Environment and Ecology 38 (4) : 927—932, October—December 2020
ISSN 0970-0420

Ichthyofaunal Diversity of Boranakanive Reservoir in Tumakuru District, Karnataka

R. Shruthi, S. Ramakrishna

Received 21 September 2020, Accepted 24 September 2020, Published on 10 October 2020

ABSTRACT

The rural water bodies and their ichthyofaunal diversity are dilapidated over the years. As ichthyofauna is a major asset to the biodiversity of our country as well as a significant economic resource, sustainable development of ichthyofauna becomes crucial. Therefore a timely survey to monitor the ichthyofaunal diversity is a pre-requisite for the ameliorating management of it. Hence, the present study to assess and record the ichthyofaunal diversity of the Boranakanive reservoir at the Tumakuru District of Karnataka (India) was carried out for a span of one year from June 2017 to May 2018 on a monthly basis, revealing a total occurrence of 13 fish species belonging from ten genera, six families and five orders of fishes. The results of the study conducted would provide an insight for the future analysis of ichthyofaunal survival in the reservoir.

Keywords: Ichthyofaunal diversity, Boranakaniver reservoir, Biodiversity.

INTRODUCTION

Fishes are an indispensable part of any aquatic ecosystem. These vertebrates highly influence the process of energy transfer through the food web. Fishes and their by-products hold a vital role as diet among the human race globally since time immemorial. They are among the staples as they serve huge amounts of nutrients like antioxidants, proteins, minerals and vitamins, specially omega-3 polyunsaturated fatty acids (Gormleyet al. 2007).

The depletion of freshwater aquatic biodiversity is alarmingly increasing with time due to anthropogenic factors and its resultant climatic or environmental fluctuations. Such being the case, fish diversity studies prove to be a helping tool in having a better understanding of the current fish diversity levels and in formulating methodical measures to scientifically manage the fish producti production along with the conservation of existing ichthyofaunal diversity of the country.

All over the world about 22,000 fish species have been recorded; among which, around 11% are represented in Indian water bodies. Out of the total 2,200 species listed,1,440 (65.45%) belong to the marine water bodies, 617 (28.05%) to the freshwaters and 143 (6.50%) belong to the brackish waters. Coming to the freshwater fish fauna, globally there are about 450 families found, around 40 among them are recorded in India and roughly 25 of these families have commercially important species. Meanwhile, the account of endemic species is about 544 (Center for Ecological Sciences, IISc). For sustainability of the

R. Shruthi*, S. Ramakrishna
Department of Zoology, Bangalore University, Bengaluru 560056, Karnataka, India
Email: shruthi.bub@gmail.com
* Corresponding author

existing resources in the case of commercial species, promotion of rational exploitation is a pre-requisite. Protection of ecosystems is an essential requirement for species survival and adequate care is required to overcome the anthropogenic stresses impacting them.

Other than great nutritional source, Fishes also hold a vital position in any aquatic ecology as significant bio-indicators of ecosystems health. Fishes strike a balance in the food chain by consuming lower organisms like planktons and later being fed upon by the animals of higher hierarchy. Any sort of imbalance caused as a result of variations in the biotic and abiotic factors have a direct influence on the overall aquatic ecology impacting the food chain which is further indicated by the fishes.

Freshwater bodies mainly the reservoirs are of prime significance throughout India, particularly in the rural regions. Most of these reservoirs have been constructed to facilitate the needs of human population around for fish culturing and irrigation. Specifically, inland fisheries have been of notable economic importance to our country for the past few decades and the fish fauna today is facing number of threats such as drought conditions, eutrophication, over fishing or other anthropogenic activities. Hence, a systematic study and understanding of developments along with timely maintenance and updating of the ichthyofaunal diversity status is of utmost importance for the conservation of various fish species (Thirumala and Kiran 2017).

Ancient generations surely had the opportunities to appreciate nature comprising of a wide range of fish diversity as per the information shared through verbal communication through ages, but due to the lack of records we fail to realize the importance of conservation. However, today humans are well equipped with technology, scientific developments and knowledge for the conservation of available fish fauna. Thus, various activities like generating public awareness, periodic recording and monitoring of reservoirs or any water ecosystems must be necessarily followed by the governmental organizations as well as individuals for the documentation of existing fish fauna to further sustainably conserve the rich ichthyofaunal diversity owned by our nation for the current and upcoming generations.

Fig. 1. Map of the Boranakanive reservoir.

The present study was undertaken at the Boranakanive reservoir (Fig. 1), holding a purpose to evaluate and record the ichthyofaunal diversity of the reservoir. The Boranakanive reservoir is located at 6 km east of Huliyar town, of Tumakuru District, Karnataka. The Boranakanive reservoir is lentic freshwater ecosystem. It was constructed as early as 1892 for minor irrigation purpose, during the British rule under the administration of the then Mysore State Maharaja, His Highness Sri JayachamarajendraWadeyar X GCSI. Currently the reservoir is majorly accessed for the purpose of irrigation and fishery.

MATERIALS AND METHODS

To check on the ichthyofaunal diversity of the reservoir, different variety of fishes were looked for regularly on a monthly basis throughout the study period of two years from June 2017 to May 2019 at the reservoir with the help of local fishermen. Fishing was done using cast net, gill net, drag nets and circular net. The varieties of fishes collected were photographed immediately and later preserved with 10% formalin solution in specimen jars for further species identification. Identification and taxonomic classification up to the species level of the fishes obtained was

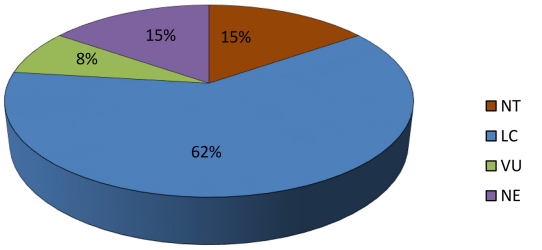

Fig. 2. Biodiversity status of Fishes in Borankanive Reservoir (June, 2017- May, 2019).

done by referring to the standard keys provided by various monographs like Day (1976), Jayaram (1999), Jhingran (1991) and further confirmed with the help of concerned experts in the field of ichthyofauna.

RESULTS AND DISCUSSION

The ichthyofaunal diversity, biodiversity status and percentage composition of fish families observed in the reservoir during the study period are depicted in the Table 1 and Fig. 2. It was observed that the fish diversity of the reservoir comprised of 13 varieties of fishes exhibiting a moderate ichthyofaunal diversity. The species recorded belonged from ten genera, six families and five orders of fishes.

The percentage composition of the exisiting order of fishes recorded in the Boranakanive reservoir is given in Fig.3. Wherein, order Perciformes constituted 33% consisting of 2 families under it. Followed by Cypriniformes, Anabantiformes, Osteoglossyformes and Siluriformes comprising of 1 fish species each recorded in the reservoir.

The percentage composition of different fish families recorded in the Boranakanive reservoir is represented in Fig.4. Family Cyprinidae represents 5 fish species, constituting 38%, while family Channidae represents 4 fish species and constitutes for 31%, followed by family Cichlidae, Gobidae and Notopteridae each represented by 1 fish species, constituting for 8% each and finally family Siluridae

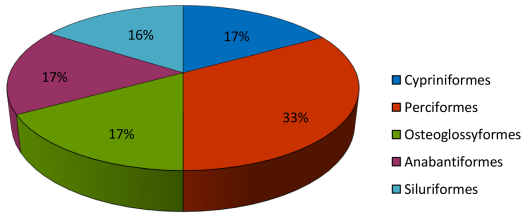

Fig. 3. Biodiversity status of Fishes in Borankanive Reservoir (June, 2017- May, 2019).

representing 1 fish species constituting for 7 % of the total fish population.

Family Cyprinidae had the maximum number of fishes to it in the assemblage composition in which fish species such as Cirrhinusreba, Catlacatla, *Labeorohita*, Cyprinuscarpio and Ctenopharyngodonidella were found to be common. The Channidae family comprised of Channamarulius, Channaorientalis, Channapunctata and Channastriatus species to its credit. Among which Channaorientalis and Channapunctata were found rare and other two species were found common. The remaining four families Chichlidae, Gobidae, Notopteridae and Siluridae had one species of fishes like Oreochromisnilotica, Glossogobiusgiuris, Notopterusnotopterus and Ompokbimaculatus respectively under each of them. However, Oreochromisnilotica and Notopterusnotopterus were found very common. While,Glossogobiusgiurisand Ompokbimaculatus were found rare.

The biodiversity status of the Boranakanive reservoir is represented in the Table 1 and Fig.2. As per the IUCN Red list category (2011), the biodi-

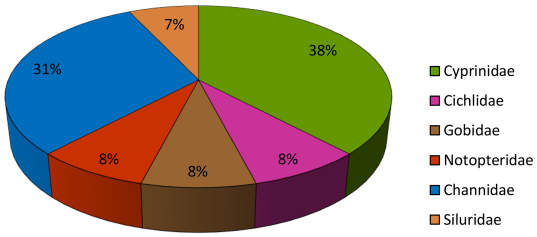

Fig. 4. Percentage composition of Fish Families in Borankanive Reservoir (June, 2017- May, 2019)

Table 1. Fish diversity in Boranakanive reservoir and their biodiversity status (June 2017–May 2019). LC–Least Concern ; VU–Vulnerable ; NT–Near Threatened ; NE–Not Evaluated. LC-Least Concern ; VU-Vulnerable ; NT-Near Threatened ; NE-Not Evaluated.

Sl. No.	Order	Family	Scientific name	Common name	Local name	IUCN status	Economic value
1	Cypriniformes	Cyprinidae	*Cirrhinus reba* (Hamilton 1822)	Reba carp	Doddarja	LC	Food fish
			Catla catla (F. Hamilton 1822)	Major South Asian carp	Catla	LC	Food fish
			Labeo rohita (F. Hamilton 1822)	Rohu	Rohu	LC	Food fish
			Cyprinus carpio (Linnaeus 1758)	Common carp	Samanyagende	VU	Food fish/ Ornamental fish
			Ctenopharyng odonidella (Valenciennes 1844)	Grass carp	Hullu gende	NE	Food fish
2	Perciformes	Cichlidae	*Oreochromis niloticа* (Linnaeus 1758)	Nile tilapia	Jilebimeenu	LC	Food fish
		Gobidae	*Glossogo biusgiuris* (J Richardson 1846)	Gangetic tank goby	Nettigennu korava	LC	Food fish/Ornamental fish
3	Osteoglossyformes	Notopteridae	*Notopterus notopterus* (Pallas 1769)	Grey feather back	Kulchappli	LC	Food fish/Ornamental fish
4	Anabantiformes	Channidae	*Channa marulius* (F. Hamilton 1822)	Great snakehead	Avalu, Aviu or Madinji	LC	Food fish/Ornamental fish
			Channa orientalis (Bloch & J. G. Schneider 1801)	Walking snakehead	Korava, Mottu or Thunda	NT	Food fish/ Ornamental fish
			Channa punctata (Bloch 1793)	Spotted snakehead	Kuchi or Belikorava	NE	Food fish/Ornamental fish
			Channa striatus (Bloch 1793)	Striped or snakehead murrel	Kuchhu Or Kuccheu	LC	Food fish/ Ornamental fish
5	Siluriformes	Siluridae	*Ompokbima culatus* (Bloch 1794)	Butter catfish	Goddleymeenu	NT	Food fish

versity status of the fish species found in India are categorized into LC- least concerned; VU- vulnerable; NT- nearthreatened; NE- not evaluated or DD- data deficient. Out of the total 13 fish species found in the Borankanive reservoir, 62% are least concerned, 15% counted for both near threatened and not evaluated and 8% of them were vulnerable.

A rich ichthyofaunal diversity has a positive influence on the health of any aquatic ecosystem, as fishes play great bio-indicators of the water quality. Also, their diversity levels help in determining the richness as well as the distribution of other organisms that are dependent on the aquatic ecosystem (Moyle and Leidy 1992).

The overall health of any freshwater ecosystem is usually monitored by a well-balanced interaction between all its constituents like water parameters, sediments, the biotic and abiotic factors. The ichthyofaunal diversity is greatly impacted if there occurs any imbalance in any of the mentioned components. Urban cities in India of late have witnessed numerous incidents of mass fish deaths among their water

bodies. Earlier, natural causes like drought conditions played a major role in the fish kill incidents. But, recently there have been various man-made causes to unexpected mass mortality of fishes like industrial effluents and direct sewage let off into the water bodies which makes way for unhealthy conditions and imbalance in the water quality also resulting in circumstances like eutrophication or frothing etc. Any type of water pollution taking place due to variety of reasons if not monitored and worked upon in time leads to a direct and irreversible damage to the entire aquatic ecosystem and the diverse populations dependent on them. In the Bengaluru city of Karnataka numerous lakeslike Bellandur, Varthur and Hebballake to name a few, have been a victim of uncontrollable rapid urbanization and other anthropogenic activities over a huge period of time. As a result of which these lakes exhibited dire consequences of undesirable situations like frothing and major fish kills. Currently, they are going through a rejuvenation process.

In comparison to the urban freshwater bodies the rural aquatic ecosystems have lesser exposure to the toxicity like industrial let offs and pollutants. However, natural causes like lack of timely rains and severe droughts along with other anthropogenic activities like over fishing, open defecation, animal washing, use of detergents through utensils and cloths washing or irrigation let off into the water bodies raise growing concerns towards the water quality deterioration and gradual depletion of fish diversity.

In our study, presence of 13 fish species was observed throughout the study period indicating a moderate ichthyofaunal diversity in the reservoir. During the study it was also observed that, it is the lack of timely rainfall in the study area that has led to the shrinkage of water levels in the reservoir which is one of the major reasons for loss of fish population besides overfishing. A balanced interaction between various physico-chemical water parameters like temperature, turbidity and DO or the depth ofwater body with the fish diversity is vital for the flourishment of fish fauna in any water ecosystem(Marshall and Elliott 1998). Presently, owing to the lackaaa of awareness among the local fishermen community, fishes as small as lesser than 5 cm are being fished out in huge numbers, hardly leaving behind enough adults toa undergo natural breeding. As a result of which, a gradual reduction in the population of particular species over a period of time is leading to the unnoticeable extinction of the specific species of fishes in most of the water bodies without leaving behind any records of existence. Also, lack of cooperation between the governmental fisheries organizations in charge and the local communities of fishermen on various issues like release of fish seeds, fish distribution, management and maintenance of fish culture or fishing techniques along with fishing license is resulting in the sufferings and rapid depletion of ichthyofaunal diversity in most of the rural water bodies.

There are various factors responsible for the distribution of organisms in the freshwater habitats in accordance to their adaptation which allows the survival in specific environments(Jeffries and Mills 1990). In order to minimize the energy expended for successful survival, species typically favour appropriate habitat conditions which optimize their physiological processes (Matthews 1990). Therefore, regular survey, monitoring and maintenance of the rural and urban freshwater bodies, periodic documentations of ichthy of aunal diversity and their distribution along with creating public awareness is the key for sustainable conservation and development offish diversity and fish production globally.

ACKNOWLEDGEMENT

The authors are grateful to Dr. M. F. Rahman, Scientist (Retd) Central Inland Fisheries Research Institute (CIFRI) and Consultant at National Fisheries Development Board (NFDB) for helping us enhance our knowledge in the field of Ichthyology.

REFERENCES

Day F. (1976) The Fishes of India. Today and Tomorrow's Book Agency. New Delhi 1 : 778.

Gormley T.R., Neumann T., Fagan J.D., Brunton N.P. (2007) Taurine content of raw and processed fish fillets/portions. Europ. Food Res. and Technol. 225 (5-6) : 837–842.

Jayaram K.C. (1999) The Freshwater Fishes of Indian Region. Narendra Publishing House, Delhi.

Jeffries M., Mills D. (1990) Freshwater ecology: Principles and applications. Belhaven Press.

Jhingran V.G. (1991) Fish and Fisheries of India.Hindustan Publication Corporation, Delhi, India.

Marshall S., Elliott M. (1998) Environmental influences on the fish assemblage of the Humber estuary, UK. Estuarine, Coastal and Shelf Sci. 46 (2) : 175–184.

Matthews K.R. (1990) An experimental study of the habitat preferences and movement patterns of copper, quillback and brown rockfishes (Sebastes spp.). Environm. Biol. Fishes 29 (3) : 161–178.

Moyle P. B., Leidy R. A. (1992) Loss of biodiversity in aquatic ecosystems: Evidence from fish faunas. In Conservation biology. Springer, Boston, MA, pp. 127–169.

Thirumala S., Kiran B.R. (2017) Ichthyofaunal Diversity in Duglapura Lake of Chikmagalur District, Karnataka.