



ABUNDANCE AND BIODIVERSITY STATUS OF FISHES IN AYYANAKERE LAKE, CHIKMAGALORE DISTRICT, KARNATAKA

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Abstract:

*The present study deals with diversity and abundance of fish species in Ayyanakere lake, Chikmagalore district, Karnataka during April 2008 to March 2009. A total of 13 species recorded from Ayyanakere lake, of which 10 are indigenous and remaining 3 species are exotic including *Catla catla*, *Labeo rohita* and *Oreochromis mossambica*. Among the 13 species 3 species are cultured in the water body. Out of 10 wild fish species found in the lake 7 species are most abundant species, they are *Notopterus notopterus*, *Mystus cavacius*, *Oreochromis reba*, *Puntius conchoni* and *Puntius jerdoni*. Rest of the species were less abundant and rarely found. Among orders, 6 species belongs to Cypriniformes, 4 species belongs to the Siluriformes, 2 species belongs to perciformes and one belongs to Osteoglossiformes. The family Cyprinidae dominated the other groups in the fish fauna in the lake. As far as biodiversity status (IUCN) is concerned, one species endangered (7.7%), four species of low risk near threatened (30.76%), one species at lower risk least concerned (7.7%), 5 species of vulnerable (38.46%) and remaining two are included under the category of not assessed (15.38%).*

Key Words: Ayyanakere Lake, Fish Fauna, Abundance, Biodiversity Status & Water Quality

Introduction:

Fish and other organisms with aquacultural potential live in water, thus, it is no surprise that professional fish culturists state that "Water quality determines to a great extent the success or failure of a fish cultural operation" (Piper *et al.*, 1982). Because water is an essential requirement for fish farming, any properly prepared business plan for aquaculture must describe the quality and quantity of water available for the proposed enterprise. An experienced aquaculturist can judge whether the water is suitable for the proposed enterprise or not. Fishes are important as they indicate the ecological processes and the producer consumer interactions. In addition to above feature, fishes are valuable resources for mankind in several ways like: Fish is a rich source of protein, fats, minerals, vitamins and with a high percentage of water. Fishes are preferred in our diet due to their high nutritional values (Ashutosh Kumar, 2006).

The development of fish culture could give quite larger share of human food in many parts of the world, where high grade protein is in short supply. Sport fishery is an important recreation for about 10% or more of the population in many developed countries and also contributes to food and the tourist industry. Due to irrational fishing practices, environmental aberrations like reduction in water volume, increased sedimentation, water abstraction and pollution over the years. This diversity is on a decline and few species have been lost from the freshwater ecosystem of India and some are belonging under endemic, endangered and threatened category (Bhakta and Bandyopadhyay, 2008).

Fishes are large in diversity and constitute approximately half of all the described vertebrates (24,618 species out of the total of 48,170) and comprise of 482 families with living species (Maitland, 1995). Over 10,000 fish species live in freshwater, which are approximately 40% of global fish diversity and one quarter of global vertebrate diversity (Lundberg *et al.*, 2000). Approximately 100 new fish species as described each year (Matiland, 1995) and about 1% of fishes, which are described from synonymy each year (Stiassny, 1999). This trend of describing new fish species are going on (Lundberg *et al.*, 2000). There are scientific reports which states that at least 5,000 fish species await discovery (Jenkins, 2005). Therefore, the present study is an attempt to know the ecology and fish diversity in Ayyanakere lake of Chikmagalur district in Karnataka.

Materials and Methods:

Study Area:

Ayyanakere is an Anicut Lake (Figure 1) constructed by Rukumanda Raya, chief of Sakharayapatna and renovated later in 1156 A.D. during the Hoysalas period. The large lake situated at the eastern base of Dattapeetha (Baba Budan) range, 18 kms northeast of Chikmagalur town provides irrigation facilities to more than 1574 hectares of registered land on a hillock adjacent to the lake. Ayyanakere area possess evergreen to deciduous forest type. It is one of the most coffee and tea growing regions in India. The climate of the region is cool and dominated by many hillocks. The water body is completely surrounded by the small to larger hillocks with perennial streams.

Figure 2 shows the location of the study area. The geographical location of this lake is 13°41'42" north latitude and 75°04'46" eastern longitude. This lake constructed to the upper Veda River. The water from this lake along with some other small tributaries forms river Veda and joins the river Avathi at Yagatipura to form Vedavathi. The Vedavathi joins to Krishna River which ultimately joins Bay of Bengal.

Many hillocks surrounded to the lake which forms the natural reservoirs. It is a shallow lake has an area of 15 sq. kms. The catchment area of 116.59 sq. kms water spread area 118.54 ha. The bund forms from the natural hills and stones with length of 450 m and height 4.80 m. The bund front slope is 1.5:1, the rear slope 2:1 and the top width of 4 m. The maximum depth of the lake is 30 m and an average depth is 20 m.

Methods:

Water Quality Parameters:

The sampling was carried out during morning between 8.00 Am to 9.00 Am. For physico-chemical analysis samples were collected weekly during April 2008 to March 2009. Water samples were collected in 2 litre capacity plastic cans. The water and air temperature were recorded at the sampling site itself by mercury thermometer. Dissolved oxygen was fixed on the spot itself in BOD bottles. The parameters like free CO₂, alkalinity, total hardness, total dissolved solids, Calcium, phosphates and chlorides were estimated as per the standard methods of APHA (1995) in our laboratory (Trivedy and Goel, 1986).

Fish Sampling:

Field investigation was carried out for a period of one year from April 2008 to March 2009. Fishes were collected by using gill nets, dragnets, scoop nets and cast nets of various mesh sizes ranging from 6-15 mm. Fishes were examined, counted and then were released back in to the system after taking 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 keys for fishes of the Indian

subcontinent (Jayaram, 1999; Talwar and Jhingran, 1991). The identification of the fishes is made on the following characters.

Results and Discussion:

Water Quality:

Seasonal variations in the physico-chemical parameters of the water in Ayyanakere Lake have been analyzed and depicted in Table 1.

Fish Diversity:

In Ayyanakere, the totals of 13 species of fishes were reported. Among these, 10 species are wild and 3 species are introduced for the commercial production. They are *Catla catla*, *Labeo rohita* and *Cyprinus carpio* (Table 2).

Among 13 species, 6 species belongs to the order Cypriniformes, 4 species belongs to the order Siluriformes, 2 species belongs to perciformes and one belongs to Osteoglossiformes. The family Cyprinidae dominated the other groups in the fish fauna in the lake. The results are in confirmatory with those of Wakid and Biswas (2005). The same observations were also made by Venkateshwaralu *et al.* (2007). Based on the fish size, the collected fishes are divided into large fish, medium fish and small fish. In the fish assemblage, the large fishes are (2 kg and above) *Cyprinus carpio*, *Labeo rohita*, *Catla catla*, *Oreochromis mossambica* and *Mastacembelus armatus*.

In the medium fishes (1 kg and below) *Mystus cavasius*, *Ompok pabo*, *Ompok bimaculatus*, *Clarias batracus*, *Notopterus notopterus*, *Puntius conchorius* and *Puntius jerdoni*.

Out of 13 species recorded from Ayyanakere, 10 are indigenous and remaining 3 species are exotic including *Catla catla*, *Labeo rohita* and *Oreochromis mossambica*. Among the 13 species 3 species are cultured in the tank. Out of 10 wild fish species found in the tank 7 species are most abundant species, they are *Notopterus notopterus*, *Mystus cavacius*, *Oreochromis reba*, *Puntius conchoniuis* and *Puntius jerdoni*. Rest of the species were less abundant and rarely found in the waterbodies. The abundance of the fish in per cent per catch is summarized in the Table 4 and Fig. 3. Rest of the cultured species *Oreochromis mossambica* was found dominant followed by *Ompok bimaculatus* and *Ompak pabo* respectively.

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 fishes were commercially important. The present study has also shown that most of the 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. Shahnawaz Ahmad *et al.* (2011) studied the fish diversity of Sogane and Santhekadur tanks, Shimoga and they identified about 17 fish species which were represented by 4 orders, 11 families and 14 genera. The family Cyprinidae dominated the other groups of fish in both the tanks.

As far as biodiversity status (IUCN) is concerned, out of 13 species, one species endangered (7.7%), four species of low risk near threatened (30.76%), one species at lower risk least concerned (7.7%), 5 species of vulnerable (38.46%) and remaining two are included under the category of not assessed (15.38%) (Table 3).

Conclusion:

Present fish diversity study in this lake shows it has 10 wild species along with three culturing species. Among 10 fish species *Oreochromis mosombica* shows dominant. It is fast breeding fish. *Ompok bimaculatus* and *Ompok pabo* are goes to the next place after *Oreochromis mosombica*. In this lake we find one endangered species

along with abundant, less abundant lower risk but least concerned, lower risk but not threatened and vulnerable species. Environmental factors are important for the commercial fish farming. Physico-chemical properties such as water temperature, pH, dissolved gases, total alkalinity, total hardness and total dissolved solids, concentration of these in water is important for the aquatic life. In present study areas the three fish species are culturing for commercial purposes they are *Cyprinus carpio*, *Catla catla* and *Labeo rohita*. During the study period, the observed values of physico-chemical parameters of Ayyanakere comes within the standard values required for the fish culture.

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Figure 1: Views of Ayyanakere Lake



Figure 2: Location of Ayyanakere lake (Source: www.mapsofindia.com)

Table 1: Physico-chemical parameters studies in Ayyanakare during study period 2008-2009

Parameters	Pre-Monsoon	Monsoon	Post-Monsoon
Air temp.	32	27	22
Water temp.	29.5	25	21
pH	7.5	7	7.2
DO	6.4	12.2	9.75
Free CO ₂	6.83	5.06	7.05
Total hardness	92	96	108
Calcium	16.03	19.63	18.83
Magnesium	12.67	13.20	15.10
TDS	100.31	127.13	134.70
Chlorides	24	23.90	28.4
Total alkalinity	63.18	50.65	66.25
Phosphates	0.45	0.28	0.59

All the parameters are in mg/l except air and water temperature (°C), pH

Table 2: List of fishes recorded from Ayyanakere during the present study

Order: Osteoglossiformes	
Family: Notopteridae	
1	<i>Notopterus notopterus</i> (Hamilton-Buchanan)
Order: Siluriformes	
Family: Bagridae	
2	<i>Mystus cavasius</i> (Hamilton-Buchanan)
Family: Siluridae	
3	<i>Ompok bimaculatus</i> (Bloch)
4	<i>Ompok pabo</i> (Hamilton-Buchanan)
Family: Claridae	
5	<i>Clarias batracus</i> (Linn)
Order: Perciformes	
Family: Cichlidae	
6	<i>Oreochromis mossambica</i> (Peters)
Family: Mastacembelidae	
7	<i>Mastacembelus armatus</i> (Lecepede)
Order: Cypriniformes	
Family: Cyprinidae	
Subfamily: Cyprininae	
8	<i>Cirrhinus reba</i> (Hamilton-Buchanan)
9	<i>Puntius conchonus</i> (Hamilton-Buchanan)
10	<i>P. jerdoni</i> (Day)
Cultured fish species	
11	<i>Cyprinus carpio</i> (Linnaeus)
12	<i>Catla catla</i> (Hamilton-Buchanan)
13	<i>Labeo rohita</i> (Hamilton-Buchanan)

Table 3: Fishes of Ayyanakere with vernacular name, abundance and biodiversity status

S. No.	Species	Vernacular Name	Abundance	Biodiversity Status	Economic Status
1	<i>Notopterus notopteus</i>	Chappalimeenu	A (3-4)	LR-nt	Less
2	<i>Mystus cavacius</i>	Girlu menu	A (3-4)	LR-nt	Less
3	<i>Ompok pabo</i> (Hamilton-Buchanan)	Godalae	A2	NA	Less
4	<i>Ompok bimaculatus</i>	Godalae	A2	EN	High
5	<i>Oreochromis mossambica</i>	Jilebi	A (3-4)	NA	High
6	<i>Mastacembalus armatus</i>	Haavumeenu	A (3-4)	LR-nt	Less
7	<i>Clariouus batrachus</i>	Murugodu	A2	VU	Less

8	<i>Cirrhinus reba</i>	Arja	A (3-4)	VU	Less
9	<i>Puntius conchoni</i> (Hamilton-Buchanan)	Dhodakarsa	A (3-4)	VU	Less
10	<i>Puntius jerdoni</i> (Day)	Saymeen	A (3-4)	VU	Less
11	<i>Catla catla</i> *	Catla	A2	VU	High
12	<i>Labeo rohita</i> *	Rohu	A2	LR-nt	High
13	<i>Cyprinus carpio</i> *	Gowri	A2	LR-lc	High

Abundance: A2= Abundant; A(3-4) = Most abundant; EN = Endangered; LR-lc = Lower risk least concerned; LR-nt = Lower risk near threatened; NA = Not Assessed; * Culturing species in the tank.

Table 4: Abundance of fish species observed and collected from Ayyanakere during the period 2008-09

S. No	Name of the Species	Nos. Collected	Percentage
1	<i>Notopteus notopteus</i>	6	7.23
2	<i>Mystus cavacius</i>	8	9.64
3	<i>Ompok pabo</i> (Hamilton-Buchanan)	12	14.46
4	<i>Ompok bimaculatus</i>	15	18.07
5	<i>Oreochromis mossambica</i>	20	24.10
6	<i>Mastacembalus armatus</i>	5	6.02
7	<i>Clarias batrachus</i>	8	9.64
8	<i>Cirrhinus reba</i>	2	2.41
9	<i>Puntius conchoni</i> (Hamilton-Buchanan)	3	3.61
10	<i>Puntius jerdoni</i> (Day)	4	4.82
	Total	83	100.00

Note: Along with these wild species, the culturing fishes were found they are *Catla catla*, *Labeo rohita* and *Cyprinus carpio*.

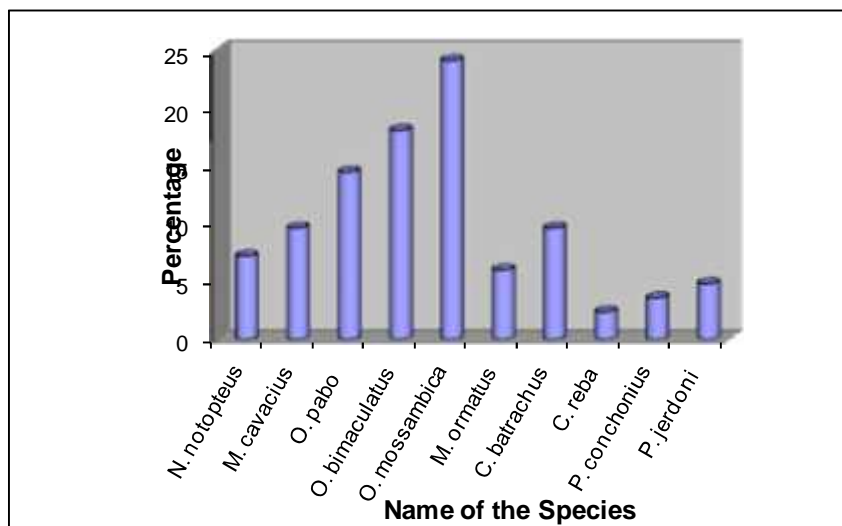


Figure 3: Composition of fish per catch in Ayyanakere Lake