according to Mangurran Mollusca were classified based on their abundance in Johilla, which was shortened as VC - Very Common (51-100Sp), C - (1988) and the dominance index that is Simpson index (C) was calculated according to Sklar (1985).

1. Calculation of Shannon's Species Diversity Index (H)

$H = -\sum (ni/ N) * \log (ni / N)$ OR $-\sum Pi * \log Pi$
Where, H= Shannon Index of Diversity.
ni=Number of individual of each species.
N=Total number of individuals in the sample, (i.e., $N = \sum ni$).
Pi=Importance probability for each species, (i.e., Pi = ni / N)

2. Calculation of Simpson's Index of Dominance (C)

$C= \sum (ni / N)2$ OR $\sum (Pi)2$
Where, C = Number of individual of each species
ni =Number of individual of each species.
N =Total number of individuals in the sample, (i.e., $N = \sum ni$).
Pi =Importance probability for each species, (i.e., Pi = ni / N)

RESULTS

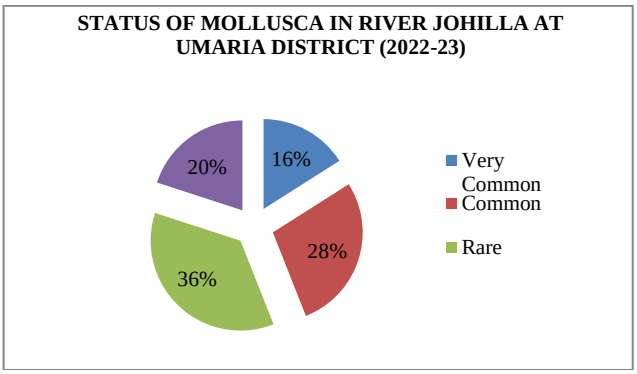
The present paper depicts altogether 25 species belonging to 15 genera, under 11 families and two classes namely Gastropoda and Bivalvia. A checklist of recorded Mollusca species given below:

Table 1 List of Recorded Species, Statistical Analysis and Status Of Mollusca In Johilla River, Umaria District (M.P.)

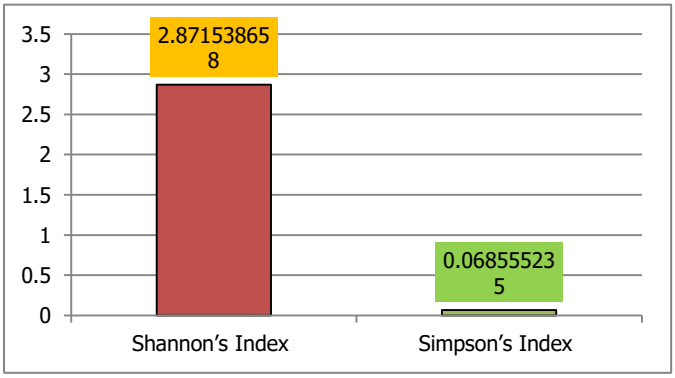
S.N	Name of Species	Total No. of Observed Species (ni)	Pi = (ni / N)	log Pi = ln (ni/N)	H = Pi x log Pi	$C = Pi^2$	Species Status
CLASS : GASTROPODA (CUVIER, 1795)							
A. FAMILY : VIVIPARIDAE (GRAY, 1847)							
1.	Bellamya bengalensis (Lamarck,1822)	68	0.105919003	-2.245080599	-0.237796699	0.011218835	Very Common
2.	Bellamya dissimilis (Muller, 1774)	28	0.043613707	-3.132383794	-0.136614869	0.001902155	Common
B. FAMILY : AMPULLARIIDAE (GRAY, 1847)							
3.	Pila globosa (Swainson, 1822)	72	0.112149533	-2.187922185	-0.245374451	0.012577518	Very Common
C. FAMILY : HYDROBIIDAE (STIMPSON, 1865)							
4.	Bithynia orcula (Nevill, 1884)	4	0.00623053	-5.078293943	-0.031640461	3.88195E-05	Very Rare
D. FAMILY : THIARIDAE (GILL, 1871)							
5.	Thiara rudis (Lea, 1850)	14	0.021806854	-3.825530974	-0.083422794	0.000475539	Rare
6.	Thiara scabra (Muller, 1774)	66	0.102803738	-2.274933562	-0.233871675	0.010568609	Very Common
7.	Melanoides tuberculata (Muller, 1774)	29	0.04517134	-3.097292474	-0.13990885	0.00204045	Common
8.	Tarebia lineata (Gray, 1828)	18	0.028037383	-3.574216546	-0.100211679	0.000786095	Rare
E. FAMILY : LYMNAEIDAE							
9.	Lymnaea acuminata (Lamarck, 1822)	5	0.007788162	-4.855150391	-0.037812698	6.06555E-05	Very Rare
10.	Lymnaea luteola (Lamarck, 1822)	42	0.065420561	-2.726918685	-0.17839655	0.00427985	Common
F. FAMILY : BULLINIDAE/PLANORBIDAE							
11.	Gyraulus labiatus (Benson, 1850)	8	0.012461059	-4.385146762	-0.054643573	0.000155278	Very Rare
12.	Indoplanorbis exustus (Deshayes, 1834)	55	0.085669782	-2.457255118	-0.21051251	0.007339312	Very Common
G. FAMILY : ANCYLIDAE							
13.	Ferrissia verruca (Benson, 1855)	4	0.00623053	-5.078293943	-0.031640461	3.88195E-05	Very Rare
CLASS : BIVALVIA (LINNAEUS, 1758)							
A. FAMILY : ARCIDAE							
14.	Scaphula celox (Benson, 1836)	5	0.007788162	-4.855150391	-0.037812698	6.06555E-05	Very Rare
B. FAMILY : UNIONIDAE							
15.	Lamellidens corrianus (Lea, 1834)	45	0.070093458	-2.657925814	-0.186303211	0.004913093	Common
16.	Lamellidens consobrinus (Lea, 1859)	40	0.062305296	-2.77570885	-0.172941361	0.00388195	Common

17.	Lamellidens marginalis (Lamarck, 1819)	28	0.043613707	-3.132383794	-0.136614869	0.001902155	Common
18.	Parreysia corrugata (Muller, 1774)	42	0.065420561	-2.726918685	-0.17839655	0.00427985	Common
19.	Parreysia rajahensis (Lea, 1841)	9	0.014018692	-4.267363726	-0.059822856	0.000196524	Rare
20.	Parreysia (Radiatula) andersoniana (Nevill, 1877)	8	0.012461059	-4.385146762	-0.054643573	0.000155278	Rare
21.	Parreysia (Radiatula) caerulea (Lea, 1831)	20	0.031152648	-3.46885603	-0.108064051	0.000970487	Rare
22.	Parreysia (Radiatula) occata (Lea, 1860)	6	0.009345794	-4.672828834	-0.043671298	8.73439E-05	Rare
23.	Parreysia (Radiatula) shurtleffiana (Lea, 1856)	5	0.007788162	-4.855150391	-0.037812698	6.06555E-05	Rare
C. FAMILY : CORBICULIDAE							
24.	Corbicula striatella (Deshayes, 1854)	13	0.020249221	-3.899638946	-0.078964652	0.000410031	Rare
D. FAMILY : PISIDIIDAE							
25.	Sphaerium indicum (Deshayes, 1854)	8	0.012461059	-4.385146762	-0.054643573	0.000155278	Rare
		642		H	-2.871538658	0.068555235	

Graph 1 Status of Mollusca in River Johilla at Umaria District (2022-23)



Graph 02 Diversity indices in 2022-23.



RESULTS AND DISCUSSION

The current study was conducted for the first time in Umaria district from August 2022 to September 2023 to explore the diversification of Mollusca in the vicinity of the Johila river. So, Overall during the sampling total 642 individual (413 Gastropoda and 229 Bivalvia specimen) were observed. During the study 25 species of Mollusca (13 Gastropoda and 12 Bivalvia species) Belonging to 11 family of 15 genera were recorded from the study sites. Family wise distribution, Relative Status and Statistical analysis shown in Table 01. During the present investigation, the Class Gastropoda is found to be abundant in comparison to Bivalvia. Out of 25 species recorded, Family : Thiaridae (Class Gastropoda) with 04 Species and Family : Unionidae (Class Bivalvia) with 09 Species making it the most specious and dominant family.

The relative abundance revealed that among the 25 Mollusca species recorded, 04 were observed to be very common (16%), 07 were common (28%), 09 were rare (36%), and 05 were very rare (20%) in the study area (Graph 01). These 36% of Mollusca species from the study area were designated as rare, and 20% as very rare, indicating the need for prescriptive conservation. It assumes all species are represented in a sample and are randomly sampled, the Shannon - wiener is a metadata statistic index (gives more weight to common or dominant species). A few rare species with only a few representatives will have no effect on diversity in this case. The Shannon-Wiener index (H) was observed to be an average of 2.871538658 in the current study of Mollusca species diversity in the Johilla River from 2022 to 2023, indicating high diversity in the studied area (Table 1). The Simpson Index (C) computation revealed that the value of the species dominance index ranged from 0.068555235. The values of the Simpson index increased as Shannon diversity decreased, indicating that dominance shows a negative association with diversity in Graph 02; a similar conclusion was presented by Al-Nemraw (2005).

Sharma *et al*., (2013) studied molluscan from Moran River, a tributary of Ganjal River in Narmada basin a total of 10 species of molluscan were reported of which 5 species were gastropoda and 5 species bivalvia. Vyas *et al*., (2012) reported molluscan faunal assemblage in the river Narmada near water intake point and shown their dominance by contributing, 9 species from gastropoda and 2 species from bivalves. All those papers have mentioned few species while present study provides a checklist of 25 species. Regarding the faunal resources of mollusca in Johilla consolidated list of freshwater molluscs includes 7 families of freshwater gastropods and 4 families of freshwater bivalves were recorded.

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