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Ecology and Ichthyofaunal Diversity of Mydala Lake of Tumakuru, Karnataka state, India

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Abstract
The Mydala lake is situated 20km from centre of Tumakuru city towards north east. It lies at 13°18'46"N latitude and 77°11'37"E longitude and water spread area is 370 hectares. The average depth of lake is 3.0 to 4.4 meters along the bund. This lake is rain fed during monsoon period and comparatively larger with limited catchments. The total catchment area of the lake is 62.96sq.km and height is about 13 to 14.8m, average rain fall is 640.27mm and soil in the catchment area is black clay/loamy. At present in the lake fish productivity is considerably low. Not much report is available on this lake. Hence, present study was carried out to assess the fish diversity status in relation to major hydrological parameters. Fish samples were collected along with water samples from five selected sampling stations of this lake during May 2016 to May 2017. The present study recorded 15 different fish species and among these *Oreochromis nilotica, Oreochromis mossambica, Ctenopharyngodom idella* are the major contributory species and family *Cyprinidae* is the most dominant group. Water temperature and rainfall were found as major influential factors for species distribution.

Keywords: fish diversity, habitat, ecology, environment, mydala lake

1. Introduction
Rivers and lakes are important sources of water in any region. Water is an essential component of an eco-system and it sustains life on earth. Availability of water has been a factor in the development of various civilisations near lakes and rivers. The structure of fish communities in continental aquatic ecosystems, especially in man-made reservoirs, can be affected by several biotic and abiotic ecological factors. Among them, lake has the greatest impact. Lake Ecosystem depends upon different factors like distribution pattern, composition of fish communities and environmental factors. This is evidenced by the abundance in the ichthyofaunal diversity when a formerly lentic environment (lake) compared to lotic zone (Edmir Daniel Carvalho, 1998) [5]. In the management of reservoirs, knowledge of the environment and the concept of ecotone should be considered (Tundisi, 1993) [11].

The exploitation of the aquatic resources either for social, economical or nutritive purposes is called fisheries. This includes the capture fisheries and culture fisheries as well. The fish populations is about half of the total number of vertebrates in the world, total 21,730 species of fishes have been recorded in the world among only 11.7% are found in Indian water (Murugan, A.S., 2012) [1]. In Indian aquatic media, 2500 fish species are available and among these freshwater bodies contain only 930 species (Jayaram, 2000) [7] and marine water bodies have 1570 species (Kar, 2003). In Indian lakes, the fish yield levels may not exceed 0.2% of gross production and energy fixation rate range from 0.0 to 0.68% from available light energy. Fresh water fishes are very much useful for the assessment of water quality as bioindicators, river network connectivity or flow regime (Chovane *et al.*, 2003) [3]. Hence, the present investigation was undertaken to study the ichthyofaunal diversity in Mydala Lake, as there is no such scientific record of ichthyofaunal diversity in Tumakuru lakes. The outcome of this work would provide future strategies for the development of conservative fish species in lentic ecosystem.

2. Materials and Methods
2.1 Study Area
The Mydala lake of Tumakuru district, Karnataka, India, is water body located 20km from centre of Tumakuru city towards north east. It lies at 13°18'46"N latitude and 77°11'37"E longitude (Fig. 1 and Table 1) and water spread area is 370 hectares. The average depth of the lake is 3.0 to 4.4 meters along the bund. The lake is rain fed during monsoon period and this water is mainly used for drinking purpose and cultivation of paddy crops in and around the lake area. Besides, washing activity is commonly seen and many aquatic weeds are present. The total catchment area of the Mydala lake is 62.96sq.km and height is about 13 to 14.8m with an average rain fall 640.27mm, temperature about 24ºC to 26ºC and soil in the catchment area is black clay/loamy. Mydala Lake is considered as largest lake of fisheries resource in Tumakuru in terms of potential area of fish production.

Table 1: Morphometric features of Mydala Lake, Tumakuru, Karnataka, India.

SL. No	Attribute	Value
1	Location of the Reservoir	13°18'46"N and 77°11'37"E At Mydala village
2	Nearest city	Tumakuru
3	District	Tumakuru
4	State	Karnataka
5	Size	Large sized lake in Tumakuru
6	Purpose	Irrigation and Drinking
7	Year of completion	1906
8	Total Catchment area (Sq.Km)	62.96sq.km
9	Total Water Spread Area (WSA) (Ha)	370 hectares
10	Water source	Monsoon run-off
11	Average Rain fall (mm)	640.27mm
12	Temperature of Water (°C)	24°C to 26°C
13	Soil type	black clay/loamy

2.2 Methodology

Water samples were collected from five selected sites in the months of May 2016 to May-2017. The sampling was usually carried out at 8:00 am to 11:00 am. The water samples were collected directly from the surface layer in plastic canes to avoid the unpredictable changes. The physicochemical analysis of samples was done according to the procedure prescribed by APHA (1998) [4] and Adoni (1985) [2].

The fishes were collected mainly by using gill nets of different mesh sizes which varied from 10 to 100 mm with the assistance of local fishermen. Immediately photographs were taken prior to preservation for the identification of fishes. The collected specimens were preserved in 4-6% formalin according to their size. Plastic jars were used to collect and preserve the fishes. Smaller fishes were directly placed in the formalin solution, while larger fishes were injected formalin on the abdomen before they were fixed. The fishes collected and fixed were labeled by giving serial numbers, exact locality from where collected and the date of the collection. The common local name of fish used in this region was labeled in each jar of the fish. The fishes were identified in laboratory with exports using taxonomic keys of Jayaram (1981) [6], Jhingran (1991) [8] and Qureshi and Qureshi (1983) [10].

Fig 1: Map of Mydala Village and Mydala Lake

3. Results and Discussion

During the present study a total of 15 species of freshwater fishes belonging to 6 families and 13 genera were recorded from the selected study sites of Mydala Lake (Fig. 4 and Table 2). On the basis of percentage composition and species richness, order *Cypriniformes* was dominant (10 species/ 66.66%) followed by *Perciformes* (3 species/20%), *Siluriformes* (2 species/13.33%) respectively (Table 2, Fig 2).

Table 2: Ichthyofaunal diversity of Mydala Lake, Tumakuru.

SL.No	Species	common Name	Order	Family
1	*Catla catla* (Hamilton,1822)	Cotla	*Cypriniformes*	*Cyprinidae*
2	*Labeo rohita* (Hamilton 1822)	Rohu	*Cypriniformes*	*Cyprinidae*
3	*Cirrhinus mrigala* (Hamilton,1822)	Mrigala	*Cypriniformes*	*Cyprinidae*
4	*Labeo fimbriatus* (Bloch 1795)	Fimbriatus	*Cypriniformes*	*Cyprinidae*
5	*Cyprinus carpio* (Linnaeus, 1758)	Common carp	*Cypriniformes*	*Cyprinidae*
6	*Hypophthalmichthys molitrix* (Valenciennes, 1844)	Silver carp	*Cypriniformes*	*Cyprinidae*
7	*Rasbora daniconius* (F. Hamilton, 1822)	Rasbora	*Cypriniformes*	*Cyprinidae*
8	*Puntius chola* (Hamilton,1822)	Sawmpy barb	*Cypriniformes*	*Cyprinidae*
9	*Ctenopharyngodon idellus* (Valenciennes,1844)	Grass carp	*Cypriniformes*	*Cyprinidae*
10	*Schistura denisoni* (F. Day, 1867)	Loach	*Cypriniformes*	*Nemacheilidae*
11	*Oreochromis nilotica* (Linnaeus,1758)	Nile tilapia	*Perciformes*	*Cichlidae*
12	*Oreochromis mossambica* (Peters,1852)	Tilapia	*Perciformes*	*Cichlidae*
13	*Channa orientalis* (Bloch & J. G. Schneider, 1801)	Asiatic snake head	*Perciformes*	*Channidae*
14	*Heteropneustes fossilis* (Bloch,1794)	Singhi	*Siluriformes*	*Heteropneustidae*
15	*Ompok bimaculatus* (Bloch, 1794)	Butter fish	*Siluriformes*	*Siluridae*

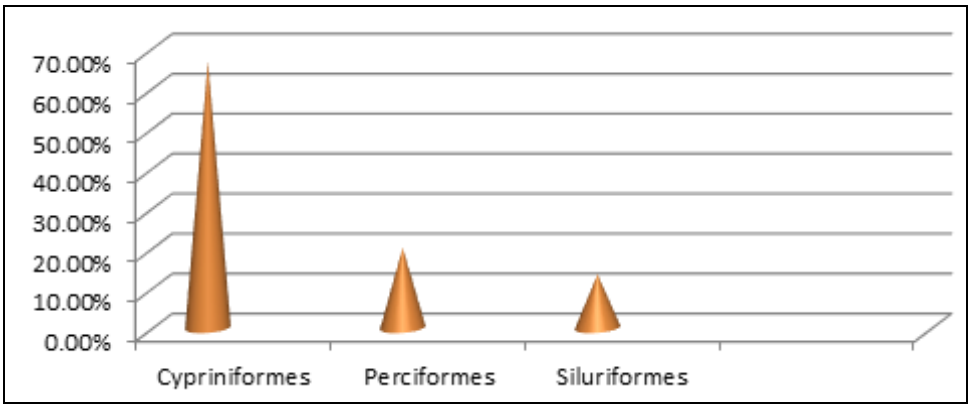

Fig 2: Order – wise fish species composition and dominance in Mydala Lake.

The ichthyofaunal diversity of Mydala Lake comprises of 6 families namely *Cyprinidae*, *Nemacheilidae*, *Cichlidae*, *Channidae*, *Heteropneustidae*, *Siluridae* (Table 2. & Fig 3).

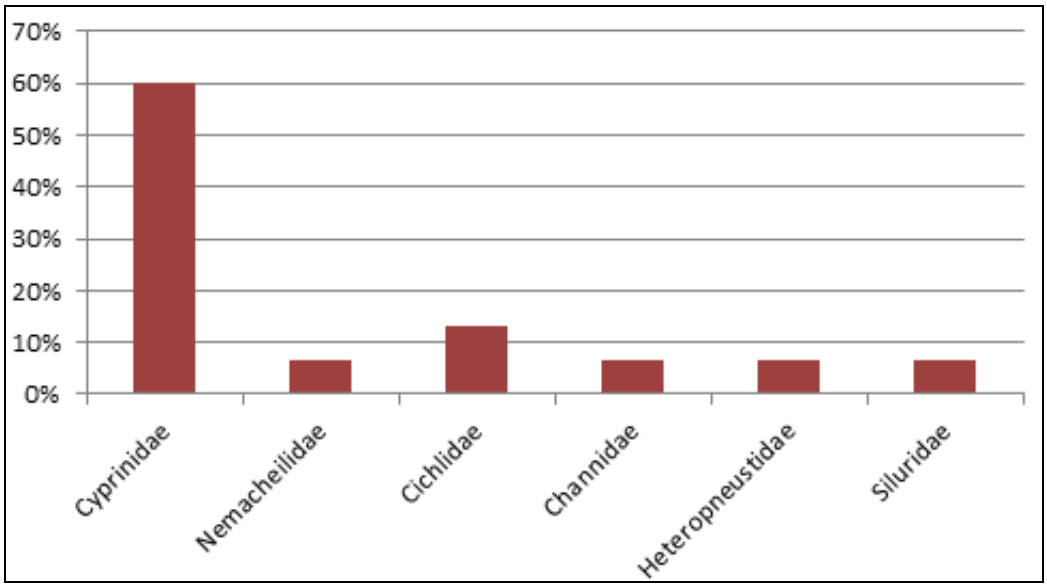

Fig 3: Family-wise fish species dominance in Mydala Lake.

Catla catla

Labeo rohita

Cirrhinus mrigala

Labeo fimbriatus

Ciprinus carpio

Hypophthalmichthys molitrix

Rasbora daniconius

Puntius chola

Ctenopharyngodon idellus

Schistura denisoni

Oreochromis nilotica *Oreochromis mossambica*

Channa orientalis *Heteropneustes fossilis*

Ompok bimaculatus

Fig 4: Showing Fish diversity of Mydala Lake, Tumakuru.

Cyprinidae is the largest, most dominating and is represented by 09 species, *Catla catla, Labeo rohita, Cirrhinus mrigala, Labeo fimbriatus, Cyprinus carpio, Hypophthalmichthys molitrix, Rasbora daniconius, Ctenopharyngodon idellus, Puntius chola*. Among these Cyprinids, *Catla catla, Labeo rohita* and *Ctenopharyngodon idellus* were abundant. The family *Cichlidae* is represented by 2 species, *Oreochromis nilotica, Oreochromis mossambica*, and these two species have more abundance as compared to other families and heavy competitor for most of Indian major carps. The present study has shown that these two species constitute about 60-65% in every catches. This may be due to its prolific feeding and breeding behaviour. *Oreochromis mossambica*, which was given the near threatened (NT) status by the IUCN (1994). The family *Nemacheilidae, Channidae, Heteropneustidae, Siluridae* was represented by single species in each family i.e., *Schistura denisoni, Channa orientalis, Heteropneustes fossilis, Ompok bimaculatus* respectively. Thus, the Mydala Lake has good potential for fish fauna and significance with respect to its fish diversity. Therefore, it is need of the hour to monitor and sustain such freshwater lentic resources for future generations.

4. Conclusion

The fish community in lake includes the native and alien species, introduced for the purpose of fish production. The present study is the first ever documentation of ichthyofaunal and ecology in the Mydala Lake of Tumakuru, Karnataka. Invasive species like Tilapia are becoming a threat to the native Indian major carps and this must be checked out. Over exploitation must be prevented by following a fishing holiday of about three months during the breeding season from July to September in order to allow the proper growth of fishes and Mesh regulation in fishing is also an important factor which should be also properly ensured. Therefore sustainable fish production by taking appropriate steps for sustaining diversity is necessary to conserve these resources.

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