



Biodiversity and Conservation Status of Fish Fauna in Lake Fateh Sagar Udaipur, Rajasthan (India)

K.C. Nagar

Department of Zoology, M.L.V. Govt. College, Bhilwara-311 001, India
E-mail: nagar_kc@yahoo.com

Abstract: The present study deals with the diversity and abundance of fresh water fishes in Fateh Sagar lake of Udaipur district, Rajasthan during 2017-18. The results of present investigation reveal the occurrence of 28 fish species belonging to 10 families and 19 genera. Among the collected species, family Cyprinidae was most dominant constituting 46.42% followed by family Bagridae and Channidae constituting 10.71% each, family Balitoridae and Siluridae constituting 7.14% each, family Notopteridae, Saccobranhidae, Centropomidae, Belonidae and Mastacembelidae were represented by 3.57% each of the total fish species. The fish diversity was 3.20659 by using Shannon-Weaver diversity index. The conservation status of these fishes was assessed according to IUCN criteria. The major threats faced by the freshwater fishes are mostly in the form of human interventions and aquatic pollution.

Keywords: Fish diversity, Fateh Sagar lake, Shannon-Weaver diversity index, IUCN status

Indian fresh water fish fauna is highly diverse. Extensive literature on freshwater fishes in India is available but mostly concerned with taxonomy (Hamilton 1822, Day 1875 Talwar and Jhingran 1991, Menon 1992 and Jayaram 1999). Ichthyofauna of different states of India have been described by various researchers (Bhat and Rao 2018, Sharma 2018, Sharma and Dhanze 2018, Prasad et al 2020, Rawat et al 2020, Thakur et al 2021, Walter Devaa and Ramesh 2021). The state of Rajasthan has great potentialities for the growth of Inland fisheries. There are a large number of rivers, streams, lakes, tanks and seasonal ponds. However, very little is known about the fish fauna of Rajasthan. But the important work has been done by Sharma and Chaudhary (2007), Gaur (2011), Banyal and Kumar (2015) and Gaur and Nagar (2021). Globally, aquatic ecosystems are among the most threatened ecosystems, suffering from declines in biodiversity that are far greater than those in even the most severely affected terrestrial ecosystems (Dudgeon et al 2006). The major threats to the aquatic resources are overexploitation, introduction of exotic species, habitat degradation and anthropogenic activities. The present investigation was under taken to study the fish biodiversity, abundance of fishes and their IUCN status of Fateh Sagar lake.

MATERIAL AND METHODS

Study area: Lake Fateh Sagar is situated in Udaipur city at Latitude 24°36'07"N, Longitude 73°40'31"E and Altitude 587 m, msl. It is an artificial lake, constructed to the north-west of

Udaipur and located to the north of Lake Pichhola (Fig. 1). The runoff emerging from surrounding hills drains into this lake. The lake is pear-shaped and is encircled by the Aravalli hills on three sides with a straight gravity stone masonry dam on the eastern side which has a spillway to discharge flood flows during the monsoon season (Fig. 2).

Collection of fish sample: The fishes were collected from different points of the lake during Oct-2017 to Sep-2018 with the help of local government contractor and some illegal fishermen using different types of nets namely gillnets, casts nets and dragnets. The collected fishes were photographed labeled and preserved in 10% formalin solution and brought to the laboratory for the identification (Day 1878, Talwar and Jhingran 1991, Jayaram 1999). Fish diversity was calculated by using Shannon-Weaver diversity index. (Shannon - Weaver 1949).

$$H' = - \sum P_i \ln P_i$$

Where, H' = Shannon Weaver index, P_i = n_i/N = the number of individuals of a species (n_i) divided by the total number of individuals, (N) present in the entire sample and ln = Natural log

The conservation status of fish species was based on the criteria given by CAMP (1998) and IUCN (2015).

RESULTS AND DISCUSSION

During present study total 28 ichthyospecies with abundance of 78 have been recorded belonging to 19 genera and 10 families. The members of family Cyprinidae were represented by 13 species (53%), followed by Channidae

and Bagridae with three species each(10%), Balitoridae and Siluridae was expressed by two species each(6%), Notopteridae, Saccobranchidae, Centropomidae, Belonidae and Mastacembelidae were represented by one species only(3%) (Fig. 3). The Shannon- Weavers diversity index of the lake Fateh Sagar was 3.20659. Datta and Majumdar (1970) recorded 75 fish species belonging to 36 genera and 16 families from Rajasthan, as per records of Zoological Survey of India. Johal et al (1993) reported 95 fish species belonging to 52 genera, 7 orders and 5 super orders. Gaur

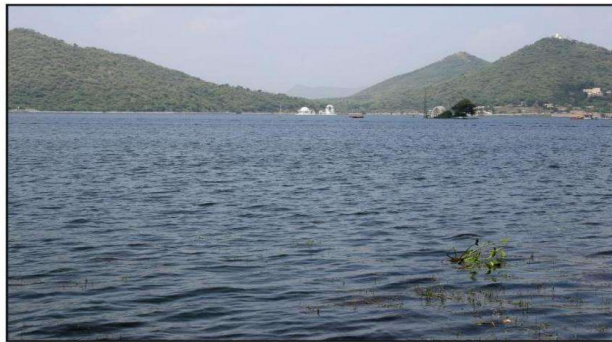


Fig. 1. Lake Fateh Sagar in winter season



Fig. 2. Lake Fateh Sagar in rainy season

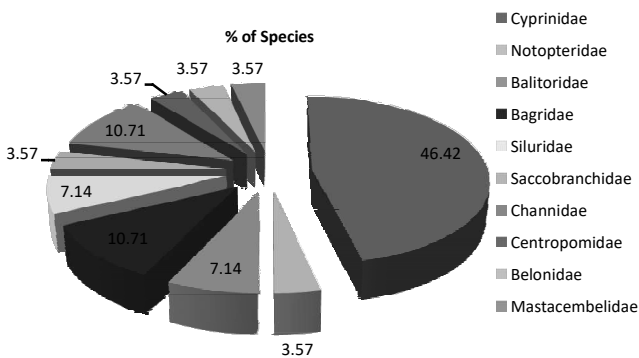


Fig. 3. Family-wise percentage composition of fish fauna of Lake Fateh Sagar

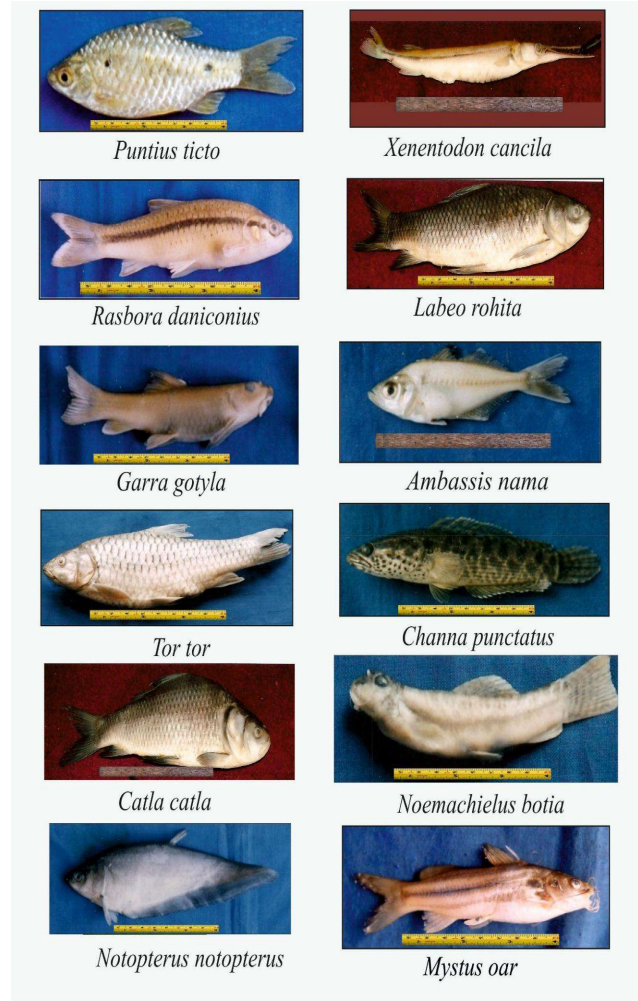


Fig. 4. Selected fish species of Lake Fateh Sagar

(2011) recorded 30 species belonging to 20 genera and 8 families from some tributaries of river Chambal of South-eastern Rajasthan. According to the IUCN, among all the 28 species recorded in Fateh Sagar lake, 4 fish species are Lower risk near threatened (LR-nt) viz. *Cirrhinus mrigala*, *Labeo bata*, *Labeo calbasu* and *Mastacembelus armatus*, 8 species are Vulnerable (VU) viz. *Systemus sarana*, *Labeo gonius*, *Mystus cavasius*, *Wallago attu*, *Callichrous pabda*, *Heteropneustes fossilis*, *Channa marulius* and *Xenentodon cancila* and 15 species of fish are Lower risk least concern(LR-lc) (Table 1). According to the present study, lake Fateh Sagar supports a vast diversity of fish fauna (Fig. 4). Efforts for conservation are necessary for the IUCN categorized 28 fish species of the study area.

CONCLUSION

Present investigation was aimed at diversity and status of fresh water fishes in Fateh Sagar lake of Udaipur district, Rajasthan. Based on Shannon-Weaver diversity index the

Table 1. Ichthyofauna of lake Fateh sagar in Udaipur district of Rajasthan

Species	Local name	Max. size observed	Status	Economic value
Family – Cyprinidae				
<i>Chela bacaila</i> (Ham.)	Chilwa	16 cm	LRlc	LV
<i>Rasbora daniconius</i> (Ham.)	Zebra	18 cm	LRlc	LV
<i>Puntius ticto</i> (Ham.)	Putti	12 cm	LRlc	BT, LV, WF
<i>Systemus sarana</i> (Ham.)	Putti	22 cm	VU	BT, LV, WF
<i>Puntius sophore</i> (Ham.)	Putti	10 cm	LRlc	BT, LV, WF
<i>Amblypharyngodon mola</i> (Ham.)	Mola	14cm	LRlc	LV
<i>Catla</i> (Ham.)	Catla	25 cm	LRlc	FD
<i>Cirrhinus mrigala</i> (Ham.)	Mrigal	22cm	LRnt	FD
<i>Labeo rohita</i> (Ham.)	Rohu	24 cm	LRlc	FD
<i>Labeo bata</i> (Ham.)	Bata	18 cm	LRnt	FD
<i>Labeo boggut</i> (Sykes)	Dudhiya	16 cm	LRlc	FD
<i>Labeo gonius</i> (Ham.)	Sarsi	15 cm	VU	FD
<i>Labeo calbasu</i> ((Ham.)	Kalaunt	17 cm	LRnt	FD
Family – Notopteridae				
<i>Notopterus</i> (Pallas)	Patola	22 cm	EN	PF, FD
Family – Balitoridae				
<i>Noemacheilus botia</i> (Ham.)	Bamna	10 cm	LRlc	MD
<i>Noemacheilus danisonii</i> (Ham.)	Bamna	7.5 cm	LRlc	MD
Family- Bagridae				
<i>Sperata seenghala</i> (Sykes)	Singhara	32 cm	LRlc	PF, FD
<i>Mystus cavasius</i> (Sykes)	Katava	18 cm	VU	PF, FD
<i>Mystus oar</i> (Ham.)	-	19 cm	LRlc	PF, FD
Family – Siluridae				
<i>Wallago attu</i> (Bloch)	Lachi	32 cm	VU	PF, FD
<i>Callichrous pabda</i>	Pabda	18 cm	VU	FD
Family-Saccobranchidae				
<i>Heteropneustes fossilis</i>	Singhi	11cm	VU	FD
Family – Channidae				
<i>Channa punctatus</i> (Bloch)	Girhi	12 cm	LRlc	LV, FD
<i>Channa marulius</i> (Ham.)	Saval	10 cm	VU	LV, FD
<i>Channa striatus</i> (Bloch)	Kabra	8 cm	LRlc	LV, FD
Family – Centropomidae				
<i>Chanda nama</i> (Ham.)	Sisa	11cm	LRlc	LV, PF
Family – Belonidae				
<i>Xenentodon cancila</i> (Ham.)	Suhia	28 cm	VU	WF
Family – Mastacembelidae				
<i>Mastacembelus armatus</i>	Bam	40 cm	LRnt	PF

Status : LR-nt -Lower risk near threatened, VU-Vulnerable, LR-lc -Lower risk least concern and EN-Endangered.

Economic Value: LV – Larvivorous fish, BT- Bait, PF- Predatory Food Fish, WF- Weed Fish, MD- Medicinal Value, FD- Food Fish

moderate fish diversity was found in Fateh Sagar lake which is due to aquatic pollution. The economic importance of fishes revealed that the most of the fish species are food fishes and have medicinal value also hence the conservation measures should be taken. According to IUCN categorized 28 fish species of the study area many species are vulnerable and near threatened so efforts should be made for conservation of these species.

REFERENCES

- Banyal HS and Kumar S 2015. Fish diversity of Chambal River, Rajasthan State, pp 271-281. In: Rawat M, Dookia S and Sivaperuman C (eds). *Aquatic Ecosystem: Biodiversity, Ecology and Conservation*. Springer, New Delhi.
- Bhat H and Rao RJ 2018. Studies on fish diversity of Tighra reservoir Gwalior, Madhya Pradesh, India. *International Journal of Zoology Studies* **3**(2): 68-73.
- CAMP 1998. Conservation Assessment and Management Plan (CAMP). In: Molur S and Walker S (eds.) *Workshop on freshwater fishes in India*. Zoo outreach Organization/CBS, Coimbatore, India. p165
- Datta Gupta AK and Majumdar N 1970. Fauna of Rajasthan, Part 7 Fishes. *Records of the Zoological Survey of India* **62**(1&2): 63-100.
- Day F 1878. *The fishes of India: being a natural history of the fishes known to inhabit the seas and fresh waters of India, Burma & Ceylon*, Texts Atlas (fourth Indian Reprint 1994) Jagmander Book Agency (formerly today & tomorrows Book agency), New Delhi, Text 778, Atlas 204
- Dudgeon D, Arthington AH, Gessner MO, Kawabata ZI, Knowler DJ, Leveque C, Naiman RJ, Prieur-Richard AH, Soto D, Stiassny MLJ and Sullivan CA 2006. Freshwater biodiversity: Importance, threats, status and conservation challenges. *Biological reviews of the Cambridge Philosophical Society* **81**: 163-182.
- Gaur KS 2011. *Biodiversity of hill stream fishes in selected tributaries of River Chambal in south east Rajasthan*, Ph.D. Thesis Submitted to M.L. Sukhadia University, Udaipur
- Gaur KS and Nagar KC 2021. Morphometric characteristics of some selected Hill Stream Fishes from Hadauti Region, Rajasthan, India. *Indian journal of Ecology* **48**(5): 1268-1272.
- Hamilton F 1822. *An account of the fishes found in the River Ganges & its branches*, Archibald Constable and Company, Edinburgh, p. 405.
- IUCN 2015. Red List of threatened species, Version 2012.2 www.iucnredlist.org.
- Jayaram KC 1999. *The fresh water fishes of the Indian region*. Narendra Publishing House, Delhi, India 551.
- Johal MS, Chahal JS and Tandon KK 1993. Ichthyofauna of Rajasthan state (India). *Journal, Bombay natural history society*, 90.
- Menon AGK 1992. *The Fauna of India and Adjacent Countries, Pisces, Vol - 4, Teleostei-Cobitoidea, Part - 2 Cobitidae*, Zoological Survey of India, Kolkata, India, p 113.
- Prasad KK, Younus M and Srinivasulu C 2020. Ichthyofaunal diversity of Manjeera Reservoir, Manjeera Wildlife Sanctuary, Telangana, India. *Journal of Threatened Taxa* **12**(10): 16357-16367.
- Rawat MS, Singh D and Gusain OP 2020. Fish diversity of River Bhagirathi Upstream to Tehri Dam Reservoir, Uttarakhand (India). *Ecology, Environment and Conservation* **26**(Supp.) 55-60.
- Shannon CE and Weaver W 1949. *The Mathematical Theory of Communication*, Urbana III, University of Illinois Press.
- Sharma I 2018. Status of fishery versus exotic fauna in Gobind Sagar. *International Journal of Fisheries and Aquatic Studies* **6**(2): 396-398.
- Sharma I and Dhanze R 2018. A checklist of the ornamental fishes of Himachal Pradesh, the western Himalaya, India. *Journal of Threatened Taxa* **10**(8): 12108-12116.
- Sharma LL and Choudhary CS 2007. Conservation and Management of fish diversity in Rajasthan, pp 132-141. In : Lakra WS and Sarkar UK (eds). *Fresh water fish diversity of Central India*. NBFGR (ICAR) Publication, Lucknow.
- Talwar PK and Jhingran AG 1991. *Inland Fishes of India & adjacent countries* Vol. 1 & 2. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, p. 1158.
- Thakur K, Kumar R and Bhavna 2021. A review on freshwater fish diversity of India and concept of DNA barcoding in fish identification. *Egyptian Journal of Aquatic Biology & Fisheries* **25**(3): 667-693.
- Walter Devaa J C and Ramesh U 2021. Current Status of Rainbow Trout in Western Ghats, Southern India: A Fish Diversity and Water Quality Assessment Study. *Indian Journal of Ecology* **8**(2): 549-557