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Fish diversity of Sogane and Santhekadur tanks, Shimoga, Karnataka

M. Venkateshwarlu, K. Honneshappa, A. Shahnawaz and N.V. Cinchana

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Abstract

The present investigation was undertaken to study the fish diversity of Sogane and Santhekadur tanks, Shimoga. About 17 fish species were identified in these tanks which were represented by 4 orders, 11 families and 14 genera. The family Cyprinidae dominated the other groups of fish in both the tanks. The study of fish fauna of an aquatic body is useful for planning of fisheries development. The water quality analysis of these tanks was analyzed to study its influence on fish.

Keywords:- *Fish diversity, Species, Protein, Economically, Karnataka*

Introduction

The nature has endowed with a wealth i.e., biodiversity and its environment, which is vital for the life to sustain on this earth. Biodiversity is the variety and variability of plants, animals and microorganisms in its environment. India is endowed with a vast expanse of open inland water. There are about 31,53,366 hectare reservoirs, 2,02, 213 hectare lakes, 2200, 000 hectare ponds, besides 29, 000 km length of rivers (Sugunan, 1999). 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).

Fishes exhibit enormous diversity in terms of their morphology, habitat and biology (Harmer, 1999). Fish can be used for ecological assessments at all levels of biological organization, assessment procedures are available at the levels of ecosystem, populations, individuals, organs and at the cellular and molecular levels (Harris, 1995). Besides to these credits, fishes are considered as one of the important protein rich food source among the aquatic fauna (Sukla and Upadhyay, 2000). In India, fish culture is practiced mostly in ponds/tanks because pond diversity is represented by a number of aquatic plants and animals including vegetation, plankton, weeds and various bottoms dwelling forms. Freshwater ponds and reservoirs comprise a vital component of the ecosystem in developing countries since they provide a high level of public interface. For the last two to three decades several investigators have studied the hydrobiological profiles of varied lentic bodies (ponds, reservoirs, lakes) with the intent to assess the water quality (Singh, 2000; Shastri and Pendse, 2001; Islam *et al*., 2001). Recently, Arunachalam *et al*. (1997); Venkateshwarlu *et al*. (2002 and 2005); Shahnawaz *et al*. (2008) reported fish diversity in some rivers of Karnataka. But as far as pond/tank fish diversity is concerned, little information is available. Venkateshwarlu *et al.,* 2003, reported biodiversity of fish fauna of Mudigodu tank and Venkateshwarlu *et al.,* 2007 reported diversity of fish fauna in Keladi pond, Karnataka. Therefore, it is the need of the hour to study the fish diversity in order to increase our national economy on scientific basis. Keeping the above in view, the present study has been undertaken.

Materials and Method

Santhekadur and Sogane tanks are situated at Latitude of 13° 52' N, Longitude 75° 45' E and Latitude of 13° 55' N, Longitude 75° 50' E in the Shimoga city at the distance of 6 and 10 km respectively. Field investigation was carried out for a period of one year from February 2007 to January 2008. Fishes were collected by using monofilament and multifilament gill nets of various mesh sizes ranging from 6-15 mm,

Author's Address
Deptt. of Applied Zoology, Kuvempu University, Shankarghatta, Shimoga, Karnataka ✉

dragnets, scoop nets and cast nets. Fishes were examined, counted and few specimens (5-10) which were preserved in buffered formalin (10%) and transported carefully to the laboratory for further analysis. Fishes were identified based on the keys for fishes of the Indian subcontinent (Jayaram, 1999; Talwar and Jhingran, 1991).

The water sampling was carried out during morning hours between 9.00 10.30to A.M. For physico-chemical analysis, water samples were collected in 1000 ml plastic bottles. The water temperature was recorded at the sampling site itself. Dissolved oxygen was fixed on the spot itself in BOD bottles. Various parameters like free CO_2, alkalinity, BOD, phosphate, nitrate, total hardness, Ca, Mg, TDS and Chloride were estimated as per the standard methods (APHA, 1995).

Results and Discussion

Fish fauna

A total of 17 species of fishes represented by 4 orders, 9 families and 14 genera were recorded in the Santhekadur and Sogane tanks (Table-1). Out of 17 fish species, 8 species belong to order Cypriniformes, 5 species to order Siluriformes, 3 species to order Perciformes and remaining 1 species to order Osteoglossiformes respectively. The family Cyprinidae dominated the other groups in the fish fauna in both the tanks. The results are in confirmatory with those of (Wakid and Biswas, 2005). The same observations were also made by Venkateshwarlu *et al*., 2007.

Table-1: List of fishes recorded from Santhekadur and Sogane Tanks

Order: Osteoglossiformes	
Family: Notopteridae	
1	*Notopterus notopterus* (Hamilton-Buchanan)
Order: Cypriniformes	
Family: Cyprinidae	
Subfamily: Cyprininae	
2	*Cyprinus carpio cummunis* (Linnaeus)
3	*Cirrhinus fulungee* (Sykes)
4	*Catla catla* (Hamilton-Buchanan)
5	*Labeo rohita* (Hamilton-Buchanan
6	*Cirrhinus reba* (Hamilton-Buchanan)
7	*Labeo calbasu* (Hamilton-Buchanan)
8	*Cirrhinus mrigala* (Hamilton)
9	*Puntius chola*
Order: Siluriformes	
Family: Bagridae	
10	*Mystus cavasius* (Hamilton-Buchanan)
Family: Siluridae	
11	*Ompok bimaculatus* (Bloch)
12	*Ompok pabo* (Hamilton-Buchanan)
Family: Claridae	
13	*Clarias batrachus* (Linn)
Family: Heteropneustidae	
14	*Heteropneustes fossilis* (Bloch)
Order: Perciformes	
Family: Cichlidae	
15	*Oreochromis mossambica* (Peters)
Family: Gobidae	
16	*Glossogibius guiris* (Hamilton-Buchanan)
Family: Mastacembelidae	
17	*Mastacembelus armatus* (Lecepede)

The four major species of carps were found like *Catla*, *Rohu*, *Mrigal* and *Cyprinus*. Based on the fish size, the collected fish species can be divided into large fish, medium fish and small sized fish. Inthe fish assemblage the large fishes are Cyprinus *carpio,* (2.00 kg and

Table-2: Fishes of Santhekadur and Sogane Tanks with vernacular name, occurrence, abundance biodiversity status and economic status

Species	Vernacular/ Local Name	Occurrence	Abundance	Biodiversity Status	Economic status
Notopterus notopterus (Hamilton-Buchanan)	Chappali	1 and 2	A (3-4)	LR-nt	Less
Cyprinus carpio cummunis (Linnaeus)	Gowri	1	A2	LR-Ic	High
Cirrhinus fulungee (Sykes)	Arja	1and 2	A (3-4)	LR-nt	High
Catla catla (Hamilton-Buchanan)	Catla	1and 2	A2	VU	High
Labeo calbasu (Hamilton-Buchanan)	Karae-kolasa	1and 2	A2	LR-nt	Less
Labeo rohita (Hamilton-Buchanan)	Rohu	2	A2	LR-nt	High
Ompok pabo (Hamilton-Buchanan)	Godalae	1and 2	A2	NA	Less
Cirrhinus reba (Hamilton-Buchanan)	Arja	1and 2	A (3-4)	VU	Less
Mystus cavasius (Hamilton-Buchanan)	Girlu	1and 2	A (3-4)	LR-nt	Less
Ompok bimaculatus (Bloch)	Godalae	1	A2	EN	High
Cirrhinus mrigala (Hamilton)	Mrigal	1and 2	A2	LR-nt	High
Clarias batracus (Linn)	Murugodu	1	A2	VU	Less
*Heteropneustes fossili*s (Bloch)	Chaelu	1and 2	A (3-4)	VU	Less
*Oreochromis mossambica** (Peters)	Jilebi	1and 2	A (3-4)	NA	High
Glossogibius guiris (Hamilton-Buchanan)	Bhangi-sidda	1and 2	A2	LR-nt	Less
Mastacembelus armatus (Lecepede)	Haavu-meenu	1and 2	A (3-4)	LR-nt	Less
Puntius chola (Hamilton-Buchanan)	Dodda-karsae	1and 2	A2	VU	Less

Note: 1= Santhekadur Tank, 2 = Sogane Tank; Abundance: A2-abundant, A (3-4) - Most abundant; EN= Endangered; LR- Ic=Lower risk least concern; LR- nt = Lower risk-near threatened; VU= Vulnerable; NA = not assessed; * Introduced species

above), *Labeo rohita, Catla catla, Cirrhinus mrigala* and *Clarias batracus.* In the medium category fishes include are (1 kg and below) *Cirhinus fulungee, Ompok bimaculatus, Cirhinus reba, Ompok pabo, Mystus cavasius, Notopterus notopterus, Glossogibius guiris, Labeo calbasu, Oreochromis mossambica* and *Mastacembelus armatus.* The small fish includes *Puntius chola* of size about 3-100 gm.

Fish species abundance and occurrence is shown in the Table-2. Out of 17 species recorded from both the tanks, 14 are indigenous and remaining 3 species are exotic including *Catla catla*, *Labeo rohita* and *Oreochromis mossambica*. Among the fish composition 8 species (*Notopterus notopterus, Cirhinus fulungee, Cirrhinus reba, Mystus cavasius, Heteropneustes fossili*s, *Oreochromis mossambica, Channa punctatus and Mastacembelus armatus)* were found to be the most abundant and rest of the species were abundant and rarely found in the water bodies. *Oreochromis mossambica* was found dominant in the fish catch in Santhekadur tank followed by *Catla catla* and *Labeo rohita* respectively. The Sogane tank is natural and constantly gets water from the Bhadra channel, where *Catla catla* and *Labeo rohita* percentage catch was less. In this tank *Mystus cavasius* was predominant followed by *Notopterus notopterus* respectively. The fish species recorded so far were all economically important and having high commercial importance.

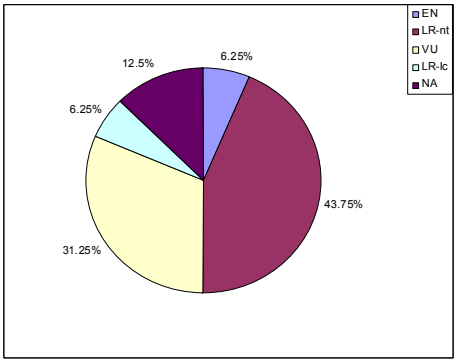

Fig. 1: Biodiversity status (IUCN) of fishes collected during present study

Note: EN= Endangered; LR- lc=Lower risk least concern; LR- nt = Lower risk-near threatened; VU= Vulnerable; NA = not assessed.

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.

Table-3: Vegetation communities abundance and distribution in the Santhekadur and Sogane tanks

Plant species	Santhekadur tank	Sogane tank
Lemna	+	+
Eichornia	-	+
Azolla	+	+
Pistia	+	+
Hydrilla	+	+
Chara	+	-
Nymphae	+	+
Typha	+	-
Ipomea aqqutica	+	-

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. As far as biodiversity status (IUCN, 1994) is concerned, out of 16 species, one species is endangered (6.25 %), eight species as lower risk-near threatened (43.75 %), vulnerable five species (31.25%), lower risk least concern is one (6.25 %) and remaining two (12.5 %) are included under the category of not assessed (Fig. 1).

Physico-chemical parameters

The physicochemical variables of both the water bodies showed positive correlation and were rich in organic substances, because of elevation in sedimentation amount, then directly promote the growth of macrophytic vegetation (Table-3). This resulted in reduction in water holding capacity and decrease depth of water in pond. Therefore, it is indicated that both the water bodies are suitable for fish culture. The physico-chemical properties of Santhekadur and Sogane tanks are summarized in

Table-4: Seasonal variation of Physico-chemical parameters of Santhekadur tank

Parameters	Pre-monsoon (Feb-May)	Monsoon (Jun-Sep)	Post-monsoon (Oct-Jan)
Air Temp(°C)	31.00	27.00	25.50
Water Temp. (°C)	28.50	25.00	24.50
pH	8.10	7.40	7.47
TDS (mg/l)	45.00	30.60	49.76
EC (µmho/s)	84.20	59.20	77.75
DO (mg/l)	8.10	9.21	8.20
BOD (mg/l)	2.41	2.00	2.35
CO_2 (mg/l)	4.80	3.40	2.90
Chloride (mg/l)	38.80	14.18	18.34
Calcium (mg/l)	14.10	12.28	6.69
Magnesium (mg/l)	5.92	0.96	3.33
T. Hardness (mg/l)	60.00	34.60	30.50
T. Alkalinity (mg/l)	28.50	30.00	31.20
T. Acidity (mg/l)	20.00	10.00	10.00
Phosphate (mg/l)	2.90	5.15	2.00
Nitrate (NO_3) (mg/l)	0.52	0.20	0.20
Sulphate (mg/l)	15.00	9.60	14.29

Table-5: Seasonal variation of Physico-chemical parameters of Sogane tank

Parameters	Pre-Monsoon (Feb-May)	Monsoon (Jun-Sep)	Post Monsoon (Oct-Jan)
AirTemp(°C)	31.00	30.00	27.00
Water Temp. (°C)	29.00	27.00	24.50
pH	7.30	6.47	7.20
TDS (mg/l)	72.00	60.00	69.46
EC (µmho/s)	140.00	90.20	67.72
DO (mg/l)	6.48	9.30	5.20
BOD (mg/l)	2.42	1.21	2.35
CO_2 (mg/l)	3.90	2.50	3.50
Chloride (mg/l)	14.76	28.36	8.14
Calcium (mg/l)	10.94	21.05	4.69
Magnesium (mg/l)	1.14	8.32	2.12
T. Hardness (mg/l)	32.00	80.00	20.10
T. Alkalinity (mg/l)	29.10	28.30	32.40
T. Acidity (mg/l)	5.10	5.20	5.02
Phosphate (mg/l)	2.10	4.50	2.80
Nitrate (NO_3) (mg/l)	0.35	0.20	0.25
Sulphate (mg/l)	10.20	14.00	11.50

Table-4 and 5. Ambient temperature and water temperature ranges from 24.50-31.00 respectively. Mean water temperature is observed to be lower than ambient temperature which is attributed to less heating of the ponds. The pH values (6.47-8.10) didn't show a definite seasonal surge and high value was recorded during February and low in September in both the ponds. This may be because of turbidity of water which in turn reduce photosynthetic activity of algae leading to accumulation of CO_2 and hence reduction of pH (Adibisi, 1980). Dissolved Oxygen (DO) indicates physical, chemical and biological activities in a water body. It is an important indicator of water quality. DO affect the solubility and availability of many nutrients and therefore productivity of aquatic ecosystems (Wetzel, 1983). In the present study, DO values were found to be more than 5.00 mg/l, which shows that both the wetlands are optimal for aquatic life. The low values of BOD indicate the low levels of biodegradable materials and absence of non-biodegradable substances. The chloride varied between 8.14-38.80 mg/l, which indicates that water appears to be suitable for irrigation purposes. A decrease trend in the chloride content in both the ponds during winter season may be related to the absence of dilution effect of water. Biologically important nutrient, Phosphate (PO_3^-) varied between 2.00-5.15 mg/l and showing its maximum range during rainy season indicating the influx of rain water containing fertilizers from the surrounding agricultural fields.Sulphate concentration of the ponds was found to be under permissible limits and variation in sulphate content in ponds might be due to variable organic input. Total hardness (mg/l $CaCO_3$) and total alkalinity were found to be low and ranged from 20.10 to 80.00 mg/l and 28.30 to 32.40 mg/l respectively and such water bodies can be considered as soft. Acidity variate from 5.02 to 20.00 mg/l and phosphate variate from 2.00 to 5.15 mg/l during the study of both the tanks. The concentration of NO_3^- fluctuate from 0.20 to 0.52 mg/l and variation in the contentration of SO_4^- observed was 9.60 to 15.00 mg/l.

References

Adibisi, A.A., 1980. The Physicochemical Hydrology of Tropical seasonal Uppar Ogun River. ***Hydrobiologia***, 79: 157-165.

APHA, 1995. *Standard Methods for the Examination of Water and Wastewater*. 19th ed. American Public Health Association, New York, 1143.

Arunachalam, M., Johnson, J.A. and Shankaranarayanan, A., 1997. Fish diversity in rivers of northern Karnataka Western Ghats. ***International Journal of Ecology and Environmental Science***, 23: 327-333.

Barman, R.P., 1998. Fish faun of Tripura, (North East India). ***J. Bombay Nat. His. Soc.***, 91: 37-46.

Debashish, K., 2005. Biodiveristiy in Northeast India with a note on their conservation. ***Him. J. Env. Zool.***, 19(1): 41-45.

Harmer, S.F., 1999. *Classification of fishes*. Discovery Publ. House, New Delhi, India.

Harris, J.H., 1995. The use of fish in ecological assessments. ***Aus. J. Ecol.***, 20: 65-80.

Islam, A.M., Choudry, A.N. and Zaman, M., 2001. Limnology of Fish Ponds in Rajshahi, Bangladesh. ***Ecol. Envir. Conserve***, 7**:** 1-7.

IUCN., 1994. Red List of Threatened Animals**.** *IUCN*, Gland.

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

Kumar, K., 1990. Management and development of Gobindasagar reservior. A case study. ***Proc. Nat. Workshop reservoir fish.***, 13-20.

Shahnawaz, A., Venkateshwarlu, M., Somashekar, D.S. and Santosh, K., 2008. Fish diversity with relation to water quality of Bhadra River of Western Ghats (INDIA). ***Environ Monit Assess.***, (DOI 10.1007/s10661-008-0729-0).

Shastri, Y. and Pendse, D.C., 2001. Hydrobiological study of Dehikhuta reservoir. ***J. Environ. Biol.***, 22**:** 67-70.

Singh, D.N., 2000. Seasonal variation of zooplankton in a tropical lake. ***Geobios***, 27: 100.

Sukla, A.N. and Upadhyay, 2000. *Economic Zoology*. Rastogi Publication, Meerut. pp: 199.

Sukumaran, P.K. and Das, A.K., 2005. Limnology and fish production efficiencies of selected reservoirs of Karnataka. ***Indian J. Fish.***, 52(1): 47-53.

Sugunan, V.V., 1999. Review. *Fishing Chimes*, 19: 7-10.

Talwar, P.K. and Jhingran, A., 1991. *Inland fishes of India and adjacent countries*. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2(19): 1158.

Venkateshwarlu, M., Jothi, Srigowri and Asha Shree, H.M., 2007. Proceedings on "*Diversity and Life processes from Ocean and Land"*. Goa University. Goa. pp: 156-159.

Venkateshwarlu, M.M. Shanmugam and Chinchana, N.V., 2003. Biodiversity of fish fauna of Mudogodu Tank, Rangenahalli. ***Ecol. Env***, 21(1):161-164.

Venkateshwarlu, M., Shanmugham, M. and Mallikarjun, H.R., 2002. The fish of Bhadra reservoir Western Ghats. ***J. Aquatic Biol.***, 17(1): 9-11.

Venkateshwarlu, M., Somashekar, D.S., Jothi Srigowri and Asha Shree, H.M., 2005. Proceedings of State Level Seminar on, *Biodiversity and Conservation*, Haveri, Karnataka, 22-25.

Wakid, A. and Biswas, S.P., 2005. Status and diversity of fish fauna in Dibru-saikhowa National park, Assam. ***J. Bom. Nat. Hist. Soc.***, 102 (1), 50-55.

Wetzel, R.G., 1983. *Limnology*. 2nd edition. Saunders Coll. Publ. pp: 767.