Eco. Env. & Cons. 28 (May Suppl. Issue) : 2022; pp. (S330-S337)
Copyright@ EM International
ISSN 0971–765X

DOI No.: http://doi.org/10.53550/EEC.2022.v28i03s.048

Preliminary survey on diversity of Fish Fauna in Kunigal tank, Tumkur District, Karnataka, India

Lalitha H.M.[1]* and Ramakrishna S.[2]

[1]Department of Zoology, University College of Science, Tumkur University, Tumakuru 572 103.
[2]Department of Zoology, Jnana Bharathi campus, Bangalore University, Bengaluru 560 056.

(Received 4 October, 2021; Accepted 1 November, 2021)

ABSTRACT

Ichthyofaunal studies were undertaken during the period from February 2014 to January 2016 in the Kunigal tank. The major objective of the present study was to report the ichthyofaunal diversity of Kunigal tank of Tumkur District. The present fish biodiversity study revealed the occurrence of 20 fresh water fish species belonging to fifteen genera, eight families and six orders. The order Cypriniformes was most dominant with 10 fish species followed by orders Perciformes and Channiformes each with 3 species, the order Siluriformes with 2 species, orders Osteoglossyformes and Beloniformes each with one species. As per IUCN Red list of Threatened species (2011), 5% are vulnerable, 15% are near threatened, 70% are least concern and 10% are not evaluated.

Key words: *Ichthyofauna, Kunigal tank, Biodiversity, Cypriniformes, IUCN.*

Introduction

Fishes are the most important groups of vertebrates influencing the life by forming a rich source of food providing proteins, fats, minerals, vitamin A and D, phosphorous and other elements. Fishes are preferred in our diet due to their high nutritional values (Mondal *et al.,* 2006). Fish biodiversity study provides a better knowledge of fishes and become a tool for conservation planning strategies of aquatic environment to maintain fish biodiversity. This has secured a great importance as it is very difficult to identify individual species critical to sustain aquatic ecosystem (Shinde *et al.,* 2009a). Ichthyofaunal diversity deals with the variety of fish species; depending on context and scale, it could refer to alleles or genotypes within fish population to species of life forms within a fish community and to species or life forms across aqua regimes (Burton *et al.,* 1992). Biodiversity is needed for stabilization of ecosystem, protection of environmental quality for better understanding of the intrinsic worth of all species found on the earth (Ehrlich, 1991). Fishes are the most dominant groups of the lower vertebrates and include nearly about 35,000 species which are found to inhabit in the various types of water bodies. India is one of the mega biodiversity countries in the world and occupies the ninth position in terms of freshwater mega biodiversity (Mittermeier *et al.,* 1997). In the Indian subcontinent, 2,500 species of fishes have been recorded, of which 930 are categorized as freshwater species (Jayaram, 1999) and remaining 1570 are marine. A fresh water perennial tank has got prime importance as a source of drinking water and fish culture potential. These water bodies are found mainly in rural areas and are used as the source of drinking water, irrigation and fish production by the local fishermen.

The evaluation of present fishery status and potential for fish production will help in the implemen-

tation of developmental activities and improvement of fish production of fresh water habitats (Pailwan *et al.*, 2008). Fisheries of the lakes, tanks and reservoirs constitute an integral component of the inland fish production in India (Jhingran, 1982). Since Fish and fisheries have significant economic importance and scope, it is very much needed to study the distribution and availability of fishes from freshwater reservoirs and tanks (Shinde *et al.*, 2009 b). Fishes are the prime indicators of ecological health and maintain a balance in the food chain by consuming plankton and small animals and become food for many animals. This balance in food chain may be affected due to pollution in the aquatic system. In addition, there are many threats to fish diversity such as construction of dam, which block the spawning, migrations and introduction of exotic species and over fishing. Therefore, knowing the status of fish fauna is indispensable to prevent the loss of particular species (Thirumala and Kiran, 2017). Changes in physico-chemical parameters, pesticides, fertilizers from the surrounding crop fields, heavy siltation due to heavy rainfall, high density of fingerling stocking to selected culture fishes, poor management of fish culture and fish diseases were found to exert undesirable impacts on plankton diversity, fish diversity and productivity. These water bodies are facing the problem of ecological degradation due to irrational human interference and unsustainable developments. Fish assemblages have been used as ecological indicator to assess and evaluate the level of degradation and health of water bodies at various spatial scales (Vijaylaxmi *et al.*, 2010).

Study Area

Kunigal tank is one of the biggest tanks in Tumkur District situated in between Kunigal town and Kottagere village. It is situated between 13° 022 N 77° 022 E (Latitude of 130 012 30'' Longitude of 770 012 30'') at an elevation of 778.45 meters above the mean sea level. It is rain fed and perennial in nature. The location map and satellite view of study area is shown in Fig. 1 and 2.

The tank was mainly constructed for the purpose of irrigation. The sources of water for Kunigal tank are rain fall, Nagini and Hemavathi rivers. The tank is situated with an area of 1030 acres and the catchment area is found to be 339.14 sq. km. It is being utilized enormously for irrigation and fish culture.

Materials and Methods

Fishes were collected from Kunigal tank with the help of local fishermen using different types of nets

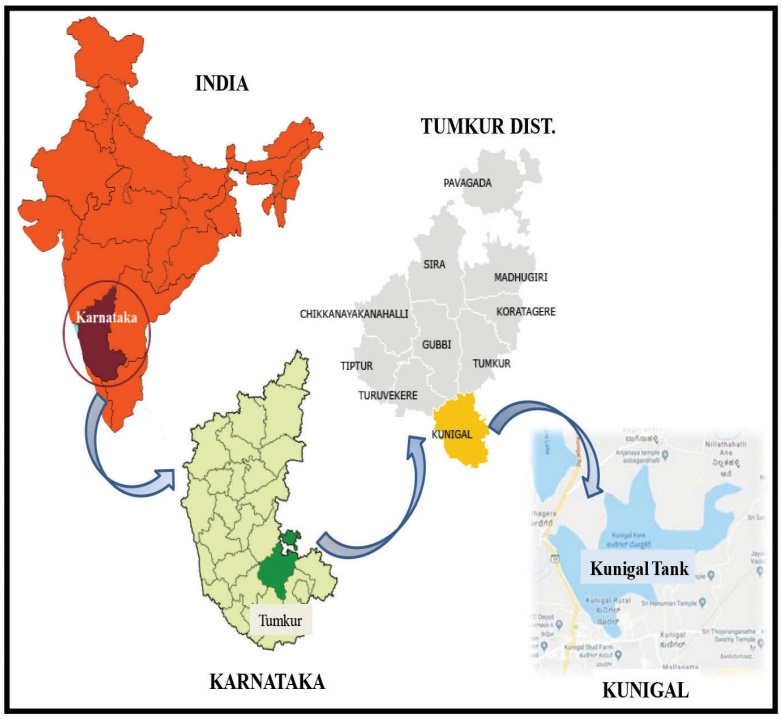

Fig. 1. Map showing Kunigal tank through Kunigal, Tumkur, Karnataka and Indi

namely gill nets, cast nets and dragnets. Immediately photographs were taken with the help of digital camera. Fishes were brought to the laboratory and preserved in 10% formalin solution in separate specimen jar according to the size of species. Small fishes were directly placed in the 10% formalin solution. While large fishes were given an incision in their abdomen and preserved. Fishes were identified up to the species level, with the help of standard keys given by Day (1967), Jayaram (1999) and Jhingran (1991).

Results

The diversity of fishes of Kunigal tank was studied for two years from February 2014 to January 2016. During the study period, Fish diversity and biodiversity status, percentage occurrence of fish orders and families are depicted in Table. 1 and Fig. 3, 4 and 5. Some of the species of fishes are represented in plate 1.

Different fish varieties have been observed in Kunigal tank. The results showed that the tank was rich in fish biodiversity. The present fish biodiversity study revealed the occurrence of 20 fresh water fish species belonging to fifteen genera, eight families and six orders from Kunigal tank in a number of catches carried out during 2014-2016.

The order Cypriniformes was most dominant with 10 fish species followed by orders Perciformes and Channiformes each with 3 species, the order Siluriformes with 2 species, orders Osteoglossy formes and Beloniformes each with one species have been recorded from Kunigal tank (Table 1).

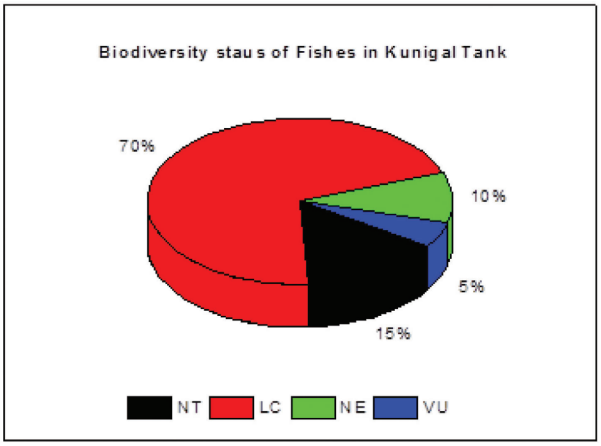

Fig. 3. Biodiversity status of fishes in Kunigal Tank during 2014 - 2016

The percentage occurrence of different orders of fishes recorded in Kunigal tank is depicted in Fig. No.2. Order Perciformes and Siluriformes were most dominant each constituting 25% followed by order Cypriniformes, Beloniformes, Anabantiformes and Osteoglossiformes each constituting 12.5% of the total fish species.

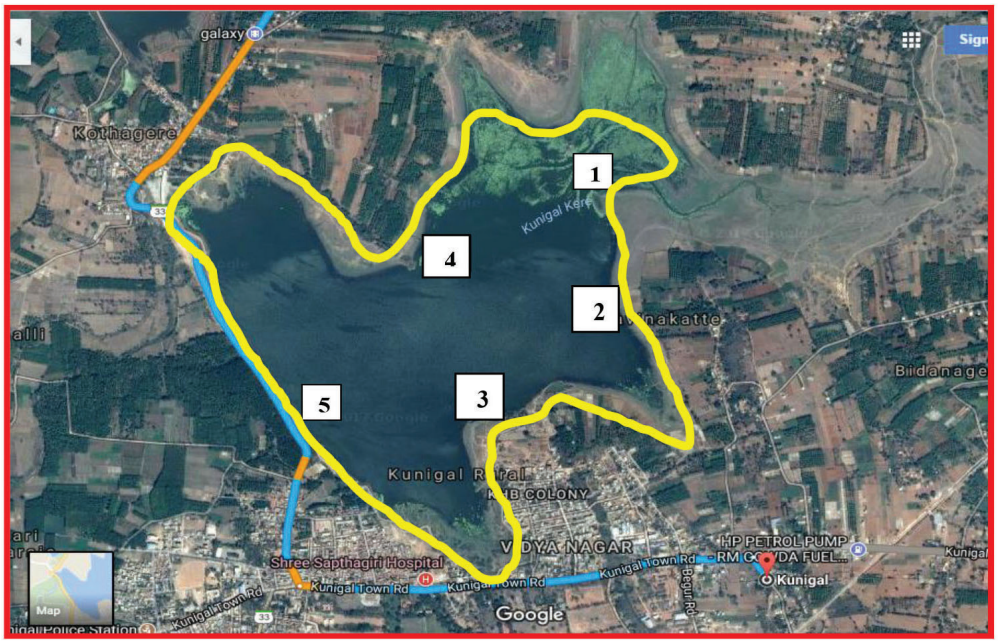

Fig. 2. Satellite view of Kunigal Tank.

Table 1. Fish diversity and Biodiversity status in Kunigal Tank (2014 -2016)

Sl. No.	Order	Family	Scientific name	Common name	Abundance	IUCN status	Economic value
1	Cypriniformes	Cyprinidae	*Hypophthalmichthyes molitrix* (Valenciennes, 1844)	Silver carp	A(3-4)	NT	Food fish
			Cirrhinus mrigala (Hamilton, 1822)	Mrigal Ornamental fish	A(3-4)	LC	Food fish/
			Cirrhinus reba (Hamilton, 1822)	Reba carp	A(3-4)	LC	Food fish
			Catla catla (F. Hamilton, 1822)	Major South Asian *carp*	A(3-4)	LC	Food fish
			Labeo rohita (F. Hamilton, 1822)	Rohu	A(3-4)	LC	Food fish
			Cyprinus carpio (Linnaeus, 1758)	Common carp	A(3-4)	VU	Food fish/ Ornamental fish
			Salmostoma acinaces (Valenciennes, 1844)	Silver razor belly minnow,	A2	LC	Food fish/ Ornamental fish
			Salmostoma clupeoides (Sykes, 1839)	Bloch razor belly minnow	A2	LC	Food fish/ Ornamental fish
			Ctenopharyngodon idellus (Valenciennes, 1844)	Grass carp	A(3-4)	NE	Food fish
			Amblypharyngodon mola (Hamilton, 1822)	Mola carplet	A(3-4)	LC	Food fish/ Ornamental fish
2	Perciformes	Cichlidae	*Oreochromis mossambicus* (W. K. H. Peters, 1852)	Mozambique tilapia	A2	NT	Food fish
			Oreochromis nilotica (Linnaeus, 1758)	Nile tilapia	A 2	LC	Food fish
		Gobidae	*Glossogobius giuris giuris* (J. Richardson, 1846)	Gangetic tank goby	A1	LC	Food fish/Ornamental fish
3	Osteoglossy-formes	Notopteridae	*Notopterus notopterus* (Pallas, 1769)	Bronze feather back	A2	LC	Food fish/Ornamental fish
4	Beloniformes	Hemiram-phidae	*Hyporhamphus limbatus* (Valenciennes, 1847)	Congaturi halfbeak	A1	LC	Food fish
5	Anabantiformes	Channidae	*Channa striatus* (Bloch, 1793)	Striped or snakehead murrel	A1	LC	Food fish/Ornamental fish
			Channa orientalis (Bloch & J. G. Schneider, 1801)	Walking snakehead	A2	NE	Food fish
			Channa marulius (F. Hamilton, 1822)	Great snakehead	A1	LC	Food fish/Ornamental fish
6	Siluriformes	Siluridae	*Ompak bimaculatus* (Bloch, 1794)	Butter catfish	A2	NT	Food fish
		Bagridae	*Mystus vittatus* (Bloch, 1794)	Striped dwarf catfish	A2	LC	Food fish/Ornamental fish

A1- rare; A2- common; A(3-4)- very common; LC- least concern; VU- vulnerable; NT- near threatened; NE- not evaluated; DD- data deficient

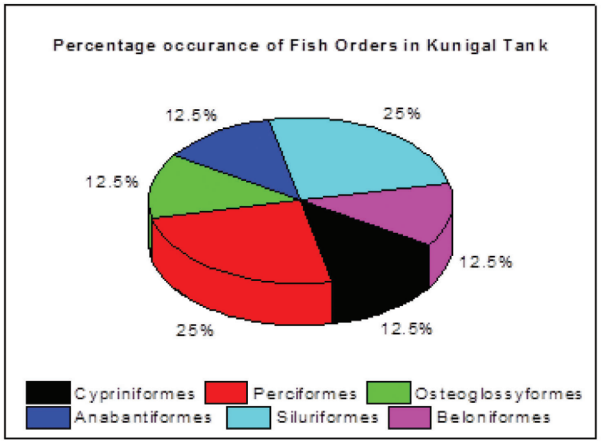

Fig. 4. Percentage occurrence of fish orders in Kunigal Tank during 2014-2016

The percentage occurrence of different families of fishes recorded in Kunigal tank is depicted in Fig. 3. Family Cyprinidae is represented by 10 fish species, constituting 50%, family Channidae is represented by 3 fish species constituting 15% and family Cichlidae is represented by 2 fish species constituting 10%. Families Notopteridae, Bagridae, Gobidae, Siluridae and Hemiramphidae each represented by 1 species and each constituting 5%.

Family Cyprinidae was the dominant group with 10 species in the assemblage composition in which *Hypopthalmichthyes molitrix*, *Cirrhinus mrigala*, *Cirrhinus* reba, Catla catla, Labeo rohita, Cyprinus *carpio*, *Ctenopharyngodon idella*, *Amblypharyngodon* mola were *found* very *common*; *Salmostoma* acinaces, Salmostoma cluepeoides found common. Family Channidae with 3 *species* in the assemblage composition in which Channa orientalis found common and Channa striatus and Channa marulius found rare. Family Cichlidae with 2 species in which Oreochromis mossambicus and Oreochromis nilotica found common.

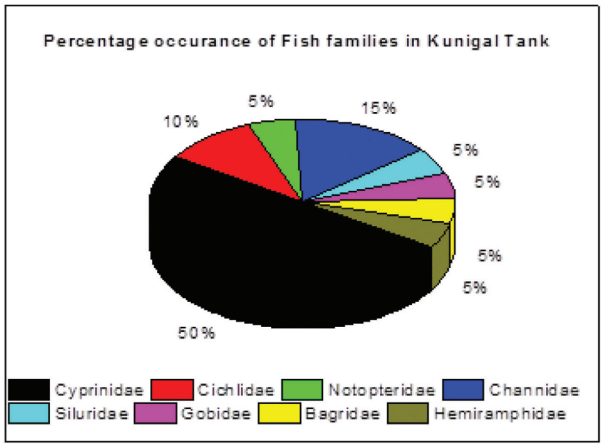

Fig. 5. Percentage occurrence of fish families in Kunigal Tank during 2014-2016

Family Notopteridae with one species in which Notopterus notopterus was found common. Family Hemiramphidae with one species in which Hyporhamphus limbatus was found rare. Family Siluridae with one species in which Ompak bimaculatus was found common. Family Bagridae with one species in which Mystus vittatus was found common. Family Gobidae with one species in which Glossogobius giuris giuris was found rare.

Biodiversity status of fishes from the Kunigal tank is presented in Table 1 and Figure 1. The biodiversity status of fishes of India under IUCN were categorized into LC- least concern; VU- vulnerable; NT- near threatened; NE- not evaluated; DD- data deficient. Out of 20 species reported in the present study, 5% are vulnerable, 15% are near threatened, 70% are least concern and 10% are not evaluated as per IUCN Red list of Threatened species (2011).

Discussion

Biodiversity is essential for stabilization of ecosystem, protection of overall environmental quality for understanding intrinsic worth of all species on the earth (Ehrlich,1991). Fish diversity essentially represents the fish faunal diversity and their abundance. Fishes are the good indicators of the water quality and the health of the ecosystem and determine the distribution and abundance of other organisms in the ecosystem (Moyle and Leidy, 1992). Lal *et al.*, (2013) reported 22 species of different 17 families and 10 orders from the Vattakkayal, Ashtamudi Lake. Basavaraja *et al.*, (2014) reported 25 fish species belongs to 04 orders, cypriniformes was dominated with 14 species in Anjanapura reservoir.

The results similar to the present study were reported by Vijaylaxmi *et al.*, (2010) who recorded the occurrence of fourteen fish species belonging to five orders from Mullameri river. The order Cypriniformes was dominant and represented by seven fish species followed by order Siluriformes with four species and the order Channiformes, Mastacembeliformes and Osteoglossiformes each with one species. Shinde *et al.*, (2009a) studied the Ichthyofauna of Harsool-Savangi Dam Aurangabad

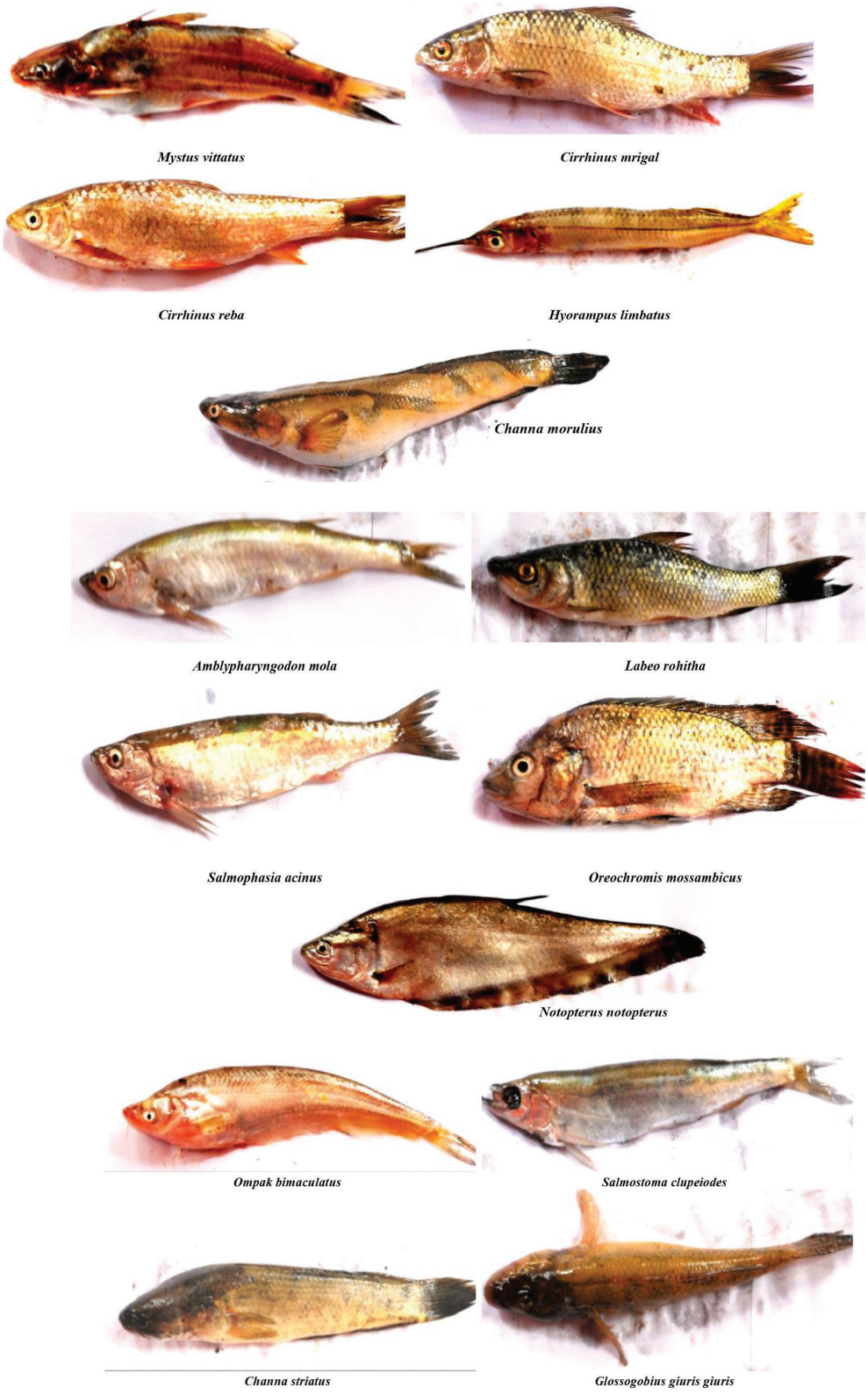

Plate 1. Some representative species of fishes found in Kunigal Tank.

(M.S) and recorded 15 fish species belonging to 3 orders, 4 families and 12 genera. The order Cypriniformes was found dominant with 11 species, followed by Perciformes 3 species and Siluriformes with 1 species. Gangadhara *et al.,* (2015) recorded a total of 34, 42 and 48 fish species in Tunga, Bhadra and Tungabhadra rivers, respectively. The species belong to the order Cypriniforms was found to be most dominant followed by the order Siluriformes, Perciformes, Osteoglossiformes, Synbranchiformes, Beloniformes and Cyprinodontiformes. Shinde *et al.,* (2009b) documented 41 species of fishes belonging to 26 genera, 14 families and 7 orders from the Pravara River Ahmednagar (M.S) and found family Cyprinidae was dominant. Shahnawaz *et al.,* (2010) examined fish diversity with relation to water quality of Bhadra river of Western ghats and recorded 56 species of fish representing 31 genera and 15 families and the Cyprinid family was found dominant. Jayabhaye and Khedkar (2008) reported a total of 25 fish species belonging to 14 genera, 5 families and 6 orders from Sawana Dam in Hingoli District of Maharashtra and found the order Cypriniformes was dominant with 15 species followed by order Siluriformes with 3 species, Clupeiformes, Channiformes and Perciformes were represented by two species and the order Mastacembeliformes by single species. Laxmappa *et al.,* (2015) recorded 30 fish species, 12 families and 22 genera in which order cypriniformes was dominant with 13 species in Koilsagar reservoir, Mahbubnagar District. Telangana. Sonawane and Barve (2015) reported 23 species of fishes belonging to 20 genera, 10 families and 08 orders in which order Cypriniformes was dominant with 09 species from the Kasura Dam, Jalna District (M.S).

Kamble and Kamble (2009) recorded 25 species of fishes belongs to 7 orders, 17 genera and 9 families, where order Cypriniformes was dominant with 12 species followed by orders Channiformes with 4 species and Siluriformes with 3 species, order Clupeiformes, Perciformes and order Mastacembeliformes each with 2 species while order Mugiliformes with one species from Ruti reservoir, near Ashti, Beed District.

Conclusion

This ichthyofaunal study indicates the high fish productivity with native species, cultivable species and rare species in Kunigal tank. It can be concluded that proper management of water body, utilization of fish wealth and sustainable steps to monitor and conserve the fish fauna are needed for sustaining fish diversity.

References

Basavaraja, D., Narayana, J., Kiran, B.R., and Puttaiah, E.T. 2014. Fish diversity and abundance in relation to water quality of Anjanapura reservoir, Karnataka, India. *International Journal of Current Microbiology and Applied Sciences*. 3(3) : 747-757.

Burton, P.J., Balisky, A.C., Coward, L.P., Kneeshaw, D.D., and Cumming, S.G. 1992. The value of managing for biodiversity. *The Forestry Chronicle*. 68(2) : 225-23.

Day, F. 1967. The fishes of India. Today and Tomorrow's Book Agency, New Delhi. 1: 778.

Ehrlich, P. R. 1991. Biodiversity studies: *science and policy. Science*. *253*(5021) : 758-762.

Gangadhara, G., Ganapathi, N.M., Sushanth, V.R., Harsha, N., and Sruthisree, C. 2015. Fish biodiversity of Tunga, Bhadra and Tungabhadra Rivers in Karnataka, India. *Research Journal of Animal, Veterinary and Fishery Sciences*. 3(10): 1-16.

IUCN, 2011. IUCN Red List of Threatened species.

Jayabhaye, U.M. and Khedkar, G.D. 2008. Fish diversity of Sawana dam in Hingoli Dist. of Maharashtra. *Journal of Aquatic Biology.* 23(1): 26-28.

Jayaram, K.C. 1999. The freshwater fishes of the Indian Region. Narendra Publishing House, Delhi.

Jhingran, V.G. 1982. Fish and Fisheries of India. Hindustan Publication Corporation, Delhi, India.

Jhingran, V.G. 1991. Fish and Fisheries of India, Hindustan Publication Corporation, New Delhi.727.

Kamble, S.M. and Kamble, A.H. 2009. Biodiversity of some aquatic animals (Crustacean, Molluscans and Fishes) Ruti-Reservoir near Ashti, Dist. Beed (MS) India. *Journal of Aquatic Bology.* 24(2).

Lal, S.S., Jaya, D.S. and Williams, E.S. 2013. Ichthyofaunal diversity of Vattakkayal, a part of Ashtamudi lake, Kollam District, Kerala, South India. *Journal of Aquatic Biology and Fisheries*. 2 : 620- 626.

Laxmappa, B., Naik, S.J.K., and Vamshi, S. 2015. Ichthyofaunal diversity of Koilsagar reservoir in Mahbubnagar district, Telangana, India. *International Journal of Fisheries and Aquatic Studies*. 2(3) : 23-30.

Mittermeier, R.A., Robles, P., and Mittermeier, C. 1997. Megadiversity: Earth's biologically wealthiest nations Cemex. México 501p.

Mondal, D.K., Das, B.K., and Kaviraj, A. 2006. Ichthyofaunal diversity and aquaculture potential of some floodplain wetlands in the district of North 24 Parganas, West Bengal. *Journal of the Inland Fisheries Society of India*. 38(1) : 23-27.

Moyle, P.B. and Leidy, R.A. 1992. Loss of biodiversity in

aquatic ecosystems: evidence from fish faunas. *In Conservation Biology*. 127-169.

Pailwan, I.F., Muley, D.V. and Maske, S. 2008. Limnological features, plankton diversity and fishery status of three fresh water perennial tanks of Kolhapur district (MS) India. *In Proceedings of Taal 2007: The 12th World Lake Conference*. 1643-1649.

Shahnawaz, A., Venkateshwarlu, M., Somashekar, D.S. and Santosh, K. 2010. Fish diversity with relation to water quality of Bhadra River of Western Ghats (India). *Environmental Monitoring and Assessment*. 161(1-4): 83-91.

Shinde, S.E., Pathan, T.S., Bhandare, R.Y. and Sonawane, S.L. 2009a. Ichthyofaunal Diversity of Harsool Savangi Dam, District Aurangabad, (MS) India. *World Journal of Fish and Marine Sciences*. 1(3) : 141-143.

Shinde, S.E., Pathan, T.S., Raut, K.S., Bhandare, R.Y. and Sonawane, D.I. 2009b. Fish Biodiversity of Pravara River at Pravara Sangam District Ahmednagar, (MS) India. *World Journal of Zoology*. 4(3) : 176-179.

Sonawane, D.L. and Barve, M.B. 2015. Ichthyofaunal Study of Kasura Dam, District Jalna, (MS) India. *Journal of Environmental Sciences Special*. (8) : 319-323.

Thirumala, S. and Kiran, B.R. 2017. Fish diversity in Jambadahalla Lake of Chikmagalur District, Karnataka. *International Journal for Scientific Research and Development*. 5(5).

Vijaylaxmi, C., Rajshekhar, M. and Vijaykumar, K. 2010. Freshwater fishes distribution and diversity status of Mullameri River, a minor tributary of Bheema River of Gulbarga District, Karnataka. *International Journal of Systems Biology*. 2(2) : 1-09.