

FISH DIVERSITY OF GANGA LAKE IN ITANAGAR, ARUNACHAL PRADESH

Bikramjit Sinha^{1*} & Lakpa Tamang²

Zoological Survey of India, Arunachal Pradesh Regional Centre

Senki Valley, Itanagar, Arunachal Pradesh (India)

Email: 1sinhabj@gmail.com, 2lakptamang@rediffmail.com

*Corresponding author

ABSTRACT

Ganga Lake or Gyakar Sinyi is the only natural, fresh-water lake in Papumpare district. Though considerable work has been done on the fish fauna of the state, the lentic water bodies such as lakes, cut-off meanders have been almost neglected. This is more so for Ganga lake which is located adjacent to state capital. Virtually no work has been done on the faunal diversity of the lake. This paper reports the occurrence of 17 naturally breeding fishes from the lake dominated by cyprinids. Presence of nearly threatened fishes like *Neolissochilus hexagonolepis* suggests the lake being a controlled area with restricted human interference as a potential site for conservation of this and other similar species in comparison to other uncontrolled natural habits like rivers. This paper highlights more detail study of the fish and other aquatic fauna of the lake and as this is a major tourist spot the lake authority should ensure maintenance of habitat condition of the lake.

INTRODUCTION

Arunachal Pradesh, the easternmost state of India is located in one of the global biodiversity hotspots of the world, the great eastern Himalayas. The state is rich in biodiversity due to the interplay of ecological principles. The state lies in the transition zone between Indo-Chinese and Indo-Malayan regions and represents elements from both the regions and also from Indo-Burmese region, depicting the phenomenon of edge effect where ecotones are known to be richer in biodiversity in comparison to either of the participating regions. Further, due to its strategic bio-geographic location, wide altitudinal variation and wide ranges of climatic conditions from temperate to alpine, the landmass supports a phenomenal range of biological diversity (Borang et al., 2008). It is perhaps the most biodiversity rich state in India and also the least explored one owing to its inaccessible and tough terrain.

Studies on the ichthyofauna of Arunachal Pradesh began almost 200 years back probably with the work of McClelland (1839). Then it took almost another

100 years for the next study on fishes of the state by Chaudhuri (1913). It was followed by Hora (1921), Jayaram and Majumder (1964), Srivastava (1966), Choudhury and Sen (1977), Ghosh (1979), Ghosh & Lipton (1982), Datta and Barman (1985), Sen (1985, 2006), Nath and Dey (1990, 2000). Recently, Bagra et al. (2009) prepared an updated checklist of the fishes of Arunachal Pradesh which concentrated mainly on the river ecosystems. With the addition of a few new species during the last couple of years there are more than 200 recorded species of fishes in the state. However, all these studies appear to have completely neglected the lentic aquatic systems with virtually no report on the fish fauna of the well known wetland complexes and lakes of the state. This is more so for Ganga Lake which is located very adjacent to the capital city of Itanagar except for some scanty records. Nath & Dey (2000) reported the occurrence of 9 species of fish in Ganga Lake. Recently, Sharma *et al.* (2012) reported the occurrence of another 4 species and also recorded the presence of 2 additional genera of fishes in the lake. Therefore, an attempt has been made here to prepare a comprehensive account of the

fish fauna (excluding introduced species) of the only natural lake in the capital city, based on secondary information and primary observations.

STUDY AREA

The Ganga Lake, locally known as Gyakar Sinyi or Gyakar Sinyik, literally meaning 'confined water' in local dialect, is a natural, fresh-water lake in western part of the capital city of Itanagar. Geographically, it is situated at 94°47.941' E longitude and 38°51.333' N latitude having an altitudinal range of 330-380 m asl. It is purely a mountain lake located amidst dense forests in the foothill region of the great Himalayan range. The mesmerizing green surrounding of the lake is mainly constituted of primary forests with lots of orchids and ferns.

Morphologically, the lake represents a unique topography with an ovuculate-triangular shape amongst the highly dissected rugged hills in the outer Himalayan ranges. However, an aerial view gives a pistol-shaped morphology of the lake. The lake has an areal coverage of about 70,000 sq. m. though the total area of the lake including the banks and embankments is about 4 sq. km. and is located very close to the boundary of the Pachin and Pam watersheds. There is no proper written history about the lake. Earlier workers described the lake of about 1000 sq. m. sheet of water near ancient ruins at Ita (Pandey, 1977). Geologically, the lake is assumed to have been formed from ponding of a tributary of the Budhibeta stream during neotectonic activity. Its peculiar triangular shape signifies its structural trauma in the Quaternary period (Devi & Singh, 2006).

Ganga Lake is of prime importance as it is the only lake and major wetland in Itanagar Wildlife Sanctuary as well as the Papumapre district as a whole. Being close to the capital city, it is also a major site of tourist attraction and recreation. The lake water is reported to be slightly acidic to slightly alkaline and the littoral zone of the lake contains a plenty of aquatic macrophytes. Among the planktonic forms, phytoplankton has dominance. The zooplankton population of Ganga Lake comprised of 6 genera of Cladocera, 4 genera of copepods and 6 genera of

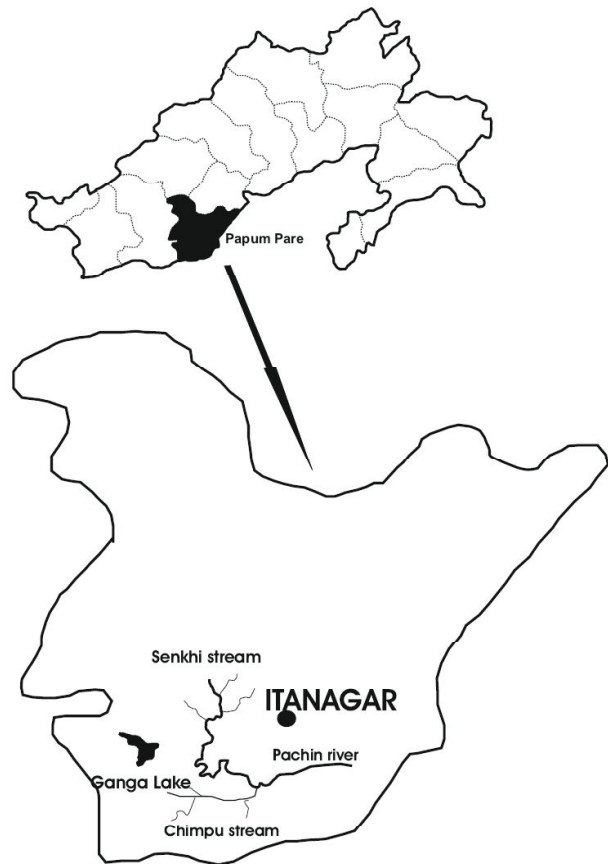


Fig. 1. Location map of Ganga lake

rotifers along with various other minor population of larval forms as well as Protozoans. The phytoplankton population of Ganga Lake comprised of 19 genera of Chlorophyceae, 9 genera of cyanophyceae and 19 genera of Bacillariophyceae. Larvae of may fly, dragon fly, stone fly, alder fly, chironomids, hemipteran bugs and water scorpions, whirling beetles, oligochaets and mollusks are the common macroinvertebrates found in Ganga lake.

Earlier, nobody dared to visit the lake as there was a belief that any one visiting it would die and that some great disaster caused by spirits would overwhelm his/her village. During those times, the lake used to have plenty of fishes which, not being habituated to human predators, used to swim and play and one could see them with naked eye as the lake water also used to be very clear (Pandey, 1977). Since then a lot has changed and now hardly any fish can be seen

with open eye as the number of fishes has declined to bottom low due to unabated illegal fishing and also the lake water has become opaque due to decomposition of litter and throwing of plastics, cans etc by people picnicking there. This can be witnessed if one throws a caste net for fishing where instead of fish one can expect a lot of plastics, bottles and cans.

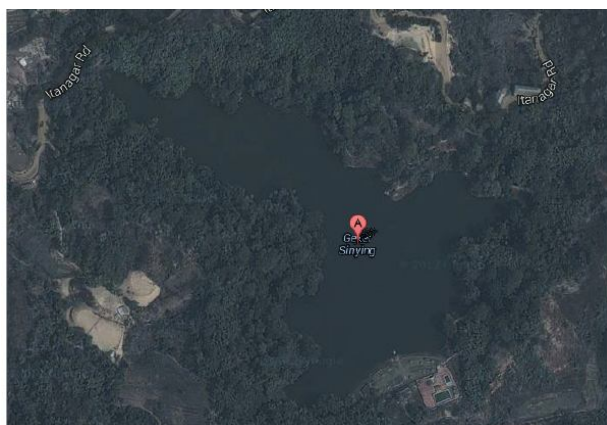


Fig. 2. Bird's eye view of Ganga lake, Itanagar, Arunachal Pradesh

METHODOLOGY

Lot of logs and twigs and presence of heavy litter in the lake water has made the use of caste net useless for fishing. Moreover, a caste net can be used only in the littoral zone. So, along with caste net, we used gill nets and local bamboo traps for fishing. In addition to this, the collections available in the museum of Zoological Survey of India, Arunachal Pradesh Regional centre was also consulted. Fishes were identified with the help of standard literature like Talwar & Jhingram (1991) and Jayaram (2013). An updated inventory of the natural fishes available in Ganga Lake is presented here.

RESULT AND DISCUSSION

As mentioned in preceding paras, when there was not human interference, there used to be a number of fishes in Ganga Lake but detail account of the different types of fishes available at that time has not been made by anyone. Even the major scientific studies such as those by McClelland (1839), Chaudhuri (1913), (1921), Jayaram and Majumder (1964), Choudhury and Sen (1977), Ghosh (1979), Sen (1985, 2006),

Nath and Dey (1990, 2000) and Bagra et al. (2009), on fishes of the state does not mention any collection from the lake. Nath & Dey (2000) in their book just mentioned the occurrence of 9 species of fish in Ganga Lake: *Neolissochilus hexagonolepis*, *Badis badis*, *Channa orientalis*, *D (B) brachydanio*, *Devario aequipinnatus*, *Bangana dero*, *Mastacembalus armatus*, *Puntius ticto* and *Puntius conchoniis*. Sharma et al. (2012) reported the occurrence of another 4 species namely *Acanthocobitis botia*, *Channa punctatus*, *Danio devario*, *Rasbora daniconius* and also recorded the presence of *Macrognathus* sp. and *Schistura* sp. in the lake. Examination of available fishes in ZSI, Itanagar museum and a fresh survey revealed the presence of some more fishes in Ganga Lake. Enumeration of fishes of Ganga Lake, excluding the introduced one's, is presented as per the classification and sequence of Catalogue of Fishes, California Academy of Sciences.

The present paper reports the occurrence of altogether 17 species of naturally occurring fishes in Ganga lake, belonging to 14 genera and 7 families. The fish composition of the lake is dominated Cypriniformes with 11 species followed by Perciformes with 4 species. The dominant genera are *Puntius*, *Danio* and *Devario*. Most of the fishes found in Ganga lake are of Least Concern (LC) status from the conservation point of view, as per IUCN categorisation, except as per the *Neolissochilus hexagonolepis* which is categorised as Near Threatened (NT). It is to be mentioned here that if Ganga lake harbours threatened and/or endangered fish species as the one observed here or for that matter taxon from any other faunal group, it is the appropriate place for taking necessary conservation measures. Because this is a restricted area and the proper habitat condition can be maintained debarring human interference which is not possible or nearly difficult in uncontrolled natural habitats like river. This is because though there are sufficient policy instruments at the national level, state level and even up to village level to check illegal fishing, practically it continues in the ground level till now. And it is assumed that it will be next to impossible to completely stop illegal fishing given the hard fact that livelihood of lot of people is associated with it and also for the inaccessible terrain of the region which makes it difficult to keep a watch on

the practices of illegal fishing.

Besides the above mentioned natural breeding fishes, the lake also has few game fishes mainly carps and minnows which has been introduced by the Fisher Department or its outsourcing agency. The above list of fishes of Ganga lake may not be exhaustive given the fact that lake habitat makes it difficult for sampling, due to which a lot variety of fishes escape catch. This paper highlights more detail investigation of the faunal

diversity of the lake should be carried out to find out a comprehensive picture of the faunal components of the lake as well as to ensure the presence of threatened or endangered species, if any, and to take appropriate conservation measures. Lastly, it is an urge to the lake authority to maintain a proper hygienic condition of the lake by keeping a strict watch on throwing of wastes like plastics, bottles, cans etc. This is critical to prevent the deterioration of the lake habitat and also from the point of view of tourist attraction.

Table 1: List of fishes recorded from Ganga lake, Itanagar

Order	Family	Genus	Species	Local name	IUCN Status
Cypriniformes	Cyprinidae	<i>Neolissochilus</i> Rainboth, 1985	<i>Neolissochilus hexagonolepis</i> (McClelland, 1839)	Ngoge (Ny)	NT
		<i>Puntius</i> Hamilton, 1823	<i>Puntius conchoni</i> (Hamilton, 1822)	Phen ngoi (Ny)	LC
		<i>Puntius</i> Hamilton, 1822	<i>Puntius ticto</i> (Hamilton, 1822)	Phen ngoi (Ny)	LC
		<i>Bangana</i> Hamilton, 1822	<i>Bangana dero</i> (Hamilton, 1822)	Ngope ngoie (Ny)	LC
		<i>Danio</i> Hamilton, 1822	<i>Danio rerio</i> (Hamilton, 1822)	Tapio (Ny)	LC
		<i>Devario</i> Heckel, 1853	<i>Devario aequipinnatus</i> (McClelland, 1839)	Tapio (Ny)	LC
			<i>Devario devario</i> (Hamilton, 1822)	Tapio (Ny)	LC
	<i>Rasbora</i> Bleeker, 1860	<i>Rasbora daniconius</i> (Hamilton, 1822)		LC	
	Cobitidae	<i>Lepidocephalichthys</i> Bleeker, 1863	<i>Lepidocephalichthys guntea</i> (Hamilton, 1822)	Remum poda (Ny)	LC
	Balitoridae	<i>Schistura</i> McClelland, 1839	<i>Schistura rupecula</i> (McClelland, 1838)	Reibo ngilang (Ny)	LC
Nemacheilidae	<i>Acanthocobitis</i> Peter, 1861	<i>Acanthocobitis botia</i> (Hamilton, 1822)	Reibo (Ny)	LC	
Synbranchiiformes	Mastacembelidae	<i>Mastacembalus</i> Scopoli, 1777	<i>Mastacembalus armatus</i> (Lacepede, 1800)		LC
		<i>Macrogathus</i> Lecepede, 1800	<i>Macrogathus</i> sp.		LC
Perciformes	Badidae	<i>Badis</i> Bleeker, 1853	<i>Badis badis</i> (Hamilton, 1822)	Khen ngoi (Ny)	LC
	Channidae	<i>Channa</i> Scopoli, 1777	<i>Channa orientalis</i> Bloch & Schneider, 1801	Cheng (Ass)	NE
			<i>Channa punctatus</i> (Bloch, 1793)	Goroi (Ass)	LC
<i>Channa striata</i> (Bloch, 1793)	Shoul (Ass)	LC			

Note: Ny: Nyishi, Ass: Assamese, NT: Near Threatened, LC: Least Concern, NE: Not Evaluated

ACKNOWLEDGEMENTS

The authors are thankful to Director, ZSI for infrastructure facilities. The authors are also thankful to the Department of Fisheries, Government of Arunachal Pradesh for providing necessary permission for fish sampling in the lake.

REFERENCES

- Bagra K., Kadu. K., Sharma. K.N., Lashkar. B.A., Sarkar. U.K. and Das, D.N. (2009). *Ichthyological survey and review of the checklist of fish fauna of Arunachal Pradesh, India. Check List* 5(2), 330-350.
- Borang, Asham, Bhatt, B.B., Tamuk Maamang, Borkotoki, Aparajita and Kalita, Jatin (2008). Butterflies of Dihang Dibang Biosphere Reserve of Arunachal Pradesh, Eastern Himalayas, India. *Bull. Arunachal For. Res.* 24(1&2): 41-53.
- Chaudhuri. B. L (1913). Zoological results of the Abor expedition (1911-1912). *Fish Records of Indian Museum* 8, 243-258.
- Choudhury. S. and N. Sen (1977). On a collection of fish from Arunachal Pradesh with some new records. *Newsletter Zoological Survey of India* 3(4), 217-223.
- Datta. A.K and Barman. R.P. (1985). Fauna of Namdapha National Park, Tirap district, Arunachal Pradesh, India. *Records of Zoological Survey of India*, 82 (1-4): 275-284.
- Devi. R.K.M and Singh. T (2006). Morphotectonic setting of the Ganga Lake, Itanagar capital complex, Arunachal Himalaya. *Geomorphology*, 76 (1-2): 1-11.
- Ghosh. S. K. and Lipton. A.K (1982). Ichthyofauna of N.E.H. region with special reference to their economic importance. *ICAR Special Bulletin* (1), 119-126.
- Ghosh, S.K. (1979). Fish fauna of the states of Meghalaya, Tripura and U. T. of Arunachal Pradesh. *Annual Report* (ICAR, Shillong), 226-231.
- Hora. S.L. (1921). On some new record and rare species of fish from the Eastern Himalayas. *Records of Indian Museum*, 22 (5), 731-744.
- Jayaram. K.C and Majumdar. (1964). On a collection of fish from the Kameng Frontier division, NEFA. *J. Bombay nat. Hist Soc.*, 61 (2): 264-280.
- Jayaram, K.C. (2012). *The Freshwater Fishes of the Indian Region*. Narendra Publishing House, Delhi, India, 615 pp. Plates xxxix.
- McClelland. J. (1839). *Indian Cyprinidae. 19. Asiatic Researchers*. Calcutta, Bishop College Press, 217-468.
- Nath, P. and S. C. Dey. (1997). *Fish and fisheries of North Eastern India Vol-I*. Arunachal Pradesh. New Delhi. Narendra Publishing House. 201 p.
- Nath, P. and Dey, S. C. (2000). *Fish and Fisheries of North Eastern India (Arunachal Pradesh)*. Narendra Publishing House, Delhi, pp. 217.
- Pandey, B.B. (1977). A visit to Gyakar Sinyik. *Resarun*. 76: 14-17.
- Sen. T.K. (1985). The fish fauna of Assam and the neighboring Northeastern States of India. *Records of Zoological Survey of India*, Occasional Paper No. 64, 1-216.
- Sen. T.K. (2006). Pisces. *Fauna of Arunachal Pradesh, State Fauna series*, 13 (Part-I): 317-396.
- Sharma. D., Das, D.N., Dutta. R., Baruah. D., Kumar. P., Tyagi. B.C and Mahanta. P.C. (2012). *Cold water lakes and rivers in Arunachal Pradesh, India. Bulletin No. 19*, Directorate of Coldwater Fisheries Research, Indian Council of Agricultural research, Bhimtal, Nainital, 79 pp.
- Srivastava, C.B. (1966). On a collection of fishes from Tirap Frontier division. *Indian Journal of Zoological Society of India*, 18: 122-128.
- Talwar, P. K and Jhingran, A. (1991). *Inland Fishes of India and adjacent countries*. Oxford and IBH publishing Co.Pvt. Ltd., New Delhi, 2 Volumes, pp. xix – 1158.