



Review Article

Volume 18 Issue 1 - April 2025
DOI: 10.19080/OFOAJ.2024.18.5559779

Oceanogr Fish Open Access J

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Distribution and Conservation Status of Ichthyospecies in Rivers Dhalai and Haora in the Eastern Himalayan Biodiversity Hotspot Region of Tripura Province in the of Northeast India: Recent Detailed Taxonomic Study



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Submission: March 17, 2025; Published: April 14, 2025

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Abstract

Fish faunal exploration at different study points in Rivers Dhalai and Haora in the province of Tripura in the North-Eastern (NE) Biodiversity (BD) hotspot, revealed the occurrence of 2 ichthyospecies under 1 genus, 1 Family and 1 Order from River Dhalai; while, 7 species under 6 genera, 3 Sub-families, 4 Families and 1 Order have been recorded from River Haora in its first survey on 13 4 1999; and, 2 species under 2 genera, one sub-family, 2 families and 2 Orders have been recorded from the River Haora in the second survey on 25 10 2005. In depth, systematic studies portrayed the highest number of species among the *Cypriniformes* and lowest among the *Synbranchiformes* and *Siluriformes* in both the studied rivers. Conservation status and Distribution of each species have been discussed in the present paper.

Keywords: Fish fauna; Ichthyodiversity; Systematics; River Dhalai; River Haora; Tripura; North-East India Himalayan Biodiversity hotspot

Introduction

The bioresources in water are under tremendous pressure chiefly due to human-generated influences, including effects on ichthyofauna and their habitat [1-10]. Hence, research works regarding fish fauna and their habitat is of utmost necessity.

Fishes account for about half of the total vertebrate population in the world. They live in almost all known aquatic habitats. Approx. 21,723 living species of fish have been noted among c 39,900 species of vertebrates on the earth [11-18].

Out of these, c 8411 are freshwater species and c11,650 are marine [19,20]. India is regarded as a Mega biodiversity country in the world [21]. Approx. 2500 species of fishes have been reported from India; out of which, c 930 live in freshwater (FW) and c 1570 live in the sea [13,14,16-18,22,23]. This bewildering fish diversity of this region has been alluring plenty of ichthyologists both from India and abroad. Concomitantly, North-Eastern region of India has been identified as a 'Hotspot' of Biodiversity in the Eastern Himalayan stretch by the World Conservation Monitoring Centre

[24]. This unparalleled rich Biodiversity of this zone could be assigned to certain reasons, notably, geomorphology and the tectonics of this region. The hills and the undulating terrains of this region give rise to innumerable torrential rheophilic streams, which lead to big rivers; and, finally, become inseparable components of the Ganga-Brahmaputra-Barak-Chindwin-Kolodyne-Gomati- Meghna system Kar [14,15,16,25-29].

There are innumerable lentic and lotic water bodies in India. And, the Province of Tripura, located in the North-Eastern Himalayan zone, is a hotspot of fish diversity, containing many wetlands and rivers of various kinds including rheophilic hill streams and plain water rivers and streams. However, the sustenance of the aquatic denizens has been much influenced by human interventions.

A little review of literature on Fish systematics works revealed that, [30] had reported on an appraisal of Satpura Hypothesis of Distribution of the Malayan Fauna and Flora to Peninsular India.

Concomitant to above, Kar [14-18,22,23,25-29,31-58] did extensive and intensive pioneering works on the fish diversity and taxonomy, fish disease (EUS) and other related aspects in innumerable water bodies of different kinds in North-East (NE) India. Kar & Sen [59] did pioneering studies on the diversity and distribution of fish in the rivers in Assam, Mizoram and Tripura. Kar & Barbhuiya [60], Kar & Das, BK [61], Kar & Kumar [62] studied the present status of water bodies and human impact vis-a-vis sustainability of fishes, particularly the endangered mahseer fishes. Kar & Das B [63] published the fish diversity in rivers in Karbi Anglong. Kar & Khyntiam [64,65] did pioneering taxonomic studies of the fishes from rivers Diyung, Vombadung, Khuolzangvadung, Tuikoi and Mahur; and, in River Jinam in Dima Hasao district of Assam. Kar & Khyntiam [66] reported the fishes of River Barak at Karong. Kar & Khyntiam [67] did Pioneering Study on Taxonomic Diversity of Fishes in the Headwaters of River Barak in Assam, Manipur and Mizoram, Northeast India. Kar & Khyntiam [68], in continuation of the reconnaissance pilot survey, did further pioneering works on the Systematic, Distribution and Conservation of Ichthyo species in the Headwaters of River Barak (Assam, Manipur and Mizoram) in Northeast, India. Kar & Roy [69,70] worked on the hitherto unknown, virulent Epizootic Ulcerative Fish Disease Syndrome (EUS). Kar et al. [65,71-85] worked on various aspects of fishes, including fish taxonomy, fish disease and fish parasites, zooplankton as fish food fauna, fishing gears and fish catching devices; and so on. Das et al. [86] studied on zooplankton assemblage.

Notwithstanding the above, some of the other significant works on the fishes and water bodies in India in general and NE India, in particular; are those of [4,7-10,11-13,87-113]. Incidentally, Doru [06] worked on the water bodies in Romania.

Notwithstanding the above, Kar D [45] presented on the Fish Diversity in the Major Rivers in Southern Assam, Mizoram and Tripura at the 2nd International Symposium on GIS and Spatial Analyses in Fisheries and Aquatic Sciences, held at the University of Sussex at Brighton in the UK. In addition, Kar D [14] dealt with the Sustainability issues of Inland Fish Biodiversity and Fisheries in Barak drainage (Assam), in Mizoram and in Tripura at the International Symposium on 'Improved sustainability of Fish Production Systems and Appropriate Technologies for Utilization' ('Sustain Fish'), held at the Cochin University of Science and Technology (CUSAT) at Cochin in Kerala. Further, Kar D [52] presented an overview of the Wetlands, Rivers, Fish Resources and Fish Disease in North-East India at the International Symposium on Aquaculture and Fisheries (as part of the International Conference on Environmental Sustainability for Food Security (ENFOSE, 2016), held at Fisheries College and Research Institute (FCRI), Tamil Nadu Fisheries University (TNFU). In addition, Kar D [80] dwelt upon the Wetlands, Rivers, Fish, Plankton resources and Fish disease and Aquaculture in North-East India as an Overview at the International Symposium, entitled, 'Lake 2016' organized by the Indian Institute of Science, Bengaluru, and the

Alva's Education Foundation, Mengaluru (India).

As per online sources, the River Dhalai (also Called Dhala River) is said to have originated from Atharamura Hill ranges in Tripura (23° 54/ 18.7535 // N and 91° 50 / 19.9604 E //) near A.K Solutions of Samar Deb Barma (now temporarily closed) and from around Emprut Chhara Baptist Church; and, its so-called upstream stretch ends at 'Dhalai Railway bridge' (L-L 23.9252640, 91.8379385) at Ambassa, covering a river distance of 4.2 km. The River Dhalai is a transboundary river bordering India and Bangladesh. In Tripura, the river Dhalai flows through Ambassa (23° 55/ 2.6// N and 91° 50/ 28.6// E) followed by places like Baralutma, Kamalpur, etc. Subsequently, the River Dhalai is said to enter Bangladesh at 'Kurma Immigration Nadi Ghat' at a L-L point of 24.216456 and 91.851669.

The river distance of River Dhalai from 'Dhalai Railway bridge' (around Ambassa) to Kurma Immigration Nadi Ghat' is 114 km; and this stretch of 114 km could be said to be the mid-reach stretch of River Dhalai. Subsequently, after flowing through various regions in Bangladesh, the River Dhalai finally joins the River Monu at a point called 'Monu-Dhalai Sangjog point' at Lat-Long position of 24° 29 / 4.3717// N and 91° 49/ 30.4471// E around a place called 'Prem Nagar Bazar Ghat in Bangladesh' (24° 29 / 01 // N and 91° 49 / 33 // E). The river length of River Dhalai from 'Kurma Immigration Nadi ghat point' (the point where River Dhalai is said to enter the territory of Bangladesh) to the 'Monu-

Dhalai Sangjog point' (the point at which River Dhalai meets River Monu) is 41 km; and this 41 km is said to be the downstream stretch of River Dhalai.

The combined flow of Rivers Dhalai and Monu, henceforth, flows as River Monu in Bangladesh and, the name River Dhalai is no longer displayed in the map. The River Monu finally joins River Kushiya (River Kushiya is found at Karimganj town along Indo-Bangladesh border) at a late-long point of 24° 35 / 42.2221 // N and 91° 43 / 44.0206 // E (around a place called 'Monumukh Bazar' in Bangladesh). The river distance of River Monu from 'Manu-Dhalai Sangjog point'(at 'Prem Nagar Bazar Ghat') to 'Rivers Kushiya-Monu meeting point at a L-L point of 24° 35' 42.2221" N and 91° 43' 44.0206 " is 23 km. Then, in Bangladesh, the River Kushiya, continues its flow as River Kalni. It may be noted here that the River Kushiya is called River Kushiya in its upstream stretch towards Harinagar village point (around Badarpur) in Barak valley in Assam and, it is called River Kalni in its downstream journey towards River Meghna. The River Kalni meets River Megha at a L-L point of 24° 8' 52.1048" N and 90° 59' 16.9462" E around Village Rajapur and, the river distance of River Kalni from 'Monumukh Bazar' on the bank of River Kalni to meeting point of River Kalni with River Meghna around village Rajapur on the bank of River Meghna is 150 km.

The River Kalni joins River Meghna; at which point, also the River Ghoraura joins the River Meghna. The point of Tri junction of

the 3 rivers, viz, River Kalni, River Ghorautra and the River Meghna is around a place called Mehandipur Tourist center around a Lat-Long Point of 24° 9' 30.8308" N and 90° 58' 41.4559" E. The River Meghna finally flows a river distance of 528 km from the tri-junction point of 3 rivers, viz., River Kalni, River Ghorautra and River Meghna (around Village Rajapur and around Mehandipur Tourist Centre) to the meeting point of River Meghna with the Bay of Bengal at Location called Village Tazumuddin (at L-L point of 22° 24' 36.0" N and 90° 52' 28.9").

The River Dhalai does not seem to have a long stretch of upstream rheophilic habitat. To the contrary, the brief hilly stretch from the origin of River Dhalai in the Atharamura Hill ranges in Tripura, has some rheophilic characteristics like mainly riffle-pool type of microhabitat and cobbles and gravels as substratum. The sufficiently long mid-reach portion of River Dhalai is marked with mainly run-sheet type of laminar flow with some amount of occasional turbulence with mainly fines (silt, sand and clay) as substratum.

The River Haora, as per online sources, originates from a Lat-Long (L-L) position of 23° 47' 26.3328" N and 91° 30' 41.3428" E around a landmark point of Kashidas Para J.B. School in the Baramura Hills in Tripura. Distance from the origin point of River Haora around J B School to barrage point at Chakmaghat is 28 km; and this stretch could be considered as the upstream stretch of River Haora. The River Haora flows down towards Agartala city and then to Bangladesh. Distance from barrage point at Chakmaghat to Agartala city (23° 49' 25.0 " N and 91° 14' 36.9" E) is 54 km and, this stretch could be considered as mid-stream stretch of River Haora. The River Haora continues to flow down towards Bangladesh. The River Haora enters Bangladesh at the point of 'Haora Border Bridge' (23° 49' 25.0298" N and 91° 41'

36.8581") and this stretch of River Haora (from Agartala city to 'Haora Border Bridge' point) has a distance of 4.6 km and, this stretch of the River Haora could be considered as down-stream stretch of river Haora. The River Haora continues to flow down in Bangladesh. The River Haora meets with River Titash near a place called Dharkhar in Bangladesh at a L-L point of 23° 50' 46.298" N and 91° 9' 38.7983 " E covering a distance of 17 km from 'Haora Border Bridge' to its meeting point with River Titash and this stretch of 17 km of River Haora could be considered as part of downstream stretch of River Haora. After meeting with River Titash, the combined flow continues to flow down in Bangladesh as River Titash (the name River Haora no longer appears in the map) and, the River Titash joins the river Meghna at a L-L point of 23° 58' 9.9628" N and 90° 58' 35.5876" E around a place called Baish Mouza Launch Ghat in Bangladesh covering a distance of 35 km (from Dharkhar in Bangladesh to Baish Mouza Launch Ghat in Bangladesh). The river Meghna meets the Bay of Bengal around a place called Tazumuddin (Village) at a L -L point of 22° 24' 36.0428" N and 90° 52' 28.8678 " E covering 261.0 km from Baish Mouza Launch ghat (meeting point of River Titash with River Meghna) to Tazumuddin (Village: meeting point of River Meghna with the Bay of Bengal).

The River Haora does not have a long stretch of rheophilic habitat. To the contrary, the short hilly stretch from the origin of River Haora in the Baramura Hills to around Chakmaghat has some rheophilic characteristics like mainly riffle-pool type of microhabitat and cobbles and gravels as substratum. The sufficiently long mid-reach portion of River Haora is marked with mainly laminar flow with some amount of turbulence occasionally. It has mainly laminar flow in the terminal downstream region with mainly fines (silt, sand and clay) as substratum (Tables 1-3).

Table 1: Fish specimen collection sites in River Dhalai in Tripura.

Site	Date of Collection	Lat-Long position	Altitude (m MSL)
River Dhalai at Ambasa	19-2-2012	23° 55'	2.6// N-
		91° 50'	28.6// E

Table 2: Fish specimen collection sites in River Haora in Tripura.

Site	Date of Collection	Lat-Long position	Altitude (m MSL)
River Dhalai at Agartala	13-4 -1999	23°49'	25.0// N-
	25-10-2005	91°14'	36.9// E-

River Dhalai in Tripura

Dhalai: 23° 55/ 2.6// N and 91° 50/ 28.6// E

Place: Ambasa: Lat-Long of River Dhalai 23° 55/ 2.6// N and 91° 50/ 28.6// E

River Haora in Tripura

R Haora: 23° 49/ 25.0// N and 91° 14/ 36.9// E

Place: Agartala: Lat-Long River Haora 23° 49' 25.0 " N and 91° 14/ 36.9// E

Material and Methods

Fish samples had been collected through experimental fishing using cast nets (diameter 3.7 m - 1.0 m), gill nets (vertical height 1.0 m - 1.5 m; length 100 m - 150 m), drag nets (vertical height 2.0 m), triangular scoop nets (vertical height 1.0 m) and by using

different types of traps. The technique of Camouflaging was also used to catch fish. Fish had been preserved first in concentrated formaldehyde in the field itself and then in 10% formalin. Fish have been identified after standard literature [11,13,101,104,114-

120] and fishbase.org. The arrangement of classification, followed here, is that of Greenwood et al. [121] and Jayaram [101, 11-13] & Kar and Khyrniam [66].

Table 3: Fish Diversity on different dates and Collection Stations in Rivers Dhalai and Haora in Tripura

Fish name	River Dhalai River No. 36 ,Collection date 19 2 2012 (No. of Fishes), Museum No	Rive Haora River No.28, Collec-tion date 13 4 1999 Lot 1, (No. of Fishes), Museum No	Rive Haora River No.28 (a), Collection date 25 10 2005 Lot 2, (No. of Fishes), Museum No	No. of Fish collected	Conservati on Status (Global) (IUCN) Not Done LATER ON	Conservation Status (Local) (based on occur-rence of Fish species in 1 or >1 locations 1 Location: of Concern(C) 2 Locations: Less Concern (LC) >2 Locations: No Concern (NC) Not Done
<i>Cabdio morar</i>		+(1),28 /16		1	LC	Concern (C)
<i>Amblypharyngodon mola</i>		+(9),28 / 18 to 26		9	LC	C
<i>Puntius chola</i>		+(1),28 / 9		1	LC	C
<i>Puntius sophore</i>		+(6),28 / 3 to 6, 8, 13		6	LC	C
<i>Cirrhinus reba</i>			+(1),28(a) /1(i)	1	LC	C
<i>Paracanthocobitis botia</i>		+(2),28 / 15, 17		2	LC	C
<i>Schistura fasciata</i>		+(1),28/7		1	Not Evaluated (NE)	
<i>Lepidocephalichthys guntea</i>		+(1),28 / 29		1	LC	C
<i>Sperata seenghala</i>			+(1), 28(a) / 2(i)	1	LC	C
<i>Macrogathusa aral</i>	+(1),36 / 1 (i)			1	LC	C
<i>Macrogathus pancalus</i>	+(2),36 / 2 (i), 2 (ii)			2	LC	C

Systematic List of Fishes of River Dhalai in Tripura Coll: 19-2-2012, River Sl. No. 36

Order (I): *Synbranchiiformes*

Family (1): *Mastacembelidae*

Genus (i): *Macrogathus* Lacepede, 1800

Species (1): *Macrogathus aral* (Bloch & Schneider, 1801)

Species (2): *Macrogathus pancalus* Hamilton, 1822

Systematic List of Fishes of River Haora in Tripura Lot (1) Coll: 13-4-1999 River Sl. No. 28

Order(I): *Cypriniformes*

Family (A): *Danionidae*

Sub-family(a): *Chedrinae*

Genus: (i) *Cabdio* Hamilton 1822

Species (1): *Cabdio morar* (Hamilton, 1822)

Order(I): *Cypriniformes*

Family (A): *Danionidae*

Sub-family(b): *Rasborinae*

Genus (ii) *Amblypharyngodon* Bleeker, 1860

Species (2) *Amblypharyngodon mola* (Hamilton, 1822)

Order(I): *Cypriniformes*

Family(B): *Cyprinidae*

Sub-family (c): *Smiliogastrinae*

Genus: (iii): *Puntius* Hamilton, 1822

Species (3): *Puntius chola* (Hamilton, 1822)

Species (4): *Puntius sophore* (Hamilton, 1822)

Order(I): *Cypriniformes*

Family(C): *Nemacheilidae*

Genus (iv): *Acanthocobitis* (*Paracanthocobitis*) Peters, 1861

Species (5): *Acanthocobitis* (*Paracanthocobitis*) *botia* (Hamilton, 1822)

Genus (v): *Schistura* McClelland, 1839

Species (6): *Schistura fasciata* Lokeshwor and Vishwanath, 2011

Order(I): *Cypriniformes*

Family(D): *Cobitidae*

Genus (vi): *Lepidocephalichthys* Bleeker, 1858

Species (7): *Lepidocephalichthys guntea* (Hamilton, 1822)

Systematic List of Fishes of River Haora in Tripura Lot (2):

Coll: 25 10 2005 River Sl. No. 28 (a)

Order(I): *Cypriniformes*

Family(A): *Cyprinidae*

Sub-family(a): *Labeoninae*

Genus (i)) *Cirrhinus* Cuvier, 1817

Species (1): *Cirrhinus reba* (Hamilton, 1822)

Order (II): *Siluriformes*

Family(B): *Bagridae*

Genus (ii): *Sperata* Holly, 1939

Species (2): *Sperata seenghala* (Sykes, 1839)

Systematic account of the Fishes

Genus: *Cabdio* Hamilton 1822

Cabdio Hamilton, an account of fishes found in the river Ganges: 333, 392.

Generic characters: Body elongate. Abdomen rounded. Head moderate rounded anteriorly.

Snout obtuse. Mouth small, inferior. Eyes lateral. Lips thin. Lower jaw without any lip and with a sharp crescent bony edge. Barbel absent. Dorsal fin inserted behind pelvic fins. Caudal fin forked. Lateral line much decurved. Scales of moderate size; eye, 17.2 to 25.3 % HL.

Material examined: (1) River Haora in Tripura; Coll. 13 4 1999 (Lot 1); 1 ex; Museum No,

28/16; Coll. Professor D. Kar and Party: First Report.

Key to species: Lateral line scales 38 to 42. Anal fin with 10 to 12 rays. 2.5 to 3 rows of scales

between lateral line and pelvic fin base.

***Cabdio morar* (Hamilton, 1822)**

Distribution: Almost throughout India, including river Barak at Lakhapur and at

Khangbor (First report by Prof. D Kar and Party); also in Bangladesh, Nepal, Pakistan, etc.

IUCN Status: Least Concern (LC)

Genus: *Amblypharyngodon* Bleeker, 1860

Amblypharyngodon Bleeker, 1860 [Natuurkundig Tijdschrift voor Nederlandsch Indië 20(3): 433] Masc. *Cyprinus mola* Hamilton 1822. Type by being a replacement name.

Generic characters: Body moderately long, sub-cylindrical. Abdomen round. Head much

compressed. Snout obtusely rounded. Mouth wide, antero-lateral and not protractile. Eyes centrally-placed and large; they are not visible from below ventral surface. Upper lip absent. Lower lip with a short labial fold. Lower jaw prominent with a thin sharp edge and a symphysial knob which fits into the upper jaw. Barbells absent. Dorsal fin inserted little behind insertion of pelvic fins. Anal fin short. Caudal fin forked. Scales minute.

Material examined: (1) River Haora in Tripura; Coll. 13 4 1999 (Lot 1); 9 exs; Museum No,

28/18-26; Coll. Professor D. Kar and Party: First Report.

Key to species: Lateral line incomplete with 65-91 scales. A silvery lateral band with dark

markings on dorsal, anal and caudal fins present.

***Amblypharyngodon mola* (Hamilton, 1822)**

Distribution: In many water bodies almost throughout India (including Sat Beel, Narapati

Beel in Cachar Assam; River Gomati in Tripura (In all these collections: First Report by Professor D. Kar and Party); also in Afghanistan, Bangladesh, Myanmar, Nepal, Pakistan, and Sri Lanka, etc.

IUCN status: Least Concern (LC)

Genus: *Puntius* Hamilton, 1822

Puntius Hamilton, 1822, Fish Ganges :310, 388 (Type species, *Cyprinus sophore*, Hamilton-Buchanan, by subsequent designation); Jayaram, 1991, rec. Zool. Surv. India Occ. Paper No.135: 1-178 (revision); Talwar and Jhingran, 1991, Inland Fishes 1: 250; Jayaram, 1999, FW Fishes of the Indian Region: 108; Menon, 1999, Rec Zool Surv India., Occ. Paper No. 175: 65; Nath and Dey, 2000. Fish and Fisheries of NE India (Arunachal Pradesh): 39; Vishwanath, 2002, Fish and Fisheries of NE India, NATP Pub.: 69.

Generic characters: Body short to moderately long, deep, compressed. Abdomen round. Head

short. Snout obtuse, conical or pointed; sometimes, maybe with tubercles. Mouth arched, anterior or inferior. Upper jaw may be protractile. Eyes moderate to large, dorsolateral; they are not visible from below ventral surface. Lips thin, cover the jaws, without any horny covering. Jaws simple without any tubercle at the symphysis. Barbels four, two or may be absent. Dorsal fin shorts are inserted nearly opposite to pelvic fins. Anal fin short. Caudal fin forked. Scales small, moderate or large.

Material examined: River Haora in Tripura; Coll. 13 4 1999 (Lot 1); 1 ex; Museum No, 28/9;

Coll. Professor D. Kar and Party: First Report.

Key to species: Body marked with two conspicuous dark blotches.

***Puntius chola* (Hamilton, 1822)**

Distribution: Almost throughout India (including Salchakra Anua, Fulbari Anua in Cachar,

Assam; Rivers Gomati and Feni in Tripura: In all these collections: First Report by Professor D. Kar and Party; also in Bangladesh, Myanmar, Nepal, Pakistan, Sri Lanka, etc.

IUCN status: Least Concern (LC).

Material examined: River Haora in Tripura; Coll. 13 4 1999 (Lot 1); 6 exs; Museum No., 28 /

3 to 6, 8, 13; Coll. Professor D. Kar and Party: First Report.

Key to Species: Pre-dorsal scales 8-10. Presence of a black spot-on dorsal fin and on caudal

peduncle.

***Puntius sophore* (Hamilton, 1822)**

Distribution: Almost throughout India, including River Barak at Lakhimpur; Rupairbala

Anua in Cachar Assam; Different locations of River Monu in Tripura; Different locations of River Gomati in Tripura: In all these collections: First Report by Professor D. Kar and Party. Also, found in Bangladesh, Myanmar, Nepal, Pakistan, Sri Lanka, etc.

IUCN Status: Least Concern (LC)

Genus: *Cirrhinus* Cuvier, 1817

Cirrhinus (Oken), Cuvier, 1817, V.KI. Fische. IN: Isi's order Encyclopadische Zeituny, 8: 113 (type species, *Cyprinus cirrhosus* Bleeker, by monotypy), -Banarescu, 1983, Rev Roum Biol (Zool). 28 (1): 13-17 (revision).

Generic characters: Body moderate, elongate, compressed. Abdomen rounded. Head short.

Snout obtusely rounded, with thin skin covering it. Mouth wide, transverse. Eyes are moderately large. Upper lip fringed or entire, not continuous with lower. Lower jaw sharp with a small tubercle at the symphysis. Barbels four, two or none. Dorsal fin inserted ahead of pelvic fins. Anal fin short. Scales of varying sizes. Lateral line complete.

Material examined: River Haora in Tripura; Coll. 25 10 2005 (Lot 2); 1 ex; Museum No., 28

(a)/1(i); Coll. Professor D. Kar and Party: First Report.

Key to species: Lateral line scales 34 to 38. Dorsal fin less than body height.

***Cirrhinus reba* (Hamilton, 1822)**

Distribution: in many water bodies almost throughout India, including Rivers Monu and

Khawai in Tripura (In all these collections: First Reports by Professor. D. Kar and Party); also, in Bangladesh, Pakistan, Punjab, etc.

IUCN Status: Least Concern (LC).

Genus: *Paracanthocobitis* Peters, 1861

Paracanthocobitis Peters, 1861, Monats. Akad. Wiss. Berlin for 1861 : 712 (Type species: *Acanthocobitis longipinnis* Peters = *Cobitis pavonaceus* McClelland, by monotypy); Menon, 1987, Fauna India, 4(1): 140; Kottelat, 1990, Verlag Dr. Friedrich Pfeil, Munchen : 18 (as a valid genus); Banarescu and Nalbant, 1995, Trav. Mus. Hist. nat. "Grigore Antipa", 35 : 430 (as a valid genus); Jayaram, 1999, FW Fishes of the Indian Region : 173; Vishwanath, 2002, Fish and Fisheries of NE India, NATP Pub. : 101.

Generic characters: Body deep and strongly compressed posteriorly. Head slightly

compressed. Nostrils close together. Presence of a slight indication of an adipose keel. Upper lip covered by 2 or 3 rows of papillae. Lower lip interrupted in the middle and with numerous papillae. Dorsal fin usually with 10 to 18 branched rays. Caudal fin slightly emarginated. Presence of conspicuous black spot at upper extremity of caudal fin.

Material examined: River Haora in Tripura; Coll. 13 4 1999 (Lot 1); 2 exs; Museum No.,

28 / 15, 17; Coll. Professor D. Kar and Party: First Report.

Key to species: Dorsal fin with 9-11 branched rays. Body depth about 20.00 to 23.63 % SL.

***Paracanthocobitis botia* (Hamilton, 1822)**

Distribution: Almost throughout India (including Baskandi Anua in Cachar, Assam; River

Feni in Tripura; (In all these collections, First report by Prof D Kar and Party); also in Manipur, Myanmar, etc.

IUCN Status: Least Concern (LC).

Genus: *Schistura* McClelland, 1839

Schistura McClelland, 1839, *Asiat. Res.*, 19: 306, 439 (Type species: *Cobitis (Schistura) rupecula* McClelland by subsequent designation).

Generic characters: Body elongate of almost uniform depth; compressed posteriorly. Head

either depressed or compressed. Snout usually blunt. The posterior nostril may be prolonged as a tube in some species. Lips with a few furrows; medially interrupted. Upper lip slightly furrowed; continuous or with a narrow median interruption. Lower lip interrupted in the middle; moderately furrowed. Processus dentiform of upper jaw present with a corresponding incision on the lower jaw in many species. Dorsal fin short; inserted ahead or opposite to pelvic fins; with seven-eight rays; rarely 10. An auxillary pelvic lobe may be present. Caudal fin slightly emarginated, forked, or truncate (never rounded); with a black bar. A general absence of adipose crest. If present, mostly in the posterior part of the body. Lateral line complete or incomplete. Presence of scales on the body generally. Usually, the presence of a characteristic color pattern.

Material examined: River Haora in Tripura; Coll. 13 4 1999 (Lot 1); 1 ex; Museum No., 28/7; Coll. Professor D. Kar and Party: First Report.

Key to species: Presence of 11-13 dark brown transverse bars against pale yellow background

on the body. Bars arranged regularly; often fused on mid-dorsal line. Width of bar broader than the inter-spae width. Presence of moderately high adipose crest on dorsal and ventral sides of caudal peduncle. Presence of 3 black spots on the base of dorsal fin.

***Schistura fasciata* Lokeshwor and Vishwanath, 2011**

Distribution: Said to be in R Barak at Western side of Maram Hill in Manipur, India; In the

present study, collection is from River Haora in Tripura: First report by Professor Devashish Kar and Party.

IUCN Status: Not evaluated

Genus: *Lepidocephalichthys* Bleeker, 1858

Lepidocephalichthys, Bleeker, 1858, *Na Tijdschr. Ned. Indet.* 16 :3: 303 (Type species, *Cobitis macrochir* Bleeker; Tilak and Hussain, 1981, *rec Zool. Surv. India Occ Paper No. 32: 3-28* (revision); Menon, *Fauna India*, 4(2): 52 (revision); Talwar and Jhingra, 1999, *Inland Fishes*, 1: 520; Jayaram, 1999, *FW Fishes of the Indian Region: 216*; Menon, 1999, *rec Zool Surv India Occ Paper No.175: 159*.

Generic characters: Body elongate; caudal peduncle laterally compressed. Abdomen

rounded. Head short, conical. Snout blunt. Mouth inferior, narrow, slightly arched. Eyes small. Lower lip interrupted in the middle. Barbels six; one pair each rostral, mandibular and maxillary. Presence of a large erectile bifid sub-orbital spine below or in front of eyes. Origin of dorsal fin variable with 8 or 9 rays. Anal fin short with 7 to 8 rays. Caudal fin truncate or slightly emarginated. Scales small. Lateral line absent.

Material examined: River Haora in Tripura; Coll. 13 4 1999 (Lot 1); 1 ex; Museum No., 28/29;

Coll. Professor D. Kar and Party: First Report.

Key to species: Depth of body <16.7 % SL. Presence of a dark lateral band or dark grey spots on the body.

***Lepidocephalichthys guntea* (Hamilton, 1822)**

Distribution: In many water bodies throughout India (including Salchakra Anua in

Assam; Rivers Feni and Lubdachhara in Tripura: In all these collections: First report by Professor Devashish Kar and Party); also in Bangladesh, Myanmar, Nepal, Pakistan, etc.

IUCN status: Least Concern (LC)

1.1.1. Genus: *Sperata* Holly, 1939

Sperata Holly, 1939, *Zool. Anzeiger* 125:14, 1939 (replacement name for *Macrones* Dumeril, 1856; therefore, taking the same type species *Bagrus lamarii* Valenciennes, 1840 (Type species: *Sperata vittatus* (Bloch) in error); Ferraris and Runge, 1999, *Proc. Acad. Nat. Sci. Philad.* 51(10): 400 (Revision); Jayaram, 2006, *Catfishes of India: 23*; Ferraris, 2007, *Zootaxa*, 1418: 106. *Macrones* Dumeril, 1856, *Ichthyologie analytique: 484* (Type species *Bagrus lamarii* Valenciennes, 1840, by original designation; preoccupied by *Macrones* Newman, 1841, *Insecta (Coleoptera)*. *Aoria* Jordan, 1856, *Proc Acad. Nat. Sci. Philad.* 70: 341 (substitute name for *Macrones* Dumeril, 1856, preoccupied by *Aoria baly*, 1863. *Insecta, Coleoptera*).

Generic characters: Dorsal profile arched. Head large elongate, slightly depressed. Snout

spatulate or rounded. Mouth moderately wide. Presence of a distinct inter-neural shield in between basal bone of dorsal fin and occipital process. Presence of 4 pairs of barbels; one each maxillary and nasal and two mandibular. Gill membranes free from each other and also from isthmus. Rayed dorsal fin generally with 7 rays and a robust spine. Adipose dorsal fin low with slightly convex margin. Pectoral fins with 9 or 10 rays and a spine. Pelvic fins generally with 6 rays. Anal fin short with 11 to 15 rays. Caudal fin deeply forked. Presence of a large round or ovoid dark spot near the posterior margin of the adipose fin.

Material examined: River Haora in Tripura; Coll. 25 10 2005 (Lot 2); 1 ex; Museum No., 28

(a)/2(i); Coll. Professor D. Kar and Party: First Report.

Key to species: Snout spatulate. Pectoral fin with 8 or 9 rays.

***Sperata seenghala* (Sykes, 1839)**

Distribution: In many water bodies in India, notably, River Barak; Haors in Assam,

notably, Chatla Haor, Bakri Haor; River Khowai in Tripura (In all these collections: First Report by Professor D. Kar and Party); also, in Rivers Brahmaputra, Ganges and their tributaries; also in Bangladesh, Myanmar, Nepal, Pakistan, Sri Lanka etc.

IUCN status: Least Concern (LC).

1.1.2. Genus: *Macrogathus* Lacepede, 1800

Macrogathus Lacepede, 1800, Hist. Nat. Poiss., 2: 283 (Type species: *Ophidium aculeatum* Bloch by subsequent designation); Sufi, 1953, Bull. Raffles Mus., No. 27: 99-105; Roberts, 1980, Copeia, No. 3: 385-391; Travers, 1984, Bull. Brit. Mus. Nat. Hist. (Zool.), 47 (2): 141-145; Roberts, 1986, Jap. J. Ichthyol., 33 (2): 97-103; Rhynchodella Bloch and Schneider, 1801, Syst. Ichth.: 478.

Generic characters: Body deep, eel-like, long, compressed. Head long pointed. Snout long

fleshy, accommodating a concave prolongation of the upper jaw consisting of a paired series of tooth plates. Mouth inferior. Cleft narrow. Eyes, small, superior, in middle of head. Dorsal fin inserted far behind end of pectoral fins with 13 to 32 detached, depressible spines and 42 to 58 rays. Anal fin with 3 spines and 42 to 58 rays. Caudal fin rounded; and, distinctly separated from dorsal and anal fins. Pelvic fins absent.

Material examined: River Dhalai in Tripura; Coll.19 2 2012; 1 ex; Museum No., 36 / 1 (i); Coll.

Professor D. Kar and Party: First Report.

Key to species: Dorsal fin spines 16-23.

***Macrogathus aral* (Bloch and Schneider, 1801).**

Distribution: In many water bodies in India, including wetlands in Assam like Rani

Meghna Beel, Javda Beel, etc. (In all these collections: First Reports by Professor. D. Kar and Party); also, in Bangladesh, Myanmar, Nepal, etc.

IUCN status: Least Concern (LC).

Material examined: River Dhalai in Tripura; Coll.19 2 2012; 2 exs; Museum No., 36 /

2 (i), 2 (ii); Coll. Professor D. Kar and Party: First Report.

Key to species: Dorsal fin with 24 to 26 spines and 30 to 42 soft rays. Anal with three spines.

Caudal fin distinctly separated from dorsal and anal fins.

***Macrogathus pancalus* Hamilton, 1822**

Distribution: In many water bodies in India (including Salchakra Anua, Shiv Narayanpur

Anua in Cachar, Assam: in all these Collections, First report by Prof. D. Kar and Party); also in Bangladesh, Pakistan, etc.

IUCN status: Least Concern (LC).

Discussion

An overall look into the habitat characteristics of the Dhalai and Haora rivers reveals that the microhabitat of the not too long upstream stretch of both the rivers consists mainly of riffles and pools; whereas it is mostly run-sheet type of microhabitat with seem to harbour the highly rheophilic species of fishes. Occurrence of plain water varieties of laminar flow of water in the mid-reach and downstream u. Further, both the rivers do not fish, that, both the rivers have sufficiently long plain water stretch.

Notwithstanding the above, the unexpectedly less diverse and comparatively poor population of fish in all the studied rivers is a matter of concern. Further, the status of the ichthyo species based on locally estimated information (but, corroborating with IUCN criteria) is to be ascertained with due importance, particularly, with locally tailored species-specific conservation measures. The present study revealed the occurrence of quite rich diversity of fishes in the explored and studied rivers with River Dhalai recording 2 species of fishes, while River Haora recorded 7 and 2 species of fishes respectively during two reconnaissance explorations in the river.

All the above-mentioned rivers flow along the vicinity of Indo-Bangladesh international border; and, had remained ichthyological not much attended to from the fisheries point of view; thus, displaying the present studies as one of the pioneering

original studies in these water bodies. Moreover, these rivers, not being highly torrentially rheophilic, as in rivers in the high gradient zones, do not, much portray typical torrential rheophilic features like falls and cascades as microhabitats and bedrocks and boulders as substrata, as found in the rivers in the high and steep mountain zones. On the contrary, the microhabitat in the surveyed rivers mostly consists of run-sheet with mainly laminar flow of water and occasionally with riffles and pools, while the substratum consists mainly of fines with only occasional cobbles and gravels. Therefore, highly torrential rheophilic fish species are usually not much found here; except, maybe sometimes accidental occurrences.

Notwithstanding the above, Bailey R G [122] had studied the fishes of River Nile in the Republic of Congo. Further, Bailey [123] also worked on the alterations in the Fish and Fisheries Ecology of a large man-made lake in Tanzania. In addition, Bailey & Hickley [124] had reported on a recent collection of *Nothobranchius virgatus* Chambers, a new killifish from southern Sudan. Concomitant to above, Didem et.al [125] had published a New Record of occurrence of *Symphodus bailloni* (*Osteichthyes: Perciformes: Labridae*) in the Western Black Sea Coast of Turkey. Further, Kullander, Sven O & Ralf Britz [126] had revealed the record of a new species of cyprinid fish from Myanmar. In addition, Kevin W Conway & Maurice Kottelat [127] had published a new species of *Psilorhynchus* from the Ataran River Basin in Myanmar, with remarks on the generic name *Psilorhynchoides*. Moreover, Wikramanayake & Moyle [128] had worked on the ecological configuration of Tropical Fish Assemblages in wet-zone streams of Sri Lanka.

Concomitant to above, Aafke M. Schipper & Valerio Barbarossa [1] had dwelt upon the Global congruence of riverine fish species richness and human impact. Armbruster JW, Werneke DC, Tan M [3] had described three new species of saddled loricariid catfishes along with a review of *Hemiancistrus*, *Peckoltia*, and allied genera (*Siluriformes*). Azadi, Mohammad Ali and Arshad-Ul-Alam, Mohammad [5] described the Ichthyofauna of the River Halda in Chittagong, Bangladesh. Batuwita Acharige & Sudesh Greshana [129] worked on the taxonomy of the South Asian Cyprinid genera *Horadandia* and *Rasboroides* (*Ostariophysii: Cyprinidae: Danioninae*); as well as the portrayal of the Present Distribution Pattern of *Rasboroides vaterifloris pallidus* in Gin River [130-140].

Acknowledgement

The author expresses his heartfelt gratitude to the Zoological Survey of India at Shillong for their help in the identification of fish specimens.

References

- Aafke MS, Valerio B (2022) Global congruence of riverine fish species richness and human Presence. *Global Ecol Biogeogr* 31: 1501–1512.
- Akhtar MM, Azomm G, Shamim RS, Hamidul I (2019) Sexual dimorphism of *Canthophrys gongota* (*Teleostei: Cobitidae*) using landmark-based geometric morphometrics in the Atrai river of Bangladesh. *Bangladesh Journal of Scientific and Industrial Research* 54(2): 187-194.
- Armbruster JW, Werneke DC, Tan M (2015) Three new species of saddled loricariid catfishes, and a review of *Hemiancistrus*, *Peckoltia*, and allied genera (*Siluriformes*). *ZooKeys* 480: 97-123.
- Arunachalam M, Raja M, Nandagopal S, Mayden RL (2013) *Garra palaruvica*, a new cyprinid fish (*Cypriniformes: Cyprinidae*) from Kerala, Western Ghats, Peninsular India. *International Journal of Zoology Research* 3(1): 62-68.
- Azadi MA, Arshad UAM (2013) Ichthyofauna of the River Halda in Chittagong, Bangladesh. *Bangladesh J Zool* 41(2): 113-133.
- Bănăduc D, Noblet B, Chauveau R, Latrache Y, Touati A, et al. (2020) Mountainous lotic systems dams environmental risks in Carpathians and Alps. *Acta Oecologica Carpatica* XIII, 57/68 pp. 57- 58.
- Barbhuiya AH, Singha R, Kar D (2021) Golden Mahseer in Barak in North-East India with a note on their morphometry and meristic. In: *Advances in Animal Research*, Global Net Publication (New Delhi), India pp. 1-93.
- Barman RC, Dana SS, Bhattacharya BK, Kar D, Barbhuiya AH (2008) Effect of situational variables on knowledge level of Fishermen for sustainable development of Beel fisheries. *Environment and Ecology* 26(4B): 2092-2094.
- Barman RC, Kar D (2014) Concept definition and approaches of community-based Wetlands Fishers and management. In: *Research Frontiers in Wetlands, Fishery and Aquaculture*, (Eds.) Kar, D., Dominant Publishers and Distributors Pvt. Ltd. (New Delhi), India pp. 291-310.
- Barman RC, Kar D, Dana SS, Bhattcharjya BK (2011) Pen aquaculture through community-based fisheries management: a case study of Dek Beel, Assam, India. *Conservation Forum Journal* 3: 56-63.
- Jayaram KC (1999) *The Freshwater Fishes of the Indian Region*. Narendra Publishing House (Delhi), India, pp. 568.
- Jayaram KC (2003) Ecotatus and Conservation Strategies for Mahseer fishes of India with special reference to Deccan species: In: *Welfare Biology in the New Millennium*, (Eds.) Kar D, Dey SC, Datta NC pp. Allied Publishers Pvt.Ltd. (Bangalore), India pp. 3-12.
- Jayaram KC (2010) *The Freshwater Fishes of the Indian Region*. In: Narendra Publishing House (New Delhi), India pp. 638.
- Kar D (2007a) *Fundamentals of Limnology and Aquaculture Biotechnology*. In: Daya Publishing House (New Delhi), India pp. 623.
- Kar, D (2013a) *Wetlands and Lakes of the World*. Springer (London). pp. 717.
- Kar D (2019) Wetlands diversity and their fishes in Assam, India. *Transylv Rev Syst Ecol Res* 21.3 "The Wetlands Diversity", Romania p. 1-94.
- Kar D (2024a) Fishes of River Kopili in the Assam Province of Eastern Himalayan Biodiversity Hotspot (Research Article). *Oceanogr Fish Open Access Journal* 17(4): 1-18.
- Kar D (2024b) Distribution and Conservation Status of Ichthyospecies of River Monu in Tripura: First Detailed Taxonomic Report. (Research Article). *Oceanogr Fish Open Access Journal* 17(4): 1-22.
- Nelson JS (2006) *Fishes of the World*. In: 4th Edition, John Wiley and Sons, Hoboken, USA pp. 601.
- Nelson JS, Grande TC, Wilson MVH (2016) *Fishes of the World*, (5th Ed.), John Wiley and Sons, Inc., Hoboken, New Jersey, USA, pp. 1-707.

21. Mittermeier RA, Mittermeier CG (1997) Megadiversity: Earth's Biologically Wealthiest Nation. In: McAllister DE, Hamilton AL, Harvery B, Global Freshwater Biodiversity (Ed.) Sea Wind, Cemex, Mexico City, 11: 1-140.
22. Kar D (2003a) Fishes of Barak drainage, Mizoram and Tripura. In: Kumar A, Bohra C, Singh LK, Environment, Pollution and Management (Eds.), APH Publishing Corporation (New Delhi), India pp. 203-211.
23. Kar D (2010) Present status of Fish Diversity and water bodies in North-east India with a note on their Conservation. Keynote address of the Session Chair, Lake 2010 International Conference. Indian Institute of Science, Bangalore, India.
24. WCMC (1998) Freshwater Biodiversity: A Preliminary Global Assessment. A Document prepared for the 4th Meeting of the Conference of the Practices to the Convention of Biological Diversity, World Conservation Monitoring Centre.
25. Kar D (2000a) Fish Genetic Resources in the Principal rivers and wetlands in North-East India with special emphasis on Barak valley (Assam), in Mizoram and in Tripura. Proc. National Project Initiation Workshop of the NATP-ICAR World Bank-aided project on Germplasm Inventory, Evaluation and Gene Banking of Freshwater Fishes': National Bureau of Fish Genetic Resources (NBFGR), Lucknow, India 1: 12.
26. Kar D (2021a) Community Based Fisheries Management: A Global Perspective. Elsevier (Academic Press) USA, pp. 603.
27. Kar D (2021b) Fish and Their Habitats in North-East India Biodiversity Hotspot. *J Oceanography and Fisheries, USA*, 13(2): 1-3.
28. Kar D (2021c) Unique Oxbow Wetlands in Assam, India. *Oceanography & Fisheries Open access Journal, USA* 14(3): 1-8.
29. Kar D (2021d) Wetlands, Fishes and Pandemics with Special Reference to India. *Sustainability in Environment*, 6(3): 136-142.
30. Menon AGK (1978) An Appraisal of Satpura Hypothesis of Distribution of the Malayan Fauna and Flora to Peninsular India. *Zoologica* 1: 18-23.
31. Kar D (1990) Limnology and Fisheries of Lake Sone in the Cachar district of Assam (India). *Matsya* 15-16: 209-213.
32. Kar D (1996) Biodiversity Conservation Prioritisation Project (BCPP) in India. Proc. International Project Formulation Workshop of BCPP, World Wide Fund (WWF) for Nature-India, 1 (New Delhi), India.
33. Kar D (1999) Microbiological and Environmental Studies in relation to Fishes of India, Gordon Research Conference, Connecticut, USA.
34. Kar D (2000 b) Species composition and distribution of Riverine fishes of Mizoram and Tripura with emphasis on Habitat parameters and Health of Fishes. Proc. National Workshop on Fish Biodiversity and Conservation in the North-East India: NBFGR-NEC (Govt. of India sponsored), 1: 25.
35. Kar D (2000c) An account of Ichthyospecies of North-East India with a note on their conservation. Proc. International Symposium, Lake 2000, Indian Institute of Science, Bangalore, 1: 16.
36. Kar D (2000d) On a collection of Fishes from River Gomati and River Howrah in Tripura. Proc. Nat. Symp. Current Trends in Wetlands and Fisheries Research in the New Millennium, 1: 20.
37. Kar D (2001a) Species composition and distribution of Fishes in the rivers in Barak valley region of Assam and the Principal rivers in Mizoram and in Tripura in relation to their Habitat parameters. Proc. National Workshop, NATP-ICAR Project Mid-term Review, 1: Central Marine Fisheries Research Institute, Cochin, p. 25.
38. Kar D (2001b) Further Studies on the Ichthyospecies composition and Distribution of Freshwater fishes in Barak drainage, and in principal rivers in Mizoram and in Tripura with a note on their Feeding and Breeding biology. National Project Monitoring Workshop of NATP-ICAR Project, National Bureau of Fish Genetic Resources, Lucknow, 1: 22.
39. Kar D (2002) Fish Genetic Resources and Habitat Diversity of the Barak Drainage, Mizoram and Tripura with a note on Conservation of Endangered Species. International Symposium, 'Lake 2002', Indian Institute of Science, Bangalore, Abstracts, pp. 117-121.
40. Kar D (2003b) Peoples' Perspective on Fish Conservation in the Water bodies of South Assam, Mizoram and Tripura: pp. 325-328. In: Mahanta, PC, Tyagi LK, Participatory Approach for Fish Biodiversity Conservation in North-East India (Eds.), National Bureau of Fish Genetic Resources (ICAR) (Lucknow), India pp. 417.
41. Kar D (2003c) Ichthyo resources of Tripura: Assessment, Management and Conservation. Proc. Nat Symp. Assessment and Management of Bioresources, North Bengal University and The Zoological Society, Calcutta, p. 48.
42. Kar D (2004a) A Glimpse into the Fish Bioresources of North-East India with a note on their management, Conservation and Biotechnological potential. Invited Lecture at the DBT-sponsored National Seminar on Biodiversity conservation and Sustainable Utilization of Environmental Resources: Tripura University.
43. Kar D (2004b) Fish Fauna of Barak Drainage in Assam, of Mizoram and of Tripura with a note on Conservation. *J Freshwater Biol*16(1-4): 31-39.
44. Kar D (2005a) Fish Biodiversity and Habitat Parameters of rivers in Barak drainage (Assam), in Mizoram and in Tripura. *Himalayan Journal of Environmental Zoology* 19(1): 41-45.
45. Kar D (2005b) Fish Diversity in the Major Rivers in Southern Assam, Mizoram and Tripura: Proc. 2nd International Symposium on GIS and Spatial Analyses in Fisheries and Aquatic Sciences. In: Nishida T, Kailola PJ, Hollingworth CE, University of Sussex, Brighton (UK), (Eds.), Fisheries and Aquatic GIS Research Group, Kawagoe, Saitama, Japan, 2: 679-691.
46. Kar D (2005c) A critical Overview of the Water Bodies in Barak valley region of Assam, in Mizoram and in Tripura with a note on the present status of Fish Biodiversity and their Conservation. National Workshop on Women and Sustainable Development in the Context of South Assam. North-Eastern Centre for Advanced Studies and Womens' College, Silchar, Assam, India.
47. Kar D (2006) Fish Biodiversity of North-East India. Proc International Conference on Ganga, Patna University and Aquatic Animal Health Management Society, Canada 1.
48. Kar D (2007b) Sustainability issues of Inland Fish Biodiversity and Fisheries in Barak drainage (Assam), in Mizoram and Tripura: pp.555-560. In: Kurup, Madhusoodana B, Ravindran K, Sustain Fish (Eds.), School of Industrial Fisheries, Cochin University of Science & Technology (CUSAT): Proceedings of International Symposium on 'Improved sustainability of Fish Production Systems and Appropriate Technologies for Utilisation', (Cochin), pp. 875.
49. Kar D (2011) Fish diversity, fish habitats, fish disease and aquaculture in North-East India Hotspot: A synopsis. *Conservation Forum Journal* 3: 5.
50. Kar D (2012) Wetlands, Rivers, Fish diversity, Fish disease and Aquaculture in North-East India. *Fishing Chimes*, 31 (12): 35-37.
51. Kar D (2013b) Wetlands, Rivers and Fishes of North-East India with a note on the Health of Fishes. Proc. International Symposium, Kerala University, India.
52. Kar D (2015) Epizootic Ulcerative Fish Disease Syndrome. Elsevier, (Academic Press), USA, pp. 312.

53. Kar D (2016a) Wetlands, Rivers, Fish Resources and Fish Disease in North-East India: An Overview. Proc. International Symposium on Aquaculture and Fisheries (as part of the International Conference on Environmental Sustainability for Food Security (ENFOSE, 2016), held at Fisheries College and Research Institute (FCRI), Tamil Nadu Fisheries University (TNFU), pp. 6.
54. Kar D (2016b) Wetlands, Rivers, Fish, Plankton resources and Fish disease and Aquaculture in North-East India: An Overview. Proc. International Symposium, Lake Indian Institute of Science, Bengaluru, and Alva's Education Foundation, Mengaluru (India), pp. 37.
55. Kar D (2022) Seasonal Floodplain Haor Wetlands in Assam Hotspot in India. *Oceanography and Fisheries open access Journal*, USA 15(2): 1-9.
56. Kar D (2024) Ichthyodiversity and Conservation Status in River Khowai in Tripura: Reconnaissance Taxonomic Report. *Oceanogr Fish Open Access J* 17(5).
57. Kar D (2024) Distribution and Conservation Status of Ichthyospecies in River Gomati in Tripura: Recent Detailed Taxonomic Report. *Oceanogr Fish Open Access J* 17(5).
58. Kar D (2025) Distribution and Conservation Status of Ichthyospecies in Rivers Feni, Muhuri and Lubdachhara in the Eastern Himalayan Biodiversity Hotspot of Tripura: Recent Detailed Taxonomic Report. *Oceanogr Fish Open Access J* 18(1).
59. Kar D, Sen N (2007) Systematic List and Distribution of Fish Biodiversity in Mizoram, Tripura and Barak drainage in North-East India. *ZOOs' Print Journal* 22(3): 2599- 2607.
60. Kar D, Barbhuiya AH (2009) Mahseer Fishes of Barak Drainage, Mizoram and Tripura. Souvenir: National Symposium on Coldwater Fisheries Management: new Strategies and Approaches. Directorate of Coldwater Fisheries Research (ICAR), Bhimtal, Uttarakhand, India, pp. 77-80.
61. Kar D, Das BK (2015) Sustainability of Freshwater Fishes in North-East India. *Fishing Chimes* 35(5): 47-52.
62. Kar D, Kumar A (2023) Present Status of Freshwater Fish Diversity and Human impact with Particular Reference to North-East India Biodiversity Hotspot. *Oceanography and Fisheries Open Access Journal*, 16(4).
63. Kar D, Das B (2024) Taxonomic Study of the Riverine Fishes of Karbi Anglong in Northeast India of the Eastern Himalayan Biodiversity Hotspot. *Oceanogr Fish Open Access Journal* 17(3): 1-9.
64. Kar D, Khyriam D (2020) On a recent pioneering taxonomic study of the fishes from rivers Diyung, Vombadung, Khuolzangvadung, Tuikoi and Mahur in Dima Hasao district of Assam. *Transylv Rev Syst Ecol Res (Romania) The Wetlands Diversity* 22(3): 83-106.
65. Kar D, Khyriam D, Das B, Das S (2020) A recent taxonomic study of the fish from the Jinam River in Dima Hasao Biodiversity Hotspot region of Assam (India). *Transylv Rev Syst Ecol Res The Wetlands Diversity* 22(2): 87-102.
66. Kar D, Khyriam D (2022) Fishes in the Upstream Rheophilic Stretch of River Barak at Karong. *Sustainability in Environment* 7(3): 77-96.
67. Kar D, Khyriam D (2023) A Pioneering Study on Taxonomic Diversity of Fishes in the Headwaters of River Barak in Assam, Manipur and Mizoram, Northeast, India. *Oceanogr Fish Open Access J* 15(5).
68. Kar D, Khyriam D (2024) Further Report on the Systematic, Distribution and Conservation of Ichthyospecies in the Headwaters of River Barak (Assam, Manipur and Mizoram), Northeast, India. *Oceanogr Fish Open Access J*.
69. Kar D, Roy A (2021a) Epizootic ulcerative syndrome (EUS) fish disease chronology, status and major outbreaks in the world. *Transylv Rev Syst Ecol Res. The Wetlands Diversity* 23(2): 29-38.
70. Kar D, Roy A (2021b) Devastating pandemic in the Globe: COVID-19. *Acta Oecologica Carpatica* 14: 1-8.
71. Kar D, Saha D, Hussain A, Barbhuiya MH, Kar S, et al. (1999) Limnological Studies of some of the Wetlands of Assam, Mizoram, Tripura and Aruna-Chal Pradesh related to their status of Eutrophication. *Proc Indian Sci Congr* 86(3): 55.
72. Kar D, Rahaman H, Barnman NN, Kar S, Dey SC, et al. (1999a) Bacterial Pathogens associated with Epizootic Ulcerative Syndrome in Freshwater Fishes of India. *Environment and Ecology* 17(4): 1025-1027.
73. Kar D, Mandal M, Bhattacharjee S (1999b) Fungal Pathogens associated with Epizootic Ulcerative Syndrome in Fishes of Barak valley region of Assam. Proc. 1st National Conference on Fisheries Biotechnology, CIFE, 1: 34.
74. Kar D, Barbhuiya AH, Das B (2008a) Wetlands, Rivers and Fish Diversity in North-East India. Key Speaker at International Symposium of Indian national cartographic Association, ISRO, Ahmedabad, Nov 2008.
75. Kar D, Barbhuiya AH, Das B (2008b) Wetland panorama of North-East India. Keynote address: Zonal Conference of Indian National Cartographic Association, Survey of India, Shillong.
76. Kar D, Barbhuiya AH, Das B (2008c) Fish Diversity and Habitat parameters of rivers in North-East India. Keynote address from Session Chair, All-India Congress in Zoology.
77. Kar D, Barbhuiya AH, Das B (2008d) Fishes and water bodies of North-east India: their Conservation: Indian Science Congress, NEHU.
78. Kar D, Barbhuiya AH (2009a) Status and Conservation of Freshwater Fishes of India, IUCN Workshop, Zoo Outreach Organisation, India.
79. Kar D, Barbhuiya AH (2009b) Hill stream Fishes of North-East India. National Symposium of Hill stream Fishes, National Centre for Cold water Fisheries, Bhimtal, ICAR.
80. Kar D, Dey SC, Datta NC (2003) Welfare Biology in the New Millennium. Allied Publishers Pvt. Ltd. Bangalore, India pp. 117.
81. Kar D, Barbhuiya AH, Arifuddin BMA, Chetia P, Islam, R, et al. (2007) Traditional Riverine Fish Catching Devices of Assam. *Fishery Technology* 44 (2): 137- 146.
82. Kar D, Barbhuiya AH, Thangjam G, Devi SM, Deb S, et al. (2008) Panorama of Fish Biodiversity in certain rivers and wetlands in Manipur. *Proc Zool Soc India* 7(2): 123-134.
83. Kar D, Shomrendra M, Singha R, Puinyabati H, Geetarani B, et al. (2011) Fish diversity and Helminth fauna in the fishes of Assam and Manipur, India. *Fishing Chimes* p. 55-65.
84. Kar S, Das P, Das U, Bimola M, Kar D, et al. (2018a) Correspondence of zooplankton assemblage and water quality in wetlands of Cachar, Assam, India: Implications for environmental management. *Limnological Review* 18(1): 9-19.
85. Kar S, Das P, Das U, Bimola M, Kar D, et al. (2018b) Correspondence of zooplankton assemblage and water quality in wetlands of Cachar, Assam, India: Implications for environmental management. *Limnological Review* 18(1): 9-19.
86. Das P, Mukherjee S, Kar S, Das U, Kar D, et al. (2018) Zooplankton as dietary component of selected freshwater fish: Network Analysis based on gut content. *AACL Bioflux* 11(1): 232-244.
87. Barman RC, Kar D, Dana SS, Majumdar D (2012) Role of availability of critical aquaculture inputs and community-managed markets on community - based floodplain wetland management. *Journal of Applied and Natural Science* 4(2): 164- 166.

88. Barman RC, Kar D (2015) Role of Education and Social Participation on community-based Floodplain Wetland Management. ESTIA (A multidisciplinary Annual Research Journal) 1: 16-22.
89. Barman RC, Kar D (2022) Wetland management and Peoples' Participation: A study from India. In: Mangalam Publications (New Delhi), India pp. 147.
90. Barman RP (1984) On a small collection of fish from Mizoram, India. Journal, Bombay Natural Hist. Society 86: 463-466.
91. Barman RP (1985a) A new freshwater fish of the Genus Barilius Hamilton (*Pisces: Cyprinidae*) from West Bengal, India. Journal, Bombay Natural Hist. Society, 83: 171-173.
92. Barman RP (1985b) A new cyprinid fish of the Genus Danio Hamilton (*Pisces: Cyprinidae*) from Andhra Pradesh, India. Journal, Bombay Natural Hist. 82: 602-605
93. Barman RP (1986) Barilius nelsoni, a new cyprinid fish (*Pisces: Cyprinidae*) from Tripura, North-Eastern India. Journal, Bombay Natural Hist. Society 86: 213-215
94. Barman RP (1992) New Record of a croaker, Johnius coitor (Hamilton Buchanan) (*Pisces: Sciaenidae*) from Tripura, North-East India. Journal, Bombay Natural Hist. Society, 89: 135-136.
95. Barman RP (1994) Fish fauna of Tripura, North-East India. Journal, Bombay Natural Hist. Society, 91: 37-46.
96. Barbhuiya AH, Das B, Darlong L, Tarafdar RG, Sharma R, et al. (2009) Fish Biodiversity in certain rivers of Tripura. Environment & Ecology 27 (1): 222-227.
97. Das S, Das T, Das BK, Kar D (2015) Length-Weight Relationship and Condition Factor in Channa punctata of River Manu in Tripura. International Journal of Fisheries and Aquatic Studies (IJFAS) 2(3): 56-57.
98. Das U, Kar D (2016) Diel and seasonal variation of zooplankton from the freshwater pond of North Tripura District, India. Lake 2016: Conference on Conservation and Sustainable Management of Ecologically Sensitive Regions in Western Ghats (the 10th Biennial Lake Conference).
99. Dey S, Manorama M, Ramanujam SN (2015) New Records of three species of Fish in the upper reaches of the Brahmaputra and Surma-Meghna River basins, Meghalaya, India. Journal of Threatened taxa, 7(12): 7922-7926.
100. Ghosh SK, Lipton AP (1982) Ichthyofauna of the NEH Region with special reference to their economic importance. ICAR Research Complex, NEH Region, Shillong, Spl Bull 1: 119-126.
101. Jayaram KC (1981) The Freshwater Fishes of India, Pakistan, Bangladesh, Burma, Sri Lanka: a Handbook. In: Zoological Survey of India (Calcutta), India pp. 497.
102. Lipton AP (1983-84) Fish Fauna of Tripura. Matsya 9-10: 110-118.
103. Mauge LA (1986) Gobiidae. In: Daget J, Gosse P, Thysvan DFE (1986) Dien Audenaerde (Eds.). Check list of the freshwater fishes of Africa (CLOFFA). ISNB, Brussels; MRAC, Tervuren, ORSTOM, Paris, 2: 358-388.
104. Menon AGK (1974) A Checklist of the Fishes of the Himalayan and the Indo-gangetic Plains. In: Inland Fish Soc India (Barrackpore), pp. 144.
105. Menon AGK (1999) Checklist: Freshwater Fishes of India, Occasional Paper No. 175, Zoological Survey of India (Calcutta), pp. 384.
106. Nath M, Singh NR, Das BK, Dutta B, Das U, et al. (2015) A preliminary study on Fish Diversity of Kakri and Deo rivers around Dharma nagar in Tripura. International Journal of Theoretical and Applied Sciences 7(2): 6-13.
107. Nath P, Dey SC (1989) Two new Fish species of the genus Amblyceps Blyth from Arunachal Pradesh, India. J. Assam Science Society 32(1): 1-6.
108. Nath P, Dey SC (1997) Fish and Fisheries of North-East India. Arunachal Pradesh, India 1: 1-140.
109. Sen N (2000) Occurrence, Distribution and Status of Diversified Fish Fauna of North-East India. In: Ponniah AG, Sarkar UK, Fish Diversity of North-East India (Eds.), National Bureau of Fish Genetic Resources, ICAR (Lucknow), India, pp. 228.
110. Sen N, Khyrnriam D (2014) Pictorial Handbook on Fishes of Northeast India, Kolkata, pp. 1- 345.
111. Sinha M (1994) Threatened coldwater fishes of North-Eastern Region of India. In: Threatened Fishes of India, Natcon. Publication No. 4 (UP), pp. 173-176.
112. Tilak R, Jain S (1987) On the Systematic status of Danio (Danio) menoni Barman (*Pisces: Cyprinidae*). Journal, Bombay Natural Hist. Society, 84: 693-694.
113. Yadava YS, Chandra R (1994) Some threatened carps and cat fishes of Brahmaputra River System. In: Threatened Fishes of India, Natcon. Publication No. 4 (UP) pp. 45-55.
114. Day F (1873) Report on the Freshwater Fish and Fisheries of India and Burma, (Calcutta), India pp. 36.
115. Day F (1885) Relationship of the Indian and African Freshwater Fish Fauna. J Linn Soc (Zool.) 18(7): 308-317.
116. Day F (1878) The Fishes of India, being a Natural History of the Fishes known to inhabit the Seas and Freshwaters of India, Burma and Ceylon, 195 pls, Text and Atlas in 4 parts, WM Dawson and Sons Ltd. (London), UK, pp. 798.
117. Day F (1889) The Fauna of British India, including Ceylon and Burma. In: Fishes 1: 509-548.
118. Shaw GE, Shebbeare EO (1937) The Fishes of Northern Bengal. J Royal Asiatic Soc Bengal Science pp. 137.
119. Misra KS (1959) An aid to the Identification of Commercial Fishes of India and Pakistan. Rec. Indian Mus 57(1-4): 1-320.
120. Talwar PK, Jhingran AG (1991) Inland Fishes of India and Adjacent Countries. Oxford and IBH Co., Pvt. Ltd. (New Delhi), India 1-2: 1158.
121. Greenwood PH, Rosen DE, Weitzman SH, Myers GS (1966) Phyletic studies of teleostean fishes with a provisional classification of living forms. Bulletin of American Museum of Natural History 31: 339-456.
122. Bailey RG (1994) Guide to the Fishes of River Nile in the Republic of Sudan. Journal of natural History 28(4): 937-970.
123. Bailey RG (1996) Changes in the Fish and Fisheries Ecology of a large man-made lake in Tanzania for the period from 1965-1994. Fisheries Management and Ecology 3: 251- 260.
124. Bailey RG, Hickley P (1986) A recent collection of Nothobranchius virgatus Chambers, a new killifish from southern Sudan. Revue fr Aquariol 12.
125. Didem G, Saadet KF, Nuran U, Abdullah EK (2012) A New Record for occurrence of *Symphodus bailloni* (*Osteichthyes: Perciformes: Labridae*) in the Western Black Sea Coast of Turkey. Scientific World Journal p. 5.
126. Kullander SO, Ralf B (2008) Puntius padamya, a new species of cyprinid fish from Myanmar (Teleostei: Cyprinidae). Electronic Journal of Ichthyology 2: 56-66.

127. Kevin WC, Maurice K (2007) A new species of *Psilorhynchus* (Teleostei: *Psilorhynchidae*) from the Ataran River Basin, Myanmar, with comments on the generic name *Psilorhynchoides*. *Zootaxa* 1663: 47- 57.
128. Wikramanayake ED, Moyle PB (1989) Ecological structure of Tropical Fish Assemblages in wet-zone streams of Sri Lanka. *Journal of Zoology* (London) 281: 503-526.
129. Batuwita A, Sudesh G (2016) A Taxonomic Study on the South Asian Cyprinid genera *Horadandia* and *Rasboroides* (*Ostariophysi: Cyprinidae: Danioninae*) and Evaluation of the Present Distribution Pattern of *Rasboroides vaterifloris pallidus* in Gin river. MPhil Dissertation, Univ of Peradeniya (Sri Lanka). pp. 144.
130. Das BK, Boruah P, Kar D (2015) Ichthyofaunal Diversity of Siang River in Arunachal Pradesh, India. *Proc Zool Soc* (Springer) 70: 52-60.
131. Das BK, Boruah P, Kar D (2015) Ichthyofaunal Diversity of Siang River in Arunachal Pradesh, India. *Proceedings of the Zoological Society*.
132. Dudgeon D (1995) The Ecology of rivers and streams in Tropical Asia. In: *Ecosystems of the World 22: River and Stream Ecosystems* (Eds.) Cushing CE, Cummins KW, Minshall GW, Elsevier Press (UK). Fishbase.org. pp. 615-657.
133. Froese R, Pauly D (2024) Fish Base. World Wide Web electronic publication. www.fishbase.org.
134. IUCN (1988) Red List of Threatened Animals, IUCN, Gland (Switzerland).
135. Kottelat M, Harries DR, Proudlove GS (2007) *Schistura papulifera*, a new species of cave loach from Meghalaya, India (Teleostei: Balitoridae). *Zootaxa* 1393: 35- 44.
136. Lambert N, Anirudha G, Bhanu PM, Devashish K (2020) The impact of abiotic factors on the occurrence, assemblages and diversity of freshwater zooplankton in lake Tanganyika, Burundian littoral. *International Journal of Entomology Research* 5(2): 74-82.
137. Lokeshwar Y, Voshwanath W, Kosygin L (2013) *Schistura paucireticulata*, a new loach from Tuirial River, Mizoram, India (Teleostei: Nemacheilidae). *Zootaxa* 3683(5): 581-588.
138. Mauge LA (1986) Gobiidae In: Daget J, Gosse P, Thysvan DFE, dien Audenaerde (Eds.). *Check list of the freshwater fishes of Africa (CLOFFA)*. ISNB, Brussels; MRAC, Tervuren; ORSTOM, Paris, 2: 358-388.
139. Pethiyagoda R (1991) *Freshwater fishes of Sri Lanka*. The Wildlife Heritage Trust of Sri Lanka, Colombo pp. 362.
140. Sen TK (1985) The Fish Fauna of Assam and the neighbouring North-Eastern States of (129) India. *Records of Zoological Survey of India. Occasional Paper No. 64: 1-216*.



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DOI: [10.19080/OFOAJ.2025.18.555979](https://doi.org/10.19080/OFOAJ.2025.18.555979)

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