



Fish fauna of Asan Wetland, Dehradun district, Uttarakhand, India

Akriti Mamgain^{1*} • J.V.S. Rauthan¹

¹Department of Zoology, DAV (PG) College, Dehradun

*Corresponding Author Email: akritimamgain07@gmail.com

Received: 13.07.2022; Revised: 28.09.2022; Accepted: 10.10.2022

©Society for Himalayan Action Research and Development

Abstract: Located on the Dehradun district, the Asan conservation Reserve is the 38th Ramsar site in India and first in the state of Uttarakhand. The wetland at Asan Barrage, is situated near the confluence of two perennial rivers Asan and Yamuna near Dehradun. The lake attracts large number of waterfowl and fish species. The present study encompasses the fish diversity of Asan Wetland. The wetland was divided into four different sampling zones. It was observed that 25 fish species belonging to 9 families were occurred in the wetland, out of these fish species, family Cyprinidae was observed as most abundant.

Keywords: Asan Wetland • Fish diversity • Cyprinidae • Perennial

Introduction

Wetlands are areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Wetlands may support both aquatic and terrestrial species. The prolonged presence of water creates conditions that favor the growth of specially adapted organisms. Wetlands occur extensively throughout the world in all climatic zones and are estimated to cover about 6% of the earth surface. They include a wide variety of habitats, which exhibit major differences in their characteristics and have supported the mankind since historical time.

Biological diversity is the variability among living organisms at all levels and from all sources, including terrestrial, marine and other aquatic ecosystem. It is the foundation of the vast array of ecosystem services that significantly contribute to human well being. Fishes are commercially important having a good nutritional value, especially in protein and lipids. Fish lipids contain omega-3 fatty acid, which is essential for normal growth. Doon valley is blessed with a rich network of river system, which provides an ideal habitat for the diversified fish fauna to flourish. But

this is also a fact that, fish biodiversity is under immense pressure from a wide range of anthropogenic factors comprising altered land and water use, changes in river flow and habitat, overexploitation, invasion of exotic species, eutrophication, sand mining and accumulation of heavy metals etc. This has resulted in transformation in species richness of freshwater ecosystem. Among the organisms, fishes are the best known species of aquatic organisms and are the food source harvested from natural populations. Furthermore, fishes exist at or near the top of the food chain and can serve as an indicator of a balanced aquatic ecosystem.

Doon valley is blessed with the plains and hill stream fishes. Geographically Dehradun district is divided into eastern and western Doon valley. Eastern part is supported by Ganga with number of tributaries and western part is supported by Yamuna with the tributaries as Asan and Tons etc. The fish fauna of Dehradun district has attracted the attention of various workers (Das 1960; Hora and Mukerji 1936; Lal and Chaterjee 1963; Singh 1964; Tilak and Hussain 1973; 1976, 1977a, b, 1978a, b, 1990; Grover 1970; Grover et al. 1994; Hussain 1995, 2003, 2010, Uniyal and Kumar 2006; Uniyal and Mehta 2007) during the past but the fishes of Asan wetlands



are largely neglected. In view of this, the present study was taken up, and a total of 25 species belonging to 19 genera, 10 families and 4 orders were collected from the river.

Materials and methods

Area of study: Asan wetland which is presently known as Asan conservation reserve, is geographically situated between latitude $30^{\circ} 24' - 30^{\circ} 28'N$ and longitude $77^{\circ} 40' - 77^{\circ} 44'E$, near the confluence of river Asan and Yamuna hydel canal at Doon valley, consisting both shallow and deep-water pools with large catchment basin surrounded by forest, agricultural pastures, river basin, and village inhabitants. In the western side of reservoir, a barrage (water regulator) is constructed as 287.5m long and river bed is 389.4m above the sea level with the water level of 403.3m above sea level. The maximum rainfall was received about 250-275 cm during rainy seasons. Asan wetland provides a most suitable natural habitats for large number of migratory as well as local aquatic birds such as waterfowl, both waders and divers in winter seasons for breeding, nesting due to ample availability of food resources.



Figure 1. Map of Asan Conservation Reserve

Laboratory work

The present study was carried out in Asan reservoir and sampling sites were divided into four zones based on the similarity of physical habitat and distance coverage of each site. Fishes were collected from four zones of reservoir by operating the cast net ($9'1''$, $9',1/2''$), gill nets and dragnets (all with varying mesh sizes). At each study site, at a time 10-12 throws were casted at different sites of the lake between mid- morning and late- afternoon on a fixed day every month. Representative specimens of different fish species were preserved in 5 % formalin solution and identified in the laboratory using standard identification keys (Jayaram, 1981, 1999; Talwar and Jhingran, 1991 and Day, 1878).

Observations

The study was conducted in Asan reservoir and its in let water bodies water bodies for the time period of approximately one year from march 2020 to February 2021. Four different sampling sites were selected viz. Asan reservoir, seepage nala, Yamuna river etc. Of the twenty- five fish species, only *Barilius bendelisis* and *Puntius sophore* were found distributed in all locations. However, not a single species of catfish, which were earlier reported in Asan reservoir, was collected from any of the sampling site. Among the abundantly available fish species in the Asan reservoir, *Cyprinidae* family was found to be in abundance. Fish assemblage is less at the origin because of high water current and increases towards the confluence of river because of high water content there (Nautiyal, 2001). The observed abundance of Genus *Barilius* during current study corroborates with the statement of Hussain (1995) and Negi and Mamgain (2013) who reported genus *Barilius* to be the most abundant with a total catch of 35% Fish fauna of the Asan wetland as observed during 2022-21 is presented is Table 1.



Table 1: Fish fauna observed in the Asan wetland system during 2020-21

S. No.	Species	Site 1	Site 2	Site 3	Site 4
	Class- OSTEICHTHYES				
	Order- CYPRINIFORMES				
	Family- CYPRINIDAE				
	Subfamily- CYPRININAE				
1	<i>Chagunius chagunio</i> (Hamilton- Buchanan) Pathal	✓	✓		
2	<i>Puntius conchonius</i> (Hamilton- Buchanan) Phuti	✓	✓		✓
3	<i>P. sophore</i> (Hamilton- Buchanan) Phuti	✓	✓	✓	✓
4	<i>Tor putitora</i> (Hamilton- Buchanan) Mahseer		✓	✓	
5	<i>Tor chelynoides</i> (McClelland) Kali- machhi			✓	
6	<i>Barilius bendelisis</i> (Hamilton- Buchanan) Chilwa	✓	✓	✓	✓
7	<i>B. vagra</i> (Hamilton- Buchanan) Chalra	✓	✓	✓	
8	<i>Brachydanio rerio</i> (Hamilton- Buchanan) Dharidar	✓	✓	✓	
9	<i>Danio devario</i> (Hamilton- Buchanan) Chand	✓	✓		✓
10	<i>Esomus danricus</i> (Hamilton- Buchanan) Chal	✓		✓	✓
11	<i>Parlucisoma daniconius</i> (Hamilton- Buchanan) Bhuri	✓		✓	✓
12	<i>Crossocheilus latius latius</i> (Hamilton- Buchanan) Saknera			✓	✓
13	<i>Garra gotyla gotyla</i> (Gray) Dhanaura	✓			✓
	Family- BALITORIDAE				
	Subfamily- NEMACHEILINAE				
14	<i>Nemacheilus beavani</i> Gunther (Gadera)		✓	✓	
15	<i>N. Botia</i> (Hamilton- Buchanan) Gadera			✓	✓
16	<i>N. corica</i> (Hamilton- Buchanan) Gadera	✓	✓		
17	<i>Lepidocephalus coudufurcatus</i> Tilak and Hussain (Ghiwa)		✓		
18	<i>Amblyceps mangois</i> (Hamilton- Buchanan) Singhi	✓	✓	✓	
	Family- Bagridae				
19	<i>Xenentodon cancila</i> (Hamilton- Buchanan) Sua	✓		✓	
	Order- PERCIFORMES				
	Suborder- PERCOIDEI				
	Family- NANDIDAE				
	Subfamily- BADINAE				
20	<i>Heteropneustes fossilis</i> (Bloch) Singhi	✓	✓	✓	
	Order- CYPRINODONTIFORMES				
	Suborder- EXOCOETOIDEI				
	Family- BELONIDAE				
21	<i>Glyptothorax pectinopterus</i> (McClelland) Patharchatti	✓			✓
	Family- HETEROPNEUSTIDAE				



22	<i>Badis badis</i> (Hamilton- Buchanan) Chiri, Kali Suborder- CHANNOIDEI Family- CHANNIDAE	✓	✓	✓	
23	<i>Ophiocephalus gachua</i> (Hamilton- Buchanan)Dawla		✓	✓	
24	<i>Mastacembalus armatus</i> (Lacepede) Bam	✓		✓	
25	<i>Macrognathus panczylus</i> (Hamilton- Buchanan) Bam	✓	✓		
Total		19	17	17	10

Note-Site1- Asan Reservoir, Site2- Seepage Nala, Site3- Asan River below barrage, Site4- River Yamuna

Results and Discussion

Total 63 fishes were collected from Asan Reservoir during March 2021 to February 2022. During the present investigation a total of 20 genera, 9 families and 6 orders were reported from the Asan river. *Barilius bendelisis* was the most abundant fish. *Barilius bendelisis* was followed by *Barilius vagra* and *Brachydanio rerio*. Of all the fishes *Tor chelynoides* was least abundant. As per the commercial values of the fishes are concerned the fishes like genus *Barilius*, *Puntius* and *Tor* are food fishes. As per the conservation status is concerned *Tor putitora* and *Mastacembalus armatus* are endangered.

The overall assessment regarding family wise representation all over the wetland, showed the domination of the members of family Cyprinidae (Hora nad Mukherjee, 1936; Uniyal and Kumar, 2006; Uniyal and Mehta, 2007) as has also been reflected in earlier observations from Himalayas including Doon valley (Dobriyal, 1985; Singh et. al., 1987; Dobriyal and Kumar, 1988; Grover et. al., 1994; Uniyal 2002 and Tariq et. al., 2021) or other parts of country (Bhat, 2003, 2004; Lakra et. al. 2010). This fact supports the widely claimed fact that *Cyprinidae* tops the list of 9 largest families, viz., *Cyprinid*, *Gobiidae*, *Ciclidae*, *Characidae*, *Loricariidae*, *Balitoridae*, *Serranidae*, *Labridae* and *Scorpienidae*. Moreover, the presence of many fish species indicates the good diversity of the River Asan during present investigation

Conclusion

Species diversity in different sampling sites indicated that altered habitat support less fish species while variety habitat contribute to the maximum diversity. Order cypriniformes emerged as the most dominant group therefore, protection of these particular habitats is recommended for conservation and management of the fish biodiversity.

Acknowledgement

First author (AM) wishes to express deep sense of gratitude to Prof. A.K. Dobriyal (Professor and head, B.G.R. Campus Pauri Garhwal) for mentoring and guiding in preparation of this research paper and also to Mrs. Neelam Nautiyal for constant support. Authors also thankfully acknowledge Head of the Department Prof. Shashi Solanki for providing laboratory facilities and entire staff for cooperation during the research period.

References

- Bhat, A. (2003). Diversity and composition of fresh water fishes in river systems of central western Ghats, India. *Environmental Biology of Fishes*, 68:25-38.
- Bhat A. (2004). Patterns in the distribution of fresh water fishes in rivers of Central Western Ghats, India and their associates with environmental gradients. *Hydrobiologica*, 529 (1-3): 83-97.
- Das, S.M. (1960). The fisheries of the Doon Valley. *Uttar Bharti*: 11-17.



- Day F., The Fishes of India; Being a Natural History of the Fishes Known to Inhabit the Seas and Fresh Waters of India, Burma and Ceylon Text and atlas, London, 1829; B. Quaritch, 1875-78.
- Dobriyal, A.K. 1985. Ecology of limnofauna in small streams and their importance to the village life in Garhwal Himalaya. *Uttar Pradesh J. Zool.* 5 : 139-144
- Dobriyal, A.K. and Kumar, N. 1988. Fish and fisheries of the river Mandakini. In: R.D. Khulbe (ED.) *Perspectives in Aquatic Biology*. Papyrus Publishing Co., New Delhi. Pp. 337-340.
- Grover, S.P., Agarwal B.S., and Rauthan J.V.S.,(1994) Ichthyofauna of Doon Valley. *Him. J. Env. Zool.*, 38(2): 133-136.
- Grover S.P. (1970) On the collection of fishes of the song river in Dun Valley, Uttar Pradesh. Gurukul Kangri Vishwavidyalaya J. Sci. Res. 2 : 115-118.
- Hora, S.L. and Mukherjee, D.D.(1936), Fishes of Eastern Doon, United provinces. *Rec. Indian Mus.*, 38(2): 133-146.
- Hussain, A., and Tilak, R.(1995), Fishes (Pisces) fauna of conservation are: Rajaji national park. Zoological Survey of India Publication, 5:115-193.
- Hussain, A.(1985), On the hill stream Loach, *Nemachilus repecola* (McClelland) with bifurcated rostral barbell and deformed caudal fin. *Bull. Zool. Surv. India.*, 7(2&3): 337-339.
- Hussain, A.(1995), Pisces: In Fauna of Western Himalaya (U.P.) *Zool. Surv. Of India. Him. Eco. Series.* 9 (Part-1): 117-150.
- Hussain, A. (1987), Studies on the fish fauna of some streams of Dehradun with notes on systematic, ecology and zoogeography. 1& 2: 7. (D. Phill, Thesis submitted to H.N.B. Garhwal University, Srinagar, Unpublished.
- Hussain, A.(2003), Fauna of Asan Wetland, Wetland Ecosystem Series 5. *Zool. Surv. India* 23-26.
- Jayaram, K.C.(1999), The fresh Water Fishes of the Indian Region, New Delhi, Narendra Publishing House.
- Lakra, W.S., Sarkar, U.K., Gopalalrishnan, A., and Pandian, A.K. (2010)Threatened freshwater fishes of India. NBFGR publication, Lucknow.
- Lal, M.B., and P. Chatterjee (1963). Survey of Eastern Doon fishes with certain notes on their biology. *Journal Zoological Society of India*, 14 (1) : 23-32.
- Malik, D.S., Kumar, S., and Panwar, S.(2015) Status of fish diversity and their distribution in relation to habitat ecology in Asan reservoir of Garhwal Himalaya. *Journal of Sustainable Environmental Research*, 4 (1&2): 79-87.
- Mohd Tariq, CB Kotnala, Koshal Kumar and AK Dobriyal (2022). Current status of ichthyo-faunal diversity of glacier fed stream Balkhila from Garhwal Himalaya. *J. Mountain Res.* 17(1), 9-16,
- Nautiyal, P.,(2001) Ichthyofauna. In; Garhwal Himalay, Nature, Culture and Society, Kandari, O.P. and O.P. Gusain (Eds.), Transmedia Publication, Srinagar. 191-197.
- Negi, R.K. and Mamgain, S.,(2013) Species diversity, abundance and distribution of fish community and conservation status of Tons River, Uttarakhand state, India. *J. Fisheries and Aquatic Sciences*, 8: 617-626.
- Rana, D., Gupta, S.K., and Rana, R., (2017)Fish fauna of Doon Valley, District Dehradun, Uttarakhand, India. *Int. J Adv. Res. Biol. Sci.* 4(12): 120-132.
- Rauthan, J.V.S., Rawat, G., Joshi, V., and Grover, S.V.,(2000) Taxonomy account and field observation and biology of trout, *Barilius vagra vagra* (Ham.) in Doon Valley. *Cheetal*, 39(3-4): 62-66 .



- Singh P.P.,(1964) Fishes of Doon Valley. Ichthyologica, (1-2): 86-92 .
- Royal, R., Bhatt, A., and Bahuguna, P.,(2021) Fish Fauna of River Yamuna from Doon Valley, Uttarakhand, India J. Exp. Zool. India Vol. 244, No. 2 (973-977).
- Singh, H. R., Badola, S.P. and Dobriyal, A.K. (1987). Geographical distributional list of ichthyofauna of Garhwal Himalaya with some new records. *J. Bombay Nat. Hist Soc.* 84:126-132.
- Talwar, P.K., and Jhingran, A.G.,(1991) Inland Fishes, Vol. 1&2, New Delhi, Oxford and IBH Publishing Co Pvt. Ltd.
- Tilak, R., and Hussain, A.,(1990) Description of a new Cyprinid, *Barilius dimorphicus* (subfamily; Rasborinae) from Rajaji National Park, Uttar Pradesh. *J. Bombay Nat. Hist. Soc.*, 87(1): 102-105.
- Tilak, R. and Hussain, A.,(1976) Description of a new species of the Genus *Glyptothorax blyth* from the river Yamuna, India (Pisces: Siluriformes: Sisoridae). *Annal. Zool. Warszwa.* 33(14): 229-234.
- Tilak, R., and Hussain, A.,(1977) Description of new species of Genus *Nemacheilus* from District Dehradun (U.P.) *Sci. & Cult.* 43(3): 133-135.
- Tilak, R., and Hussain, A.,(1978) Description of new species of the Genus *Lepidocephalus bleeker* from Uttar Pradesh (Cobitidae: Cypriniformes). *Matsya*, 3; 60-63.
- Tilak, R., and Hussain, A.,(1973) Notes on fishes of Doon Valley, Uttar Pradesh I. Distributional and morphological studies on some glyptothoracid fishes, Family Sisoridae. *Rec. Zool. Surv. India*, 67(1-4); 391-399.
- Uniyal, D.P., and Kumar, A.,(2002) Strategy for conservation of fish diversity of Uttaranchal. In: National Biodiversity Strategy action Plan for Uttaranchal (ed. A.S. Negi and A. Kumar), 74-76.
- Uniyal, D.P., Kumar, A.(2006) Fish diversity in the selected streams of Chakrata and Shivalik hills (District Dehradun, Uttarakhand), India Record Zoological Survey of India, Occ. Paper No. 253: 1-12
- Uniyal, D.P. and H.S., Mehta.(2007) Faunal diversity of Western Doon Shivaliks Fishes: (Pisces) Zoological Survey of India (Speial Publication: 41-59.
- Vijaylaxmi, C., Rajshekhar, M., Sarkar, U.K., (2007). Fishes of North East India. Ed. The Director , National Bureau of fish Genetic Resources, Lucknow 264 pp