

Fish diversity and Abundance in Kudligere tank of Bhadravathi Taluk, Karnataka with special note on their Biodiversity status

Dr.S.Thirumala

Assistant Professor

Department of Environmental Science

Government First Grade College & P.G. Center,

Near Anubav Mantapa

Davanagere-577004, Karnataka.

Dr.B.R.Kiran

Research & Teaching Assistant

in Environmental Science

DDE, Kuvempu University,

Shankaraghatta-577451,

Karnataka

Abstract

Abundance and biodiversity status of fishes of Kudligere tank, Karnataka was studied monthly from February 2010 to January 2011. The present study has shown that Kudligere tank supported 18 fish species belonging to 04 orders, 07 families and 15 genera. Among fish families Cyprinidae was dominant with 08 species followed by Bagridae with 03 species, Siluridae and Channidae with 02 species. While, Claridae, Notopteridae and Cichlidae each with single species respectively. As far as biodiversity status (IUCN-1994) is concerned, one species is endangered (5.55%), 07 species as lower risk-near threatened (38.89%), vulnerable 02 species (11.11%), lower risk least concern is one (5.55%), 06 species included under the category of Not assessed (33.33%) and 01

species considered as Data deficient with 5.55%. Water quality characteristics responsible for the occurrence and distribution of fishes in this tank are discussed in brief. Therefore, for the proper management and utilization of this fish wealth, it is necessary to take up the sustainable steps to monitor and conserve fish health.

Key words: Abundance, Biodiversity status, Fish fauna, Kudligere tank, Karnataka

Introduction

Fishes are not only important indicators of ecological health and the abundance, but also maintain a balance in the food chain by consuming plankton and small

animals and form food for many animals. This balance in food chain may be affected due to pollution in 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 (Ramanjaneya and Ganesh, 2016).

India represents about 11.72% of fish species including 23.96% genera, 57% families and 80% orders of the world (Barman, 1998). There are about 2,500 species of fishes in India, of which 930 belong to freshwater, 1,570 species are marine (Debashish, 2005).

There is an urgent need to document the status of fish diversity from time to time in order to ensure proper management and conservation of the fish species in Kudligere tank. Keeping in this vision, the present study was undertaken to document the position of fish diversity in Kudligere tank in relation to biodiversity status.

Materials and Methods

Study area

Kudligere tank is located in Kudligere village in Bhadravati taluk of Shimoga district of Karnataka State, India. It is located 24 Km towards East from district head quarters Shivamogga. 11 KM from Bhadravati town and 262 Km from State capital Bangalore. Arebilachi (3 KM) , Arakere (4 KM) , Nagathibelagalu (5 KM) , Kagekodamaggi (6 KM) , Veerapura (6 KM) are the nearby Villages to Kudligere. Kudligere is surrounded by Shimoga taluk towards west , Channagiri taluk towards East , Tarikere taluk towards South , Honnali taluk towards North . Shimoga , Tarikere , Shikaripura , Davanagere are the nearby cities to Kudligere. This Place is in the border of the Shimoga District and Chikmagalur District. Tarikere is South towards this place

Details of the tank

Area	98.18 acre
Depth	10-15 Ft
Purpose	Fish culture, Irrigation, Drinking

Fish and water sampling

The study was conducted regularly for a period of one year from February 2010-January 2011 and fishes were collected with the help of fisherman by using gill nets of varying mesh sizes. The fishes were identified as per Jayaram (1999), Talwar and Jhingran (1991) and Dutta Munshi and Shrivastava (1988). The physico-chemical parameters were estimated at regular intervals and analysis was done by following standard procedures of APHA (1998) and Trivedi et al.(1998).

Results and Discussion

The physico-chemical variations of the water influenced tank water quality. The water temperature ranged between 22 to 30 °C. However, the pH values ranged between 7.4 to 8.1 and hence the water body showed alkaline nature. The increase in pH values was due to increased concentration of bicarbonate alkalinity. The same results were achieved by Ramakrishnan, et al., (2000) and Mawhoob Noman Alkadas et al.(2010). The results are also in accordance with those of WHO (1984a& b). The low values of BOD (1.4 to 2.6 mg/l) show the less quantity of biodegradable materials.

Dissolved Oxygen (DO) is an important indicator of water quality. DO affect the solubility and availability of many nutrients and therefore productivity of aquatic ecosystems (Wetzel, 1983). Significant fluctuations in DO ranged between 4.8 to 7.6 mg/l, thus supporting the concept that lentic water bodies under natural conditions contains a high quantity of DO ending with saturation point (Welch, 1952).

The total alkalinity was observed in the range of 80 to 190 mg/l and the similar observations were made by Mahadevan and Krishnaswamy (1983) and Wagh (1998). The present investigation shows the total hardness varied between 40 to 72 mg/l and showed soft to moderately hard category. The optimum values of hardness ranges between 75 to 150 mg/l which supports the total fish productivity (Das, 1996).The calcium and magnesium values ranged between 12 to 35 and 9 to 28 mg/l respectively. Hence, the water of the Kudligere tank is suitable for fish culture.

The fishes are categorized in to herbivores, carnivores and omnivores. Herbivores fishes include *Labeo rohita*, carnivores fishes include *Notopterus notopterus*, *Mystus*

cavasius, *Oreochromis mossambicus*, etc. and omnivores includes *Clarias batracus*, *Cirrhinus mrigala* etc. In Kudligere tank almost all fishes recorded are useful as food fishes and *Salmostoma*, *Puntius* species are used for ornamental purpose.

The present study of fishfauna in Kudligere tank showed that most of the fish species recorded were widely distributed in the lotic water bodies of Western Ghats. In this study cyprinid fishes were dominant. Therefore, the present investigation indicates that cyprinid fishes are found to be the more dominant group than others which is supported by other studies also (Singh et al., 2006).

As far as biodiversity status (IUCN, 1994) is concerned, out of 18 species, one species is endangered (5.55 %), 07 species as lower risk-near threatened (38.89 %), vulnerable 02 species (11.11%), lower risk least concern is one (5.55 %) ,06 species included under the category of Not assessed (33.33%) and 01 species considered as Data deficient with 5.55% (Fig. 1).

Among the fish families Cyprinidae was most dominant constituting 44.44%

followed by Bagridae with 16.66%. While, Siluridae and Channidae constituting 11.11% each and rest of the families like Clariidae, Notopteridae and Cichlidae shows 5.56% each respectively (Figure 2). This indicates good correlation with overall species richness across the sites and could be utilized by the biodiversity conservation managers for prioritization of sites of conservation and habitat restoration (Bergerot et al. 2008).

The fish species recorded so far were all economically important and having high commercial importance. Kumar (1990) reported 51 fish species of 9 families in Govindsagar reservoir, Himachal Pradesh, out of which almost all were commercially important. The present fish study has also shown that most of fish species recorded were predatory in nature. Sukumaran and Das (2005) have also made the same observation and stated that majority of the reservoirs of Karnataka state have a large population of predatory fish species.

Conclusion

The study of fish diversity and analysis of the physico-chemical parameters of

Kudligere tank of Bhadravathi taluk, Karnataka revealed that most of the water quality parameters of this tank is under permissible limits. The current study revealed that the Kudligere tank contains economically important and cultivable fishes as well as some ornamental fishes. However, in modern days the water holding capacity in the tank is decreasing, which might affect the survival of fish species. In addition, human anthropogenic activity and agricultural run off might also influence the fish diversity in the water body. However, it is recommended to monitor the water regularly in this tank and appropriate control measures are required to conserve the fish diversity in the tank.

Acknowledgements

The Authors are grateful to Mr. Narayana Rao, Bhadravathi for support and help for the completion of this work.

References

1. APHA. American Public Health Association. 1998. Standard Methods for the Examination of Water and Wastewater. 20th edition. Amer. Publ. Health. Assoc., Amer.

- Water Works Assoc. and Water Poll. Contr. Fed., Washington, D.C.
2. Barman, R.P. 1998. Fish fauna of Tripura, (North East India). J. Bombay Nat. His. Soc., 91: 37-46.
3. Bergerot, B., E. Lasne, T. Vigneron & P. Laffaille. 2008. Prioritization of fish assemblages with a view to conservation and restoration on a large scale European basin, the Loire (France). *Biodiversity Conservation* 17(9):2247-2262.
4. Das, R. K. 1996. Monitoring of water quality, its importance in disease control. Paper presented in Nat. Workshop on fish and prawn disease, epizootics and quarantine adoption in India. October 9, 19996. CICFRI. Pp 51-55.
5. Datta Munshi, Srivastava M.P. 1988. Natural history of fishes and systematic of fresh water fishes of India. Narendra Publishing House, Delhi.
6. Debashish. K. 2005. Biodiversity in Northeast India with a note on their conservation. *Him. J. Env. Zool.*, 19(1):41-45.

7. IUCN. 1994. Red List of Threatened Animals. IUCN, Gland.46
8. Jayaram, K.C. 1999. The freshwater fishes of the Indian region. Narendra Publishing House, Delhi-06.
9. Kumar, K.1990. Management and development of Gobindasagar reservoir. A case study. Proc. Nat. Workshop reservoir fish. 13-20.
10. Mawhoob Noman Alkadasi, E. T. Puttaiah and A. Shahnawaz.2010. Fish fauna of Lakkavalli Lake, Karnataka with respect to environmental variables. Current Biotica 4(1):103-110.
11. Mahadevan, A. and Krishnaswamy, S. 1983. Chironomid population size as an index of pollution in the river Vaigai. Pollution res. 3(1):35-38.
12. Ramakrishnan, N., N.C. Ganesan and R Thevanathan, 2000. Distribution of planktonic algae in three different freshwater bodies of Tiruvannamalai District, Tamil Nadu, Nat. Symp. On Phycology in the New Millennium Org. in CAS, Uni. Of Madras, Chennai (March 1-3), pp 45.
13. Ramanjaneya and Ganesh C. B. 2016. Fish faunal diversity in Tungabhadra Reservoir, Hosapete, Ballari District, Karnataka. International Journal of Research in Fisheries and Aquaculture 6(2): 21-25.
14. Shahnawaz Ahmad, M. Venkateshwarlu, K. Honneshappa and Aabid Khaliq Tantray. Fish diversity of Sogane and Santhekadur tanks, Shimoga, Karnataka, India. Current Biotica 5(1): 46-55
15. Shahnawaz, A., Venkateshwarlu, M., Somashekar, D.S., Santosh, K., 2010. Fish diversity with relation to water quality of Bhadra River of Western Ghats (India). Environ Monitoring and Assessment. 161: 83-91.
16. Shahnawaz, A., Venkateshwarlu, M., 2009. A checklist of fishes from the Tunga and Bhadra rivers, Karnataka, India with a special note on their Biodiversity status. Current Biotica 3(2): 232-243.
17. Singh, S., Omprakash, M., S. Chari and Vardia, H. K. 2006. Diversity of fish fauna in catchment of Mahanadi River in Raipur District of

- Chhattishgarh. Environment & Ecology, 24 (1), 165-169.
18. Sukumaran, P.K. and A.K. Das. 2005. Limnology and fish production efficiencies of selected reservoirs of Karnataka. Indian J. Fish., 52(1): 47-53.
19. Talwar PK, Jhingran AG. (1991) Inland fishes of India and adjacent countries. Vol 1 & VII. Oxford & IBH Publ. Co. Pvt. Ltd; New Delhi.
20. Trivedi, R. K., Goal, P. K and C. L. Trishal, 1998. Practical methods in Ecology and Environmental Science. Enviro Media Publications, Karad, India.
21. Wagh, N. S. 1998. Hydro biological parameters of Hargal dam in relation to pollution. Ph.D thesis, Dr. B. A. M. U. Aurangabad.
22. Welch. P.S. 1948. Limnological methods. Mc Graw Hill, New York, USA.
23. WHO, 1984a. Guidelines for drinking water quality. Vol, I. Recommendations. WHO, Geneva.
24. WHO, 1984b. Guidelines for drinking water quality. Vol, II. Health criteria and other supporting information, WHO, Geneva.

Table 1 . Fish abundance and Biodiversity status in Kudligere tank, Bhadravathi Taluk,

Sl No	Scientific Name	Abundance	Biodiversity status (IUCN,1994)
	Order: Cypriniformes Family: Cyprinidae Subfamily: Cyprininae		
1	<i>Salmostoma untrahi</i> (Day)	A-2	NA
2	<i>Ctenopharyngodon idella</i>	A-1	DD
3	<i>Cirrhinus mrigala</i> (Ham)	A-2	LR-nt
4	<i>Labeo rohita</i> (Ham-Buch)	A-2	LR-nt
5	<i>Osteobrama cotio peninsularis</i> (Silas)	A-2	NA
6	<i>Puntius</i> sp.	A-(3-4)	LR-nt

7	<i>Cyprinus carpio cummunis</i> (Linnaeus)	A-2	LR-Ic
8	<i>Catla catla</i> (Ham-Buch)	A-2	VU
	Order: Siluriformes Family: Bagridae		
9	<i>Mystus cavasius</i> (Ham-Buch)	A-(3-4)	LR-nt
10	<i>Mystus armatus</i> (Ham-Buch)	A-2	NA
11	<i>Sperata seenghala</i>	A-(3-4)	NA
	Family: Siluridae		
12	<i>Ompok pabo</i> (Ham-Buch)	A-2	NA
13	<i>Ompok bimaculatus</i> (Bloch)	A-2	EN
	Family: Claridae		
14	<i>Clarias batrachus</i> (Linn)	A-2	VU
	Family: Chamidae		
15	<i>Channa marulius</i> (Ham-Buch)	A-2	LR-nt
16	<i>Channa punctatus</i>	A-2	LR-nt
	Order: Osteoglossiformes Family: Notopteridae		
17	<i>Notopterus notopterus</i> (Ham)	A-(3-4)	LR-nt
	Order: Perciformes Family: Cichlidae		
18	<i>Oreochromis mossambica</i> (Peters)	A-(3-4)	NA

LR-nt= Lower risk Near threatened; NA-Not assessed, VU- Vulnerable, EN- Endangered ;

DD- Data Deficient ; LR-ic- Lower risk least concern.

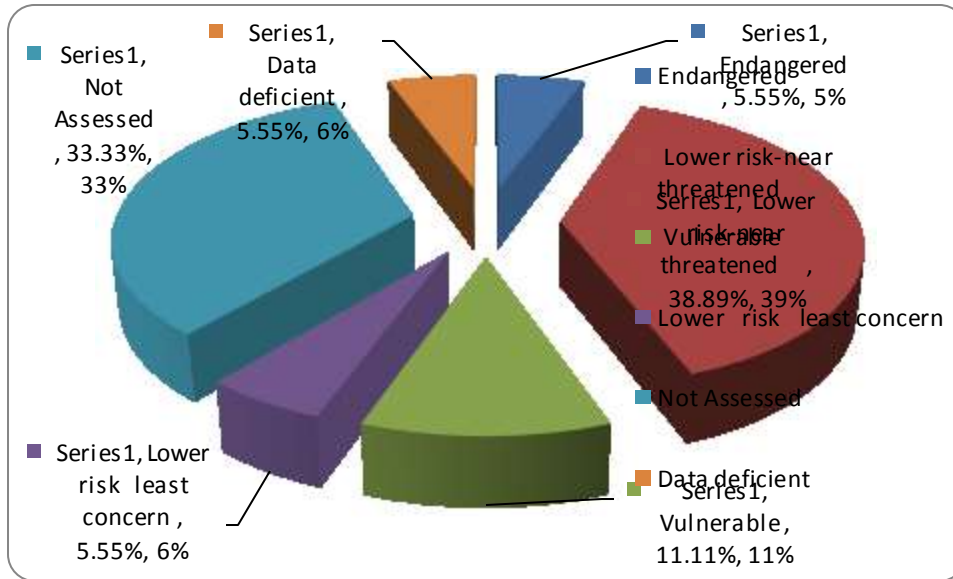


Figure 1 : Biodiversity status (IUCN 1994) of fishes in Kudligere tank, Karnataka

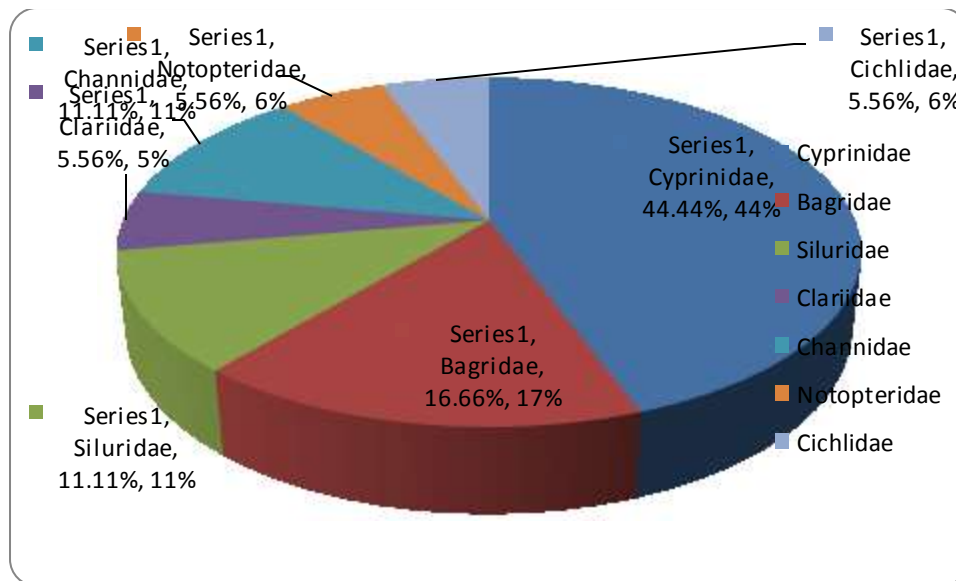


Figure 2 : Percentage occurrence of fish families of Kudligere Tank, Karnataka