

Original Research Article

Ichthyofaunal diversity of downstream Dikhu river and its tributaries in Mon district of Nagaland, India

Abstract

This study has been undertaken to investigate the **Ichthyofaunal** diversity, their present IUCN conservation status and economic value within the downstream Dikhu river and its tributaries in Mon district of **Nagaland** between 2019 to 2020. During the survey a total number of 22 fish species belonging to 8 families 17 genera were recorded. The catch lists composition showed the predominance of cyprinidae with 50%, Balitoridae 14%, Bagridae and Sisoridae 9%, Amblycipitidae and Channidae 5% whereas Psilorhynchynchidae and Belonidae represented by 4% each. The most significant of the investigation was the finding of endangered (EN) species *Tor putitora*, near threatened (NT) *Nimacheilus manipurens* and four species *Nemacheilus sikmaeinsis*, *Barilius barana*, *Garra lissorhynchus* and *Bagarius yarrelli* as a vulnerable (VU) species of IUCN Red list.

Keywords: *Ichthyofaunal diversity, Downstream Dikhu river, Fishes, Species, Conservation.*

1. INTRODUCTION

Ichthyofaunal diversity refers to array of fish species; counting on context and scale, it may be alleles or genotype among the fish population within the aqua regimes (Burton *et al.*, 1992). Fish represent almost half the overall vertebrates described in the world. They will be found in almost all the conceivable aquatic environments. Fish exhibit enormous diversity of shape, size and biology, and within the habitats they occupy Nelson (1984). But rapid growing population and concomitant increases, in contrast of natural resources are the supreme challenge for the aquatic resource management (Noss and Peters, 1995; Folkerts, 1997; Cordell *et al.*, 1998 and Melvin *et al.*, 2000). **With the use of increasingly sophisticated fishing gear, fish are being overfished throughout the world, and the expansion of fisheries has been linked to a decline in many fish stocks. (Allan JD *et al* 2005, Priyanka M *et al* 2015). There is an increasing concern worldwide for the loss of aquatic ecosystems and associated biodiversity particularly for riverine landscapes (Dunn H. 2004). Therefore, there is an urgent need for both conservation efforts and fish resource exploration at the study location.**

Nagaland is a mountainous state of the north eastern part of India. Natural fish stock populations in the state are largely supported by its distinctive terrain, variety of physiographic features, and watershed pattern. Different fish species have been identified from the diverse aquatic resources by individuals such as (Hora 1936; Kosygin and Vishwanath 1998; Ao *et al.*, 2008; Goswami *et al.*, 2012). It appears that no thorough survey has been carried out to document the existence of diversified fish fauna in the various

drainage systems of Nagaland, even though there may be many more species scattered in the river/hill streams. Hence the current survey was carried out in order to ascertain the fish diversity, IUCN status of conservation, and economic significance of the downstream Dikhu river system in Mon district, Nagaland.

2. MATERIAL AND METHODS

2.1 Study Site

The Dikhu river has a latitude of 26.5364356, longitude of 94.709655, Elevation of 486m/1594 feet and has a total length of 160 km (Figure. 1). It is one of the most prominent rivers of Nagaland which originates from Nuroto Hill area of Zunheboto and passes through Tuensang, Longleng, Mokokchung and Mon districts of the state Nagaland. The Dikhu river is one of the principle tributary of Brahmaputra and the river offered rich fish fauna which include food fishes, ornamental fishes, game fishes, etc. The rich fauna is attributed to many reasons, viz., the geomorphology, consisting of hills, plateaus and valleys, resulting in the occurrence of a variety of torrential hill streams, rivers, lakes and swamps (Goswami *et al.*, 2012)

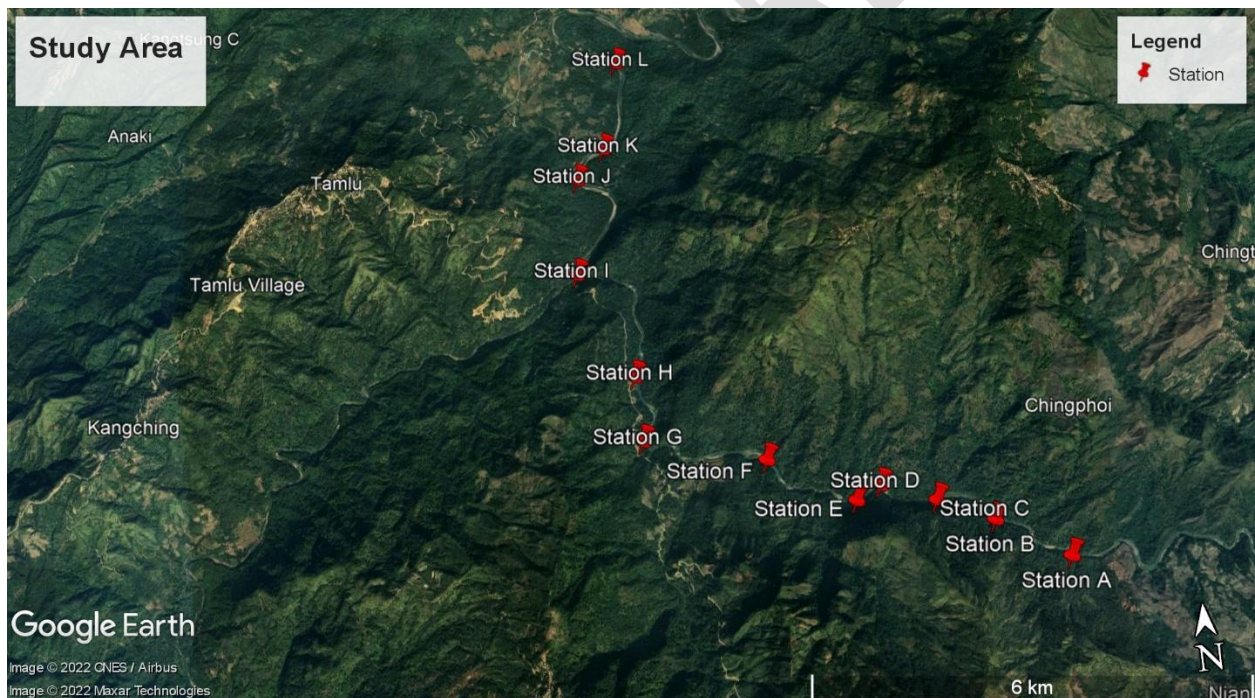


Figure 1: Map showing selected stations in downstream Dikhu river system

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2.2. Collection and Identification

The documentation of present study was carried out with the help of local fishermen having more than decades of experience in fishing technologies. Fish samples were collected through experimental fishing technique with different locally adopted technique, and cast nets, gill nets of various shape and sizes. The specimens and the sites of the area were photographed and all the essential data like place of collection, number of fish caught, body color, body marking etc were recorded in the field itself. The specimens collected in the Field were kept in 5% formaldehyde as described by (Joshi and Sreekumar 2015) and the collected specimens were deposited in the laboratory of department of Zoology, Kohima Science College, Jotsoma for identification using a standard taxonomic reference (Talwar and Jhingran 1991; Ao *et al.*, 2008; Jayaram 2010)

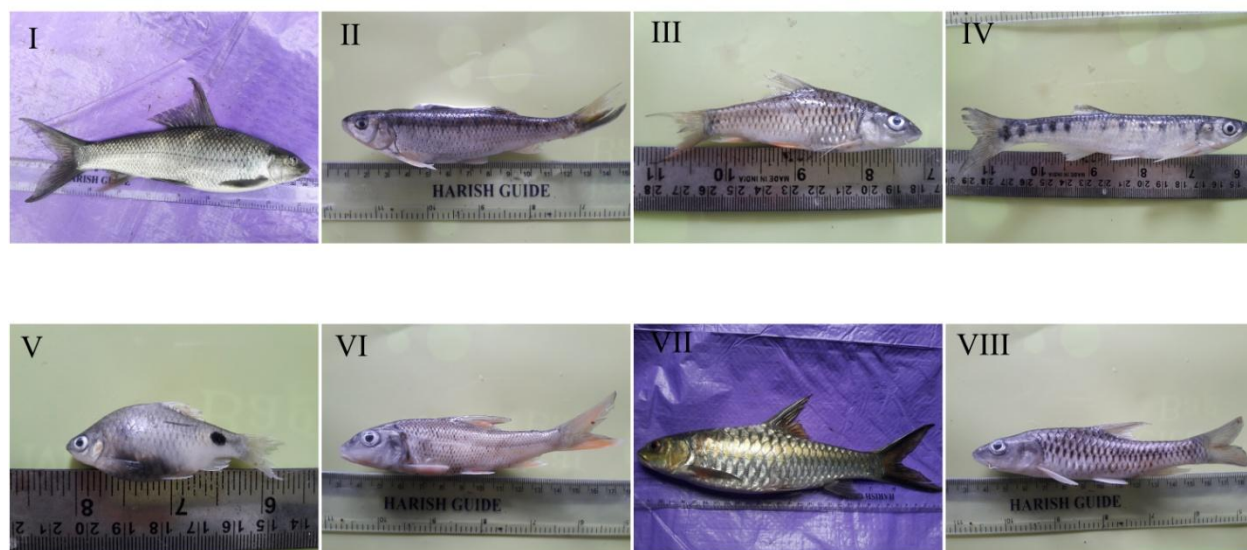


Figure 2 : I. *Labeo calbasu* II. *Barilius barna* III. *Chagunius chagunio* IV. *Barilius vagra* V. *Cyprinus conchonius* VI. *Barilius bendelisis* VII. *Neolissocheilus hexagonolepis* VIII. *Tor putitora*

3. RESULTS AND DISCUSSION

In the present studies a total of 22 species of fishes belonging to 4 orders, 8 families, 6 sub- families, 17 genera (Table 1) were identified from the downstream Dikhu river system. The family Cyprinidae dominated the catch lists with 50%, Balitoridae 14%, Bagridae and Sisoridae 9% ,Amblycipitidae and Channidae 5% whereas Psilorhynchynchidae and Belonidae represented by 4% each (Figure 3). During the survey, presence of 13 least concern (LC) species , 3 lower risk-near threatened (LR-nt) species, 4 vulnerable (VU) species viz *Bagarius yarrelli*, *Barilius barana* *Garra lissorhynchus*, *Nemacheilus sikmaeinsis*, 1 Near threatened (NT) species viz *Nimacheilus manipurensis* and 1 endangered (EN)

species viz *Tor putitora* were recorded (Table 1). One of the major discoveries is the reporting of *Tor putitora*, since this species is remarkable because it is listed as endangered on the IUCN (3.1) Red List.

Table 1: Systematic list of Ichthyofauna of Dikhu River System.

Sl.no	Systematic position	Common name	Fins Formula	Economic value	Conservation status (IUCN)
1	A.ORDER:CYPRINIFORMES 1.Family: Balitoridae I Sub Family: Nemacheilinae				
	<i>1.Nemacheilus manipurensis</i> (Chaudhuri, 1912)	Mainpur loach	Di6;Pi5;VI6;Ai 5 C18.	Or	NT
	<i>2. Nemacheilus sikmaeinsis</i> (Hora, 1921)	Sikmai loach	Dii7;Pi9-10;Vi9;Aii 5.	Fd, Or	VU
	<i>3. Nemacheilus scaturgina</i> (McClelland, 1839)	McClelland loach	D iii 7;Pi9;Vi9;Ai5.	Or	LR-nt
	2.Family: cyprinidae I.Sub family: Rasborinae				
	<i>1.Barilius barna</i> (Hamilton-Buchanan, 1822)	Barna baril	Diii6; Pii 12;VI9;Aiii11-12;C18.	Fd, Or	VU
	<i>2. Barilius vagra</i> (Hamilton-Buchanan, 1822)	Vagra baril	Dii-iii7;P i14-15;Vi7;Aii12;C19.	Fd, Or	LC
	<i>3. Barilius bendelisis</i> (Hamilton-Buchanan, 1822)	Hamilton's barila	D iii 8; P i 14; V ii 9; A ii 8; C19.	Or	LC
	II.Sub family: Danioninae				
	<i>1.Danio aequipinnatus</i> (McClelland, 1839)	Giant danio	Dii7-8;P ii12; Vi9;Aii-iii 13-14;C21.	Or	LR-nt
	<i>2.Danio dangila</i> (Hamilton, 1822) McClelland, 1843)	Dangila danio	D ii 7; P i 12;Vii 9;Aii 5;C19.	Fd, Or	LC
	III.Sub family: Garrinae				

	1. <i>Garra lissorhynchus</i> (McClelland, 1843)	Khasi garra	D iii 6; Pi12; Vii8; A ii6; C19.	Fd	VU
	IV.Sub family: Barbinae				
	1. <i>Cyprinus conchoni</i> (Hamilton-Buchanan, 1822)	Rosy bard	Diii7-8; Aii-iii 5; Pi18; Vi8; C19.	Fd, Or	LC
	V.Sub family: Cyprininae				
	1. <i>Cyprinus chagunio</i> (Hamilton-Buchanan, 1822)	Lalputi	Dv8; Pi15; Vi 8; Aiii5; C19.	Fd	LC
	2. <i>Tor putitora</i> (Hamilton-Buchanan, 1822)	Putitor mahseer	D iii8-9; Pi18; Vi8; A ii 5; C19.	Fd, S	EN
	3. <i>Labeo calbasu</i> (Hamilton-Buchanan, 1822)	Kalbasu	Diii15; Pi16; V i8; A ii5; C19.	Fd, S	LC
	4. <i>Neolissocheilus hexagonolepis</i> (McClelland)	Chocolate mahseer	D iv 9; Pi16; Vi8; A iii5; C19.	Fd, S	LC
	3.Family: Psilorhynchinae				
	1. <i>Psilorhynchus homaloptera</i> (Hora & Mukerji, 1935)	Homaloptera minnow	Diii 9; P vii-viii 10; Vii 8; A ii 5; C18.	Fd	LC
2	B.Order: Siluriformes				
	I.Family : Amblycipitidae				
	1. <i>Amblyceps mangois</i> (Hamilton-Buchanan, 1822)	Indian torrents catfish	Di5-6; P i 6; V i 4; A i 8; C 19.	Or	LR-nt
	II.Family: Bagridae				
	1. <i>Olyra longicaudatus</i> (McClelland, 1842)	Himalayan olyra	Dii7; Pi 5; V ii4; Aii16-20; C19.	Or	LC
	2. <i>Aorichthys aor</i> (Hamilton-Buchanan, 1822)	Long whiskered catfish	Di7-8; Pi18; V i 5; A iii 8; C17.	Fd	LC
	III.Family: Sisoridae				
	1. <i>Bagarius yarrelli</i> (Sykes, 1841)	Goonch	Di7; Pi11-14; Vi5; Aii9-12; C19	Fd	VU
3	2. <i>Glyptothorax trilineatus</i> (Blyth, 1860)	Blyth's glyptothorax	Di6-7; Pi 10; V i 5; A i 10.	Fd, Or	LC
	C.Order: Perciformes				
	I.Family: Channidae				
	1. <i>Channa stewartii</i> (playfair, 1867)	Assamese snakehead	Di 38-39; Pi 19; Vi 5; A i28; C17.	Fd, Or	LC

4	D.Order: Beloniformes I.Family: Belonidae				
	1. <i>Xenentodon cancila</i> (Hamilton-Buchanan,1822)	Freshwater garfish	Di17-19;Pi10 ;V i7;Ai16-18;C15.	Or	LC

Fd: Food; **O:** Ornamental, **S:** Sport, **EN-**Endangered; **NT-** Near Threatened; **VU-**Vulnerable; **LC;**Least Concern; **LR-nt:** Lower Risk (near threatened),**D-**Dorsal; **V-**Pelvic; **P-**Pectoral; **A-**Anal

Though the state of Nagaland lies within one of the biologically hot spot region of the world (Myers et al.,2000), The region is not spared from the worrying repercussions of so-called civilization. The aquatic environment of the current study location is severely threatened by widespread habitat damage, overfishing, and other illegal activities including the use of electrofishing and dynamite bombing, among other things. Another significant element that contributes to the loss of biodiversity in the state is the presence of indigenous people, who have long practices of fishing and hunting. The state adheres to the general belief of the people of north-eastern India that "all fishes are designed to be eaten," with the exception that some fish species are preferred to others (Gurumayum SD *et al.*,2016).

Despite the pressure that anthropogenic activities place on the fish fauna, the state's abundant biodiversity resources are reflected in the rapid discovery of several fish species that are new to science. Thus, evaluation and recording of the available fish species become essential for proper implementation and conservation measures. The presence of 1 endangered fish species, 4 vulnerable species, and 1 near threatened species from the current survey is extremely concerning. Therefore, there is a critical need for both fish resource exploration and conservation at the study location. Since habitat destruction is one of the primary mechanisms affecting biodiversity loss, most biologists are concerned about its importance for habitat conservation measure. Biodiversity conservation is one of the major issues and aquatic environments are in serious threats therefore, it is necessary to protect and develop research and systematic conservation planning to protect freshwater biodiversity. Cooperative efforts across the entire landscape are necessary for the long-term maintenance of species and their management. Instead of dealing with biodiversity on a species level, it should be done at the habitat or ecosystem level. Local media, by utilising a variety of communication channels may address the issue of biodiversity to educate and to raise the awareness among the public about it. Environmental actions at the national and international levels need to be strengthened to safeguard the biodiversity otherwise no immune to further change of existing threat intensity or the new threat arises.

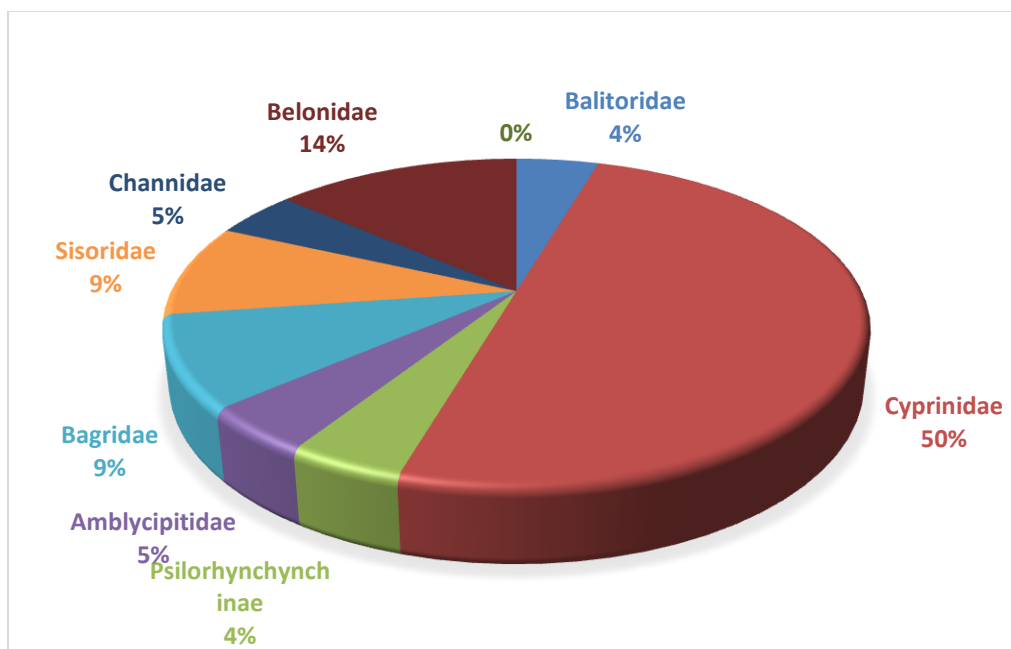


Figure 3 : Percentage composition of fish families from downstream of Dikhu river system.

4. CONCLUSION

The present work of Ichthyofaunal diversity of the downstream Dikhu river and its tributaries shows that this particular river system is endowed with a variable type of fishes. From the investigation a total of 22 species of fishes belonging to 4 orders, 8 families, 6 sub- families, 16 genera (Table 1) were identified from the downstream Dikhu river system. The family Cyprinidae dominated the catch lists with 50%, Balitoridae 14%, Bagridae and Sisoridae 9% ,Amblycipitidae and Channidae 5% whereas Psilorhynchinae and Belonidae represented by 4% each (Figure 3). Present surveys recorded the presence of 13 least concern (LC) species , 3 lower risk-near threatened (LR-nt) species, 4 vulnerable (VU) species, one species each in near threatened (NT) and endangered (EN) species categories of IUCN (3.1) Red list.

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