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Piscean Diversity of Simen River, Dhemaji, Assam, North East India

Faruk Ahmed, Saimoun Ken Manhai, Pabitra Sarmah

Abstract: ***The availability of ichthyofaunal diversity in a riverine ecosystem is a good indicator of river health. A good ichthyofaunal diversity of a riverine ecosystem represents a balanced ecosystem of the river. Taking this ecological conception into consideration, the ichthyofaunal diversity of the Simen River is studied during the present investigation. The Simen River in the district of Dhemaji, Assam, is a Himalayan tributary of the Brahmaputra River system, which flows through Arunachal Pradesh and Assam. Samples were collected fortnightly early in the morning from September 2022 to August 2023. Different types of nets and gears were found to be used by the fishermen. Collected fish were preserved in 5% formalin on the spot and brought to the laboratory for identification. The collected fish were identified up to the species level. A total of 43 species of fish belonging to 33 genera and 21 families were identified from the river during the study period. The family Cyprinidae was found to be the most dominant among the fish families.***

Keywords: Simen River, Ichthyofauna, Downstream, Cyprinidae, Fishing Gears.

I. INTRODUCTION

Rivers are lotic habitats characterised by the physical and chemical parameters of the water. Water parameters play a crucial role in maintaining the diversity of aquatic flora and fauna. A river is a freshwater ecosystem characterised by water currents, land-water interactions, and oxygen tension. The present investigation has been conducted in the Simen River, which originates in the West Siang district of Arunachal Pradesh. The Nanyel River joins it on the left side and the Jate, Juri, and Igo rivers on the right side throughout its 30 km downstream length. From its origin, the river crosses about 7 km through Arunachal Pradesh and enters Assam. The river confluences into the Brahmaputra at Sengajan Ghat, Dhemaji, Assam. It is the lifeline for a vast number of people in the Dhemaji district of Assam and is home to a diverse array of aquatic flora and fauna. The Simen River provides habitats, including streams, riparian zones, and wetlands, in its downstream areas, which support a variety of living biota [1].

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*Correspondence Author(s)
Faruk Ahmed, PGT, North East Vision Academy, Barpeta (Assam), India. Email ID: farukahmed7086@gmail.com,
Saimoun Ken Manhai, Assistant Professor, Department of Zoology, Silapathar College, Silapatha, Dhemaji (Assam), India. Email ID: saimounkenmanhai1@gmail.com
Dr. Pabitra Sarmah*, Assistant Professor, Department of Zoology, Silapathar Science College, Amritpur, Silapathar Dhemaji (Assam), India. Email ID: psarmahnlp@rediffmail.com, ORCID ID: 0000-0002-0703-7936

These wetlands, streams, and riparian zones serve as habitats for indigenous fish, migratory birds, aquatic plants, and amphibians.

Based on the above background information, the present investigation was undertaken to reveal the Ichthyofaunal diversity of the Simen River, Dhemaji, Assam.

II. MATERIALS AND METHODS

A. The Study Area

The study was conducted in the Simen River, located in the Dhemaji district of Assam, India. Dhemaji district, with a latitude of 27° 05' N and a longitude of 94° 12' E, is an administrative region (second-order administrative division) located in the state of Assam, India, which is part of Asia. The district covers an area of 3237 sq km and is basically a plain area lying at an elevation of 104 meters above sea level.

Samples were collected three times a day - once in the morning, once in the afternoon and once in the evening- from September 2022 to August 2023 from three collection centres. Cast nets, gill nets, lift nets, drag nets, trap nets, etc., were the fishing gears used by the fishermen to collect fish. Photographs of collected fish were taken, preserved in 5% formalin on the spot and brought to the laboratory. The species were identified with the help of standard keys [4]. Different relevant literature [6] was discussed. The classification of fishes was done following [8]. Nomenclature of unidentified fishes was done through [11]. The valid scientific names of the collected fish were taken from. Finally, identification was confirmed by the literature, as cited.

III. RESULTS

In the present study, a total of 43 fish individuals were encountered and identified, belonging to 21 families and 33 genera (Table 1). Among the collected fish species, 20 species of the family Cyprinidae, viz. *Amblypharyngodon mola (Hamilton, 1822), Barilius bendelisis (Hamilton, 1822), Barilius bola (Hamilton, 1822), Cabdio jaya (Hamilton, 1822), Cirrhinus mrigala (Hamilton, 1822), Cirrhinus reba (Hamilton, 1822), Esomus dandricus (Hamilton, 1822), Garra gotyla (Gray, 1830), Labeo angra (Hamilton, 1822), Labeo bata (Hamilton, 1822), Labeo calbasu (Hamilton, 1822), Labeo gonius (Hamilton, 1822), Labeo rohita (Hamilton, 1822), Laubuka laubuca (Hamilton, 1822), Pethia ticto (Hamilton, 1822), Puntius chola (Hamilton, 1822), Puntius sophore (Hamilton, 1822), Rasbora daniconius (Hamilton, 1822), Salmostoma phulo (Hamilton, 1822) and Systomus sarana (Hamilton, 1822)* were identified. Only one species of the family Cyprinidae was found to be vulnerable. The ichthyofauna of the Simen River consists of

the family Channidae, with three species, viz. *Channa punctata (Hamilton, 1822), Channa striatus (Bloch,1793)* and *Channa marulia (Hamilton, 1822). Mystus tengara (Hamilton, 1822)* and *Mystus cavasius (Hamilton, 1822)* belong to the family Bagridae, while Ompok bimaculatus (Bloch,1794) and Wallago attu (Bloch & Schneider, 1801) belong to the family *Siluridae.* Families such as Notopteridae, Anguillidae, Nemacheilidae, Cobitidae, Heteropneustidae, Bagridae, Schilbeidae, Clariidae, Sisoridae, Mastacembelidae, Synbranchidae, Nandidea, Chandidae, Osphronemidae, Belonidae, Gobiidae and Tetraodontidae represent only one species each.

The significant percentage (Table-2 & Fig.1) of fish species occurred in the family *Cyprinidae* 46.5% (n=20) followed by *Channidae* 6.9% (n=03), Bagridae 4.7% (n=2), Siluridae 4.7% (n=2), 2.3% each for Notopteridae (n=1), Anguillidae (n=1), Nemacheilidae (n=1), Cobitidae (n=1), Heteropneustidae (n=1), Bagridae (n=1), Schilbeidae (n=1), Clariidae (n=1), Sisoridae (n=1), Mastacembelidae (n=1), Synbranchidae (n=1), Nandidea (n=1), Chandidae (n=1), Osphronemidae (n=1), Belonidae (n=1), Gobiidae (n=1) and Tetraodontidae (n=1).

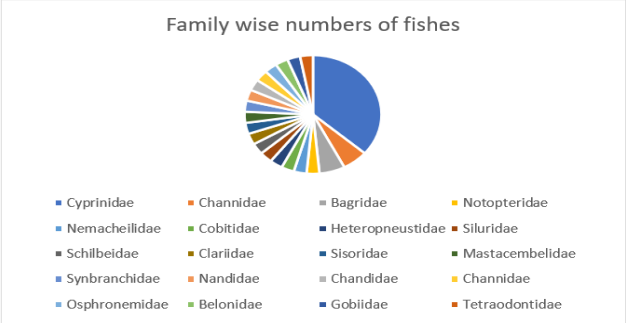
Table-1: List of Fish Species with Conservation Status (IUCN) and Abundance

Sl. No	Families	Scientific Names	Local Name	Conservation Status (IUCN)	Abundance
1	Notopteridae	*Notopterus (Pallas,1769)*	Kandhuli	LC	+++
2	Anguillidae	*Anguilla bengalensis (Grey, 1831)*	Bami	LC	+++
3	Cyprinidae	*Amblypharyngodon mola (Hamilton, 1822)*	Moa	LC	+++
4		*Barilius bendelisis (Hamilton, 1822)*	Boriwala	LC	+++
5		*Barilius bola (Hamilton, 1822)*	Boriwala	LC	+++
6		*Cabdio jaya (Hamilton, 1822)*	Boriwala	LC	++++
7		*Cirrhinus mrigala (Hamilton, 1822)*	Mirika	LC	+
8		*Cirrhinus reba (Hamilton, 1822)*	Lashmi	LC	++
9		*Esomus dandricus (Hamilton, 1822)*	Donicona	LC	+++
10		*Garra gotyla (Gray, 1830)*	----	LC	++
11		*Labeo angra (Hamilton, 1822)*	Naro	LC	+++
12		*Labeo bata (Hamilton, 1822)*	Bhagon	VU	+++
13		*Labeo calbasu (Hamilton, 1822)*	Mali	LC	++++
14		*Labeo gonius (Hamilton, 1822)*	Bato	LC	++++
15		*Labeo rohita (Hamilton, 1822)*	Row	LC	++++
16		*Laubuka laubuca (Hamilton, 1822)*	Lowputhi	LC	++
17		*Pethia ticto (Hamilton, 1822)*	Puthi	LC	+++
18		*Puntius chola (Hamilton, 1822)*	Puthi	LC	++++
19		*Puntius sophore (Hamilton, 1822)*	Puthi	LC	++++
20		*Rasbora daniconius (Hamilton, 1822)*	Bordonicona	LC	++++
21		*Salmostoma phulo (Hamilton, 1822)*	Selkona	VU	++
22		*Systomus sarana (Hamilton, 1822)*	Seniputhi	LC	++++
23	Nemacheilidae	*Neonoemacheilus assamensis (Menon, 1987) [7]*	Botia	LC	++++
24	Cobitidae	*Botia dario (Hamilton, 1822)*	Gedu	LC	+++
25	Heteropneustidae	*Heteropneustes fossilis (Bloch, 1794)*	Singi	LC	++++
26	Bagridae	*Mystus tengara (Hamilton, 1822)*	Sigonra	LC	++++
27		*Mystus cavasius (Hamilton, 1822)*	Lalua Sigonra	LC	+++
28	Siluridae	*Ompok bimaculatus (Bloch,1785) [2]*	Pabho	NT	++
29		*Wallago attu (Bloch & Schnelder, 1801)*	Borali	VU	++
30	Schilbeidae	*Clupisoma garua (Hamilton, 1822)*	Neriya	LC	++
31	Clariidae	*Clarias magur (Hamilton, 1822) [5]*	Magur	LC	++++
32	Sisoridae	*Bagarius yarrelli (Sykes, 1839) [10]*	Garua	VU	++
33	Mastacembelidae	*Mastacembelus armatus (Lecepede, 1800)*	Tura	LC	++++
34	Synbranchidae	*Monopterus cuchia (Hamilton, 1822)*	Kusia	LC	++++
35	Nandidae	*Nandus (Hamilton, 1822)*	Gedgedi	LC	++++
36	Chandidae	*Chanda nama (Hamilton, 1822)*	Chanda	LC	++++
37	Channidae	*Channa punctata (Hamilton, 1822)*	Goroi	LC	++++
38		*Channa striatus (Bloch,1793)*	Sol	LC	++++
39		*Channa marulia (Hamilton, 1822)*	Sal	LC	+++
40	Osphronemidae	*Trichogaster fasciata (Bloch & Schnelder, 1801)*	Bheseli	LC	++++
41	Belonidae	*Xenentodon cancila (Hamilton, 1822)*	Kokila	LC	++++
42	Gobiidae	*Glassogobius giuris (Hamilton, 1822)*	Patitmutura	LC	+++
43	Tetraodontidae	*Tetraodon cutcutia (Hamilton, 1822)*	Gangatop	LC	++++

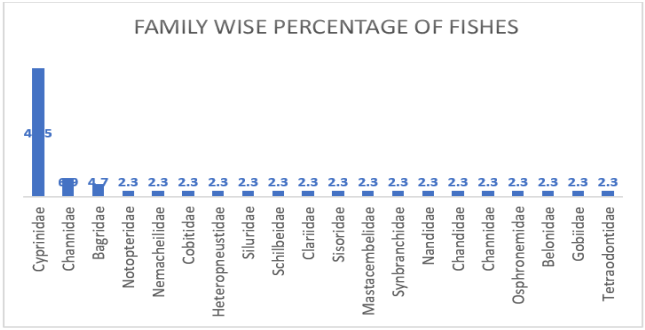
** "LC" =Least Concerned, "NT" =Near Threatened, "VU" =Vulnerable, "+" =Least Abundant, "++" =Less Abundant, "+++" =Abundant, "++++" =More Abundant, "+++++" = Most Abundant.*

Table-II: Family of Identified fish Species with Several Species

	Family	No. Of species	%
1	Cyprinidae	20	46.5
2	Channidae	3	6.9
3	Bagridae	2	4.7
4	Siluridae	2	4.7
5	Notopteridae	1	2.3
6	Nemacheilidae	1	2.3
7	Cobitidae	1	2.3
8	Heteropneustidae	1	2.3
9	Schilbeidae	1	2.3
10	Clariidae	1	2.3
11	Sisoridae	1	2.3
12	Mastacembelidae	1	2.3
13	Synbranchidae	1	2.3
14	Nandidae	1	2.3
15	Chandidae	1	2.3
16	Channidae	1	2.3
17	Osphronemidae	1	2.3
18	Belonidae	1	2.3
19	Gobiidae	1	2.3
20	Tetraodontidae	1	2.3



[Fig.1: Pie Diagram Showing Family-Wise Numbers of Fish]



[Fig.2: Bar Diagram Showing Family-Wise Percentage of Fishes]

Fig.3: (a) Jakoi and Khaloi

Fig.3: (b) Polo

Fig.3: (c) Khawali Jal

Fig.3: (d) Sepa

Fig.4: (a) Neonoemacheilus Assamensis

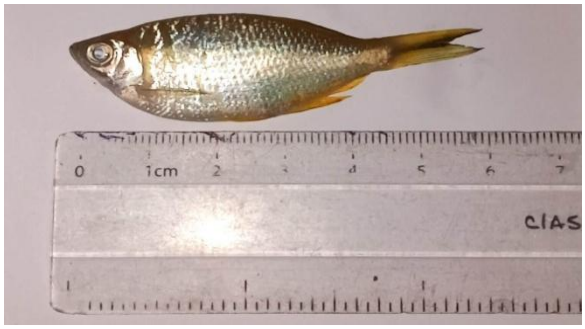


Fig.4: (b) Devario Devario

Fig.4: (c) Botia Dario

Fig.4: (d) Labeo Bata

Fig.4: (e) Laubuka Laubuca

Fig.4: (f) Labeo Calbasu

Fig.4: (g) Amblypharyngodon Mola

Fig.4: (h) Cabdio Jaya

Fig.4: (i) Cirrhinus Reba

Fig.4: (j) Heteropneustes Fossilis (Bloch, 1794)

Fig.4: (k) Mystus Tengara

Fig.4: (l) Mystus Cavasius

Fig.:4 (m) Ompok Bimaculatus

Fig.4: (n) Wallago Attu

Fig.4: (o) Clarias Magur

Fig.4: (p) Mastacembelus Armatus

Fig.4: (q) Xenentodon Cancila

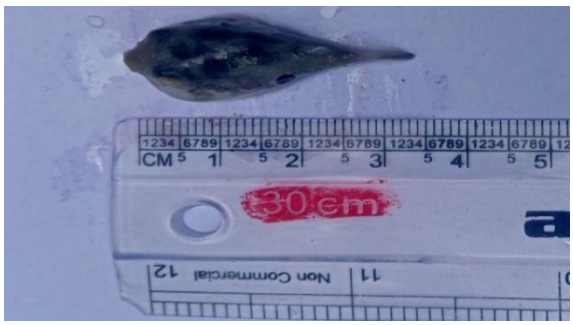


Fig.4: (r) Tetraodon Cutcutia

IV. DISCUSSION

The ichthyofauna of the Simen River exhibits only plain water fishes, and no hill stream fishes were recorded during this investigation. The fish of the Simen River were incredibly varied in size. Some of the fish were small and may weigh a few grams, e.g., Chanda nama, Pethia, and Puntius, while the largest fish ranged to over one meter, e.g., Wallago and Bagarius, and weighed up to 60 kg [3]. It has been observed that most of the physico-chemical factors and plankton, especially zooplankton, play an essential role in the distribution and seasonal variations of fish in the river [9]. The abundance of family members, such as Cyprinidae, Bagridae, and Siluridae, directly depends on the density of zooplankton, including protozoa, rotifers, Cladocera, and copepods.

Commercially important fishes *like Labeo rohita, L. calbasu, L. gonius, Cirrhinus mrigala, C reba, Wallago attu, Ompok bimaculatus, Clarias magur, Heteropneustes fossilis, Mastacembelus armatus, Monopterus cuchia, Channa striatus, C. marulia,* etc have been found abundantly.

The study on the IUCN conservation status of fish species in the Simen River reveals that four species fall under the category of vulnerable species. Most fish species are categorised as of least concern.

During the study period, several types of fishing gear

were recorded, including diverse forms of fishing nets, bamboo traps, hooks, and lines used to catch fish, as well as various factors such as the physiography of the water body and the nature of the fish stock. The fishing devices in the Simen river are Khewali jal, Mushari jal, Ber jal, Langi Jal, Phansi jal, Dheki jal, Parangi jal, etc. Some other fishing accessories observed during the study period include Jakoi, Khaloi, Polo, Chepa, and Juluki, among others.

V. CONCLUSION

This communication presents the ichthyofaunal diversity of the Simen River. The study reveals a decreasing trend in fish diversity in the river, primarily due to habitat loss, pollution, sand and gravel collection, and erosion. In this context, the fish diversity in the river must be documented at regular intervals as a measure of ecosystem health and to understand the dynamics of fish diversity.

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DECLARATION STATEMENT

After aggregating input from all authors, I must verify the accuracy of the following information as the article's author.

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- **Ethical Approval and Consent to Participate:** The content of this article does not necessitate ethical approval or consent to participate with supporting documentation.
- **Data Access Statement and Material Availability:** The adequate resources of this article are publicly accessible.
- **Author's Contributions:** The authorship of this article is contributed equally to all participating individuals.

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AUTHOR'S PROFILE

Mr. Faruk Ahmed, M.Sc., is working as a Post Graduate Teacher in North East Vision Academy, Barpeta, Assam. He holds a Master's degree in Zoology from the PG Department of Zoology, Silapathar Science College, affiliated with Assam Science and Technology University, Guwahati. With a strong academic and research background, he has published three research papers, presented two papers at national seminars, contributed two abstracts and a book chapter in an Edited Book. His work reflects a deep commitment to zoological studies and education, making notable contributions to the academic community through both teaching and scholarly activities. His areas of expertise are insect and fish diversity.

Mr. Saimoun Ken Manhai M.Sc. (SLET), is working as an Assistant Professor in the Department of Zoology at Silapathar College and has over 4 years of teaching experience. He completed his M.Sc. at Dibrugarh University and qualified for the SLET. He has one research publication in an international journal (Scopus). He has attended and actively participated in numerous national and international seminars, workshops, and webinars. He has published three chapters. His work reflects a deep commitment to zoological studies and education, making notable contributions to the academic community through both teaching and scholarly activities. He has completed one FIP & one RC.

Dr. Pabitra Sarmah. M.Sc., B.Ed., M.Phil., Ph.D. is working as Assistant Professor in the Department of Zoology, Silapathar Science College and has a teaching experience of more than 23 years. He teaches in both undergraduate and postgraduate courses. He secured an M.Sc. in Zoology with specialisation in Fish Biology & Fishery Science and obtained a Ph.D. from Gauhati University in Fish Biodiversity and Hydrobiology of riverine ecosystem. He obtained an M.Phil. from Periyar University, Salem, in the blood parameters of facultative and obligate Indian air-breathing fishes. He also received a B.Ed. and completed one FIP from the UGC-HRDC, Himachal Pradesh University, Shimla, and one RC from the Teacher Learning Centre, Ramanujan College, University of Delhi. He has seventeen research publications in national and international journals. He has attended and actively participated in several national and global seminars, workshops, and webinars. He has published one book and two chapters. He has organised one National seminar and is recognised as a Ph.D. guide by Assam Science & Technology University. His areas of expertise include aquaculture, fish and fisheries, and the socio-economy of fisherfolk.