



A Preliminary Study on Fish Diversity of Kakri and Deo River around Dharmanagar in Tripura

Mampi Nath^{*}, Romen Singh Ngasepam^{**}, Biplab Kumar Das^{**}, Binku Dutta^{**}, Uma Das^{**},
Papia Das^{**}, Sulata Kar^{**} and Devashish Kar^{***}

^{*}M. Sc. 4th Semester Student (Fishery), Department of Life Science and Bioinformatics,
Assam University, Silchar, INDIA

^{**}Department of Life Science and Bioinformatics, Assam University, Silchar, INDIA

^{***}Dean School of Life Sciences, Assam University, Silchar, INDIA

(Corresponding author: Romen Singh Ngasepam)

(Received 19 April, 2015, Accepted 28 June, 2015)

(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: A short survey was conducted on fish biodiversity of two rivers namely River Deo and River Kakri of North Tripura District about three months from December 2014 to February 2015. River Deo is one of the ten major rivers of Tripura which is originated from Jampui hill has a northern flow through Kanchanpur and meets with the river Manu. River Kakri is the earlier name of River Juri after Kakri Bridge, Krishnapur which was a branch of Juri flowing from Krishnapur towards Bangladesh. During our study we had collected a total of 19 different types of fish species from both rivers where 15 different species of fish were found from River Deo and 14 different types of fish species were found from river Kakri. Among them *Puntius conchoni*, *Lepidocephalus guntea*, *Heteropneustes fossilis*, *Channa striatus*, *Macrognathus aral*, *Channa puntatus*, *Chanda nama*, *Puntius sp.*, *Amblypharyngodon mola*, *Puntius sophore* were found in both rivers. 5 more species found in Deo River, these are *Clarias batrachus*, *Catla catla*, *Mystus bleekeri*, *Anabas testudineus*, and *Trichogaster fasciatus*. While in Kakri River 4 more species were found, these are *Glossogobius giuris*, *Notopterus notopterus*, *Aspidoparia morar*, *Pethia ticto* were found in Kakri River.

Key Words: Kakri River, Deo River, Fish Diversity, *Aspidoparia morar*, Tripura

INTRODUCTION

Fish are cold-blooded animals with a backbone (vertebrates), gills for breathing underwater, and paired fins for swimming. They live underwater and are dependent on water for dissolved oxygen, support, food, and shelter. (Helfish, and Neves, 2009). Fish constitutes almost half of the total number of vertebrates in the world. They live in almost all conceivable aquatic habitats 21,723 living species of fish have been recorded out of 39,900 species of vertebrates (Jayaram, 1999) of which 8411 are freshwater species and 11,650 are marine. Ichthy diversity refers to variety of fish species; depending on context and scale, it could refer to alleles or genotypes within piscian population, to species of life forms within a fish community, and to species of life forms across aqua regimes (Burton *et al.*, 1992)

India is one of the Mega biodiversity countries in the World and occupies 9th position in terms of freshwater Mega biodiversity (Mittermeier and Mittermeier, 1997).

In India there are c. 2,500 species of fishes; of which, c. 930 live in freshwater and c. 1570 are marine (Kar, 2003). Out of the 2546 species so far listed, 73 (3.32%) belong to the cold freshwater regime, 544 (24.73%) to the warm freshwater domain, 143 (6.50%) to the brackish water and 1440 (65.45%) to the marine ecosystem (Bhakta *et al.*, 2008). Lakes in India support rich variety of fish species, which interns, support the commercial exploitation of the fisheries potential (Krishna and Piska, 2006). Battul *et al.*, (2007) studied the fish diversity from Ekrukh Lake near Solapur, Maharashtra and reported the fish diversity is correlated with biological and various physico-chemical parameters that regulate the production and distinction of different species of the fishes. Sharma *et al.*, (2007) reported 29 species of fishes belonging to six orders from Krishnapura Lake, Indore. Dhankand *et al.*, (2008) also reported 29 fish species from Sagar reservoir, Jhabua district of Madhya Pradesh. Likewise, several studies have been made in many water bodies across the country.

The North eastern region of India is considered to be one of the hotspots of freshwater fish biodiversity in the world (Kottelat and Whitten, 1966; Ramnujam *et al*, 2010). This rich diversity of this region could be assigned to certain reasons, notably, the geomorphology and the tectonics of this zone (Kar, 2005 a, b, c). The hills and the undulating valleys of this area gives rise to large number of torrential hill streams, which lead to big rivers ; and , finally , become part of Ganga-Brahmaputra-Barak–Chindwin–Kolodyne–Gomati-Meghna system (Kar, 2005c). Fish Diversity in Tripura: The River in Tripura reflected 28 species belonging to 8 families in Manu, 22 species belonging to 6 families in Khowai, 53 species belonging to 19 families in Gomati, and 22 species belonging to 8 families in Feni (Kar &

Sen, 2007). The present paper just a highlight to know the present scenario of fish diversity of Deo River and Kakri River.

Study Site: The river Deo is one of the ten major rivers in Tripura. The river is originated from Jampui hill (23°56'05.4"N 92°16'39.1"E) and has a northerly flow through Kanchanpur (24°02'08.9"N 92°11'59.1"E) meeting the river Manu (24°9'32"N, 92°1'40"E) near Kumarghat forming an arc behind it. This is a ferocious river during the rains and causes great erosion on its banks. It has a total length of 132 km. The Manu-Deo basin has a total basin area of 1979 sq. Km which is 18.6 % of total geographical area. The Manu-Deo has annual flow of 170034 thousand m³ which is 21.44 % of the total flow.



Fig. 1. Showing Deo River.

River Kakri is the earlier name of River Juri after Kakri Bridge, Krishnapur (24°20'16.8" N 92°09'27.3" E). Earlier Kakri was a branch of Juri flowing from Krishnapur towards Bangladesh. But currently the Juri River after Krishnapur is almost dry and the water from Juri flows through Kakri. Presently the Kari River has changed her name as Juri.

The Juri River is a trans-boundary river in India and Bangladesh. It rises in the Jampui Hills (23°56'05.4"N 92°16'39.1"E) of the Indian state of Tripura. It enters Kulaura Upazila of Maulvi Bazar District (24°25'01.3"N 91°45'20.9"E) of Bangladesh. Later it joins Kushiya River (24°42'22.4"N 91°57'17.7"E). The Juri has a length of 79 km having catchment area of 482.46 Sq. km. The annual flow in the river Juri is 15709 thousand m³ which is 1.98 % of the total flow.

MATERIALS AND METHODS

The fish has been collected in the month of December 2014 to March 2015 from the river Deo and Kakri. The photographs of the collected fishes were taken along with the scale. After that the collected specimens were immediately transfer in 10% formalin in a large container that allowed proper spreading of their fins. Then the specimens were examined on field and classified into families which were carried in separate containers. Each container was labelled properly against the physical data sheet of sampling and brought to the laboratory for further taxonomic exercise. Collected specimens were identified as per Talwar and Jhingran, (1991); Jayaram, (2010); Vishwanath, (2002). The evaluation of the conservation status has been followed by the Conservation Assessment and Management Plan (CAMP, 1998). The analysis of the constraints has been evaluated through surveys and interaction with the local people living near the concerned area. (Nath B. and Deka. C, August 2012).

RESULT

Table 1: Fish Diversity of Deo and Kakri River (According As Iucn Red List Status 2012).

SL No.	Name of Fishes	Order	Family	IUCN	Deo River	Kakri River
1	<i>Puntius conchonius</i>	Cypriniformes	Cyprinidae	LC	P	P
2	<i>Lepidocephalus guntea</i>	Cypriniformes	Cobitidae	LC	P	P
3	<i>Clarias batrachus</i>	Siluriformes	Clariidae	LC	P	A
4	<i>Catla catla</i>	Cypriniformes	Cyprinidae	LC	P	A
5	<i>Heteropneustes fossilis</i>	Siluriformes	Heteropneustidae	LC	P	P
6	<i>Channa striatus</i>	Perciformes	Channidae	LC	P	P
7	<i>Glossogobius giuris</i>	Perciformes	Gobiidae	LC	A	P
8	<i>Notopterus notopterus</i>	Osteoglossiformes	Notopteridae	LC	A	P
9	<i>Macrornathus aral</i>	Synbranchiformes	Mastacembelidae	LC	P	P
10	<i>Channa punctatus</i>	Perciformes	Channidae	LC	P	P
11	<i>Chanda nama</i>	Perciformes	Ambassidae	LC	P	P
12	<i>Aspidoparia morar</i>	Cypriniformes	Cyprinidae	LC	A	P
13	<i>Mystus bleekeri</i>	Siluriformes	Bagridae	LC	P	A
14	<i>Anabas testudineus</i>	Perciformes	Ambassidae	DD	P	A
15	<i>Trichogaster fasciatus</i>	Perciformes	Belonidae	LC	P	A
16	<i>Puntius sp.</i>	Cypriniformes	Cyprinidae	LC	P	P
17	<i>Pethia ticto</i>	Cypriniformes	Cyprinidae	LC	A	P
18	<i>Amblypharyngodon mola</i>	Cypriniformes	Cyprinidae	LC	P	P
19	<i>Puntius sophore</i>	Cypriniformes	Cyprinidae	LC	P	P

P = Present and A = Absent DD = Data deficient & LC = Least Concern

Table 2: Species Wise Significance of Fishes (According As Iucn Red List Status 2012).

SL No.	Name of Fishes	Role towards human
1	<i>Puntius conchoni</i>	Fisheries: Commercial; Aquarium
2	<i>Lepidocephalus guntea</i>	Fisheries: Commercial; Aquarium
3	<i>Clarias batrachus</i>	Fisheries: Commercial; Aquaculture: Commercial; Aquarium
4	<i>Catla catla</i>	Fisheries: Highly Commercial; Aquaculture: Commercial
5	<i>Heteropneustes fossilis</i>	Fisheries: Highly Commercial; Aquaculture: Commercial; Aquarium: Commercial
6	<i>Channa striatus</i>	Fisheries: highly commercial; aquaculture: commercial;
7	<i>Glossogobius giuris</i>	Fisheries: Minor Commercial; Aquaculture: Commercial; Aquarium: Commercial
8	<i>Notopterus notopterus</i>	Fisheries: Commercial; Aquaculture: Commercial; Aquarium
9	<i>Macrognathus aral</i>	Fisheries: Commercial
10	<i>Channa puntatus</i>	Fisheries: Commercial; Aquaculture: Commercial; Aquarium: Commercial; Bait: Occasionally
11	<i>Chanda nama</i>	Fisheries: Minor Commercial; Aquarium: Public Aquariums
12	<i>Aspidoparia morar</i>	Fisheries: Minor Commercial
13	<i>Mystus bleekeri</i>	Fisheries: Minor Commercial; Aquarium: Commercial
14	<i>Anabas testudineus</i>	Fisheries: Commercial; Aquaculture: Commercial; Aquarium:
15	<i>Trichogaster fasciatus</i>	Fisheries: Commercial; Aquaculture: Commercial; Aquarium
16	<i>Puntius sp.</i>	Fisheries: Commercial; Aquarium
17	<i>Pethia ticto</i>	Fisheries: Commercial; Aquarium
18	<i>Amblypharyngodon mola</i>	Fisheries Interest, Commercial
19	<i>Puntius sophore</i>	Fisheries: Commercial; Aquarium

DISCUSSION

During of my fish diversity study I have collected total 19 types of fish species belonging from 5 orders and 11 families, from Deo and Kakri river of Tripura. Among this 19 types fish species, *Puntius conchoni*, *Lepidocephalus guntea*, *Heteropneustes fossilis*, *Channa striatus*, *Macrognathus aral*, *Channa puntatus*, *Chanda nama*, *Puntius sp.*,

Amblypharyngodon mola, *Puntius sophore* were found in the both rivers. Beside this *Clarias batrachus*, *Catla catla*, *Mystus bleekeri*, *Anabas testudineus*, *Trichogaster fasciatus* were found in Deo River and *Glossogobius giuris*, *Notopterus notopterus*, *Aspidoparia morar*, *Puntius ticto* were found in Kakri River. According to IUCN except *Anabas testudineus* all other 18 sp. are least concern. (Table1) (Fig. 2).

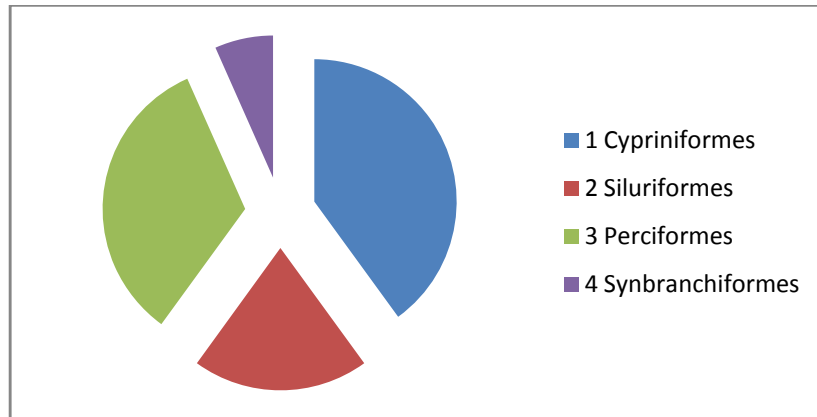


Fig. 2. Pie Chart Showing Order Wise Distribution of Fishes of Deo River.

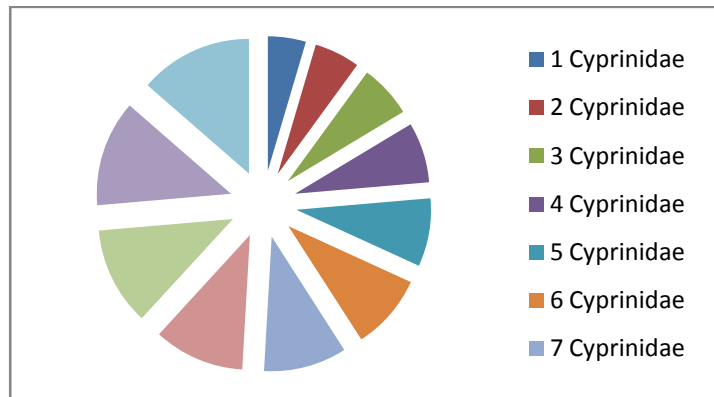


Fig. 3. Pie Chart showing Family Wise Distribution of Fishes of Deo River.

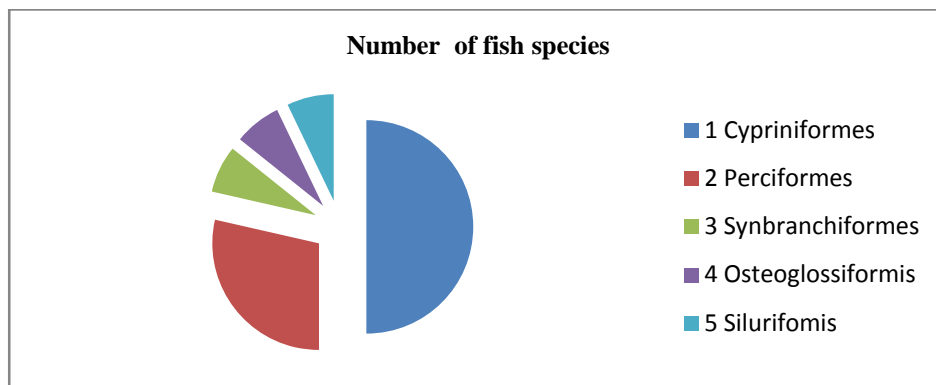


Fig. 4. Pie Chart Showing Order Wise Distribution of Fishes of Kakri River.

From Deo river total 15 species were collected. Among them, 6 fishes were found belonging the order Cypriniformes, 3 fishes were found belonging the order Siluriformes, 5 fishes were found belonging the order Perciformes, 1 fish was found belonging the order Synbranchiformes (Table 2) (Fig. 3).

Among these 15 species, 5 fishes of Cyprinidae family, 1 fish of Cobitidae family, 1 fish of Heteropneustidae family, 2 fishes of Channidae family, 1 fish of Gobiidae family, 1 fish of Notopteridae family and 1 fish of Ambassidae family were found.

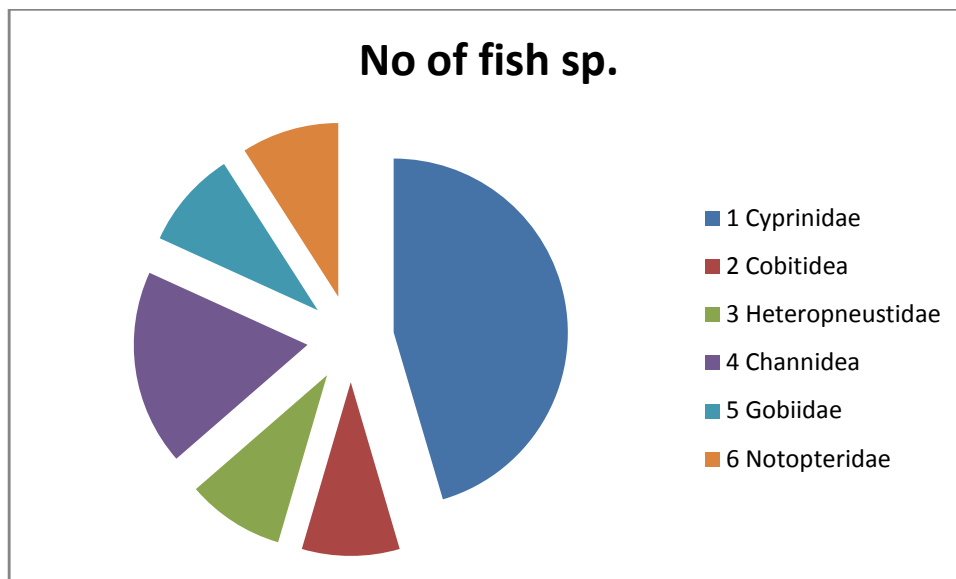


Fig. 5. Pie Chart Showing Family Wise Distribution of Fishes of Kakri River.

Total 14 species were collected from Kakri River. Among these 14 species, 7 fishes were found belonging the order Cypriniformes, 4 fishes were found belonging the order Perciformes, 1 fish was found belonging the order Synbranchiformes, 1 fish was found belonging the order Osteoglossiformes and 1 fish was found belonging the order Siluriformes. (Fig.5). According to family wise distribution of fishes of Kakri river 14 species belongs to 8 families. Among these 14 species, 6 fishes of Cyprinidae family, 1 fish of Cobitidae family, 1 fish of Heteropneustidae family, 2 fishes of Channidae family, 1 fish of Gobiidae family, 1 fish of Notopteridae family, 1 fish of Ambassidae family were found and 1 fish of Mastacembelidae were found. Significance of all the 19 species found from Kakri River and Deo River have been studied. All of have them great commercial value in the society.

CONCLUSION

Fishes as Keystone species determine the abundance and distribution of ecosystem biodiversity representing indicators of water quality and ecosystem health. Fish have a very special consideration and place in human civilization from the time immemorial. Fish is one of the most important sources of food. As India occupied 9th position in fresh water mega biodiversity. Fish is one member of a paraphyletic group of organisms that consist of all gill bearing aquatic craniates animals that lack limbs with digits. Fish are cold-blooded animal

allowing their body temperature to vary as ambient temperatures change, though some of the large active swimmer like white shark and tuna can hold a higher core temperature. Fishes are the most important source of food and also play an important role in health and commercial values as many countries have been staple items of diet of many people in the world. Fishes constitute slightly more than half of the total number approximately 54,711 recognized living vertebrate species. The fishes are one of the main exploitable resources of the aquatic ecosystems that fresh fish flesh excellent source of protein for human diet. Nutritional studies have proved that proteins rank in the same class as chicken protein and are superior to milk; beef protein and egg albumin. Fish proteins comprise all the ten essential amino acid desirable strength for human consumption. Hence, fish diversity is essential key for stabilization of ecosystem, protection of overall environmental quality.

ACKNOWLEDGEMENT

The authors are thankful to Assam University, Silchar and Principal, Thambal Marik College, Oinam, and DBT, Ministry of Science and Technology, Govt. of India for establishing necessary laboratory facilities to the Thambal Marik College, Oinam. Also thanks to the UGC, New Delhi for granting UGC-fellowship to the second author.

REFERENCES

- Burton, P.J., A. E. Balisky, L.P. Coward, S.G. Cumming and D.D Kneeshaw (1992). The value of managing for biodiversity. *The Forestry Chronicle* **68**(2): 225-237.
- Darlington, P.J. (Jr.) (1957). Zoogeography: The Geographical Distribution of Animals, pp. 675, John Wiley and Sons (New York).
- Dey, S.C. (1973). Studies on the Distribution and Taxonomy of the Ichthyofauna of the hill streams of Kamrup-Khasi-Garo Regions of Assam with special reference to the Functional morphology of some rheophilic Fishes, D.Sc. Thesis, xi + 299, University of Calcutta (India).
- Dey, S.C. and Kar, D. (1989 c). Fishermen of Lake Sone in Assam: Their socio-economic status. *Science and Culture*, **55**: 395-398.
- Dey, S.C. and Kar D (1990). Fish yield trend in Sone, a tectonic lake of Assam. *Matsya*, **15-16**: 39-43.
- Dhar, N. (2004). Certain aspects of Limnology and Fishery of Baskandi Lake in the Cachar district of Assam, pp. 165, PhD Thesis, University of Gauhati (Assam).
- Gupta, S.K. and Gupta, P.C. (2006). General and Applied Ichthyology (Fish and Fisheries). *S.Chand and Company PVT.LTD*.
- Jayaram, K.C. (1999). The Freshwater Fishes of the Indian Region, xvii +551, Narendra Publishing House (Delhi).
- Kar, D. (1990). Limnology and Fisheries of Lake Sone in the Cachar district of Assam (India), *Matsya*, 15-16: 209-213.
- 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).
- Kar, D. (1998). Biodiversity Conservation Prioritisation Project (BCPP) in India. *Proc. International Project Finalisation Symposium of BCPP, World Wide Fund (WWF) for Nature-India*, 1: New Delhi.
- Kar, D.; Dey, S.C.; and Roy, A. (2000 a). 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, with a note on Epizootic Ulcerative Syndrome fish disease. *Proc. National Project Initiation Workshop of the NATPICAR World Bank- aided Project on `Germplasm Inventory, Evaluation and Gene Banking of Freshwater Fishes. National Bureau of Fish Genetic Resources (NBFGR), Lucknow*, **1**: 12 pp.
- Kar, D.; Mandal, M.; Laskar, B.A.; Dhar, N.; and, Barbhuiya, M.H. (2000 b). Ichthyofauna of some of the oxbow lake in Barak valley region of Assam. *Proceedings of the National Symposium on Wetlands and Fisheries Research in the New Millennium*, **1**: 16 pp.
- Kar, D. and Barbhuiya, M.H. (2000 b). Ichthyodiversity of Chatla Haor: A Floodplain wetland in Barak valley Region of Assam: pp.3-6. *In: Advances in Zoology and Environmental Degradation and Biodiversity*, pp. 279 (Ed.) Pandey, B.N. and Singh, B.K., Daya Publishing House (New Delhi).
- Kar, D.; Dey, S.C.; Roy, A.; and, Mandal, M. (2000 c) Epizootic Ulcerative Syndrome Fish Disease in Barak valley region of Assam, India. *Proc. Nat. Symp. Current Trends in Wetlands and Fisheries Research in the New Millennium*, **1**: 2 pp.
- Kar, D.; Dey, S.C.; Mandal, M.; and, Lalsiamliana (2000 d). Epizootic Ulcerative Syndrome among the fishes of Assam. *In: Proc. National Workshop of NATP-ICAR-NEC North-East Programme*, Shillong, **1**: 24 pp.
- Kar, D. (2002). Present status of Biodiversity of Fishes of Barak valley region of Assam with a note on their Management and Conservation, pp. 3-10. *Proc. UGC-Sponsored State-level Seminar on Biodiversity of Assam, Session Chairman's Lecture*, 30 Jan 2000 (Eds.) Bhattacharjee, M.K.; Dattachoudhury, M.; and, Mazumder, P.B., Karimganj College, Assam University (Assam).
- Kar, D.; Laskar, B.A.; Mandal, M.; Lalsiamliana; and, Nath, D. (2002 a). Fish Genetic Diversity and Habitat parameters in Barak drainage, Mizoram and Tripura. *Indian J. Environment and Ecoplanning*, **6**(3): 473-480.
- Kar, D.; Laskar, B.A.; Nath, D.; Mandal, M.; and, Lalsiamliana (2002 b). *Tor progenies* (McClelland) under threat in River Jatinga, Assam. *Science and Culture*, **68**(7-8): 211.
- Kar, D.; Laskar, B.A.; and, Nath, D. (2002 c). *Tor* sp. (Mahseer fish) in river Mat in Mizoram. *Aqua cult*, **3**(2): 229-234.
- Kar, D.; Laskar, B.A.; and Lalsiamliana (2002 g). Germplasm Inventory, Evaluation and Gene Banking of Freshwater Fishes. 3rd Annual Technical Report: pp.57. *National Project Evaluation Workshop*, 3: NATPICAR World Bank-aided Project: National Bureau of Fish Genetic Resources (Lucknow).

- Kar, D.; Dey, S.C.; Mandal, M.; Laskar, B.A.; and, Lalsiamliana (2002 h). Preliminary Survey of the Fish Genetic Resources of the Rivers in Barak Drainage, Mizoram and Tripura, pp. 73-81. In: Restoration of Lakes and Wetlands (Eds.) Ramachandra, T.R.; Rajasekhara, Murthy, C.; and, Ahalya, N., pp. xxii + 400, Allied Publishers (P) Ltd. (Bangalore).
- Kar, D. (2003 a). Fishes of Barak drainage, Mizoram and Tripura: pp. 203-211. In: Environment, Pollution and Management (Eds.) Kumar, A.; Bohra, C.; and, Singh, L.K., pp. xii + 604, APH Publishing Corporation (New Delhi).
- Kar, D. (2005 a). Fish Genetic Resources and Habitat Diversity of the Barak drainage: pp. 68-76. In: Aquatic Ecosystems, Conservation, Restoration and Management (Eds.) Ramachandra, T.V.; Ahalya, N.; and, Rajsekara Murthy, C., xiii + 396, Capital Publishing Company (Bangalore).
- Kar, D. (2005 b). Fish Fauna of River Barak, of Mizoram and of Tripura with a note on Conservation. *J.Freshwater Biol.*, **16**.
- Kar, D. (2005 c). Fish Diversity in the Major Rivers in Southern Assam, Mizoram and Tripura: pp.679-691. *Proc. 2nd International Symposium on GIS and Spatial Analyses in Fisheries and Aquatic Sciences*, 2-6 Sep 2002, University of Sussex, Brighton (UK), (Eds.), Vol. **2**, Nishida, T.; Kailola, P.J.; and, Hollingsworth, C.E. Fisheries and Aquatic GIS Research Group, Kawagoe, Saitama (Japan).
- Kar, D and Sen, N (2007). Systemic list and distribution of fishes in Mizoram, Tripura and Barak Drainage of North Eastern India. *Zoos' Print Journal* **22**(3): 2599-2607.
- Kar, D.; Barbhuiya, A.H and Das, B. (2010). Fish diversity, habitat parameters and fish health in wetlands and rivers of North-East India. *Wetlands, Biodiversity and Climate Change*. 1-68.
- Kenjum, B., Kento, K., Sharma N. K., Laskar A.B., Sarkar K.U., Das N. D., (2009) Ichthyological survey and review of the checklist of fish fauna of Arunachal Pradesh.
- Khound J.N., Phukan, P., And Bhattacharyya, and G.K., (2012). Physico-Chemical studies on water quality in Jia-Bharali River basin, North Brahmaputra plain, India.
- Khodake, S.P.; Rajendra, P.B.; Petare, R.K. (2014). Ichthyofaunal diversity in Jamkhedi Reservoir in Dhule district of Maharashtra, India. *J. Environ. Res. Develop.* Vol. **9**, No. 01,177-183.
- M. Sinha (1994) *J. Inland Fish. Soc. India.* Vol. **26**(1) 1-19.
- Mittermeier, R.A. and Mittermeier, C.G. (1997). Mega diversity: Earth's Biologically Wealthiest Nation. In: Global Freshwater Biodiversity (Ed.) McAllister, D.E; Hamilton, A.L.; and, Harvery, B; Sea Wind, Cemex, Mexico City, **11**: 1-140.
- Motwani, M.P. Jayaram, K.C.; and, Sehgal, K.L. (1962). Fish and Fisheries of Brahmaputra River System, Assam, I. Fish Fauna with observation on their zoogeographical significance. *Trop. Ecol.*, **3**: 17-43.
- Nath, P. & S.C. Dey (2000). Conservation of Fish Germplasm Resources of Arunachal Pradesh, pp.49-67. In: Ponniah, A.G. and U.K. Sarkar (Eds.). *Fish Biodiversity of North-East India*. NATP Publication No. 2, NBFGR (Lucknow), xiii+228pp.
- Nichols, J.T. (1928). Fishes of the White Nile (with Table of World's Freshwater Fish Faunae). American Mus. *Novitates* No. 319.