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Fish diversity in Durgadahalli Lake of Tumakuru, Karnataka, India

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Abstract
The fish diversity is a good indicator of health of aquatic ecosystem and represents the balanced ecosystem. The present study was conducted for a period of one year from January 2017 to December 2017 in Durgadahalli Lake which is located in the north-east of Tumakuru district, at a distance of 15 km from Tumakuru city of Karnataka. It lies at 13° 13' 56" N latitude and 77° 25' 30" E longitude. It receives water mainly from rain fall at an average of 620 mm and by Jayamangalli river. In recent years due to varied ecological conditions and impacts of human activity have increased variations in aquatic ecosystem. Hence, the present report on fish diversity is of its first kind in Durgadahalli lake. A total of 10 species of fishes belonging to 09 genera, 03 families and 02 orders were recorded from the lake. The order Cypriniformes (80%) was found to be dominant followed by Perciformes (20%) among fish assemblage. All the fish species recorded were of commercial importance.

Keywords: fish diversity, cypriniformes, perciformes, Durgadahalli Lake

1. Introduction
Fishes are cold-blooded animals allowing their body temperature to vary with external temperature change. The freshwater fish biodiversity has seen a constant decline in recent years due to the destruction of habitat on account of various threats and anthropogenic factors. The fish population in the world is about half of the total number of vertebrates and about 21,730 species of fishes have been recorded in the world in which only 11.7% are found in Indian water bodies (Murugan, 2012) [10]. Fisheries is directly associated with the economy of the country and provide alternate resource of food for the growing population and also play an important role in health and commercial values in many countries of the world (Indira Devi, *et.al.*, 2014) [2]. Hence, biodiversity is essential for stabilization of ecosystem protection and environmental quality for understanding intrinsic worth of all species on the earth. Fishes are the keystone species which are good indicators of the water quality and the health of the ecosystem (Moyle & Leidy, 1992) [6]. Fishes are valuable sources of high grade protein and they occupy a significant position in the socio-economic sector by providing the population not only the nutritious food but also income and employment opportunities. In addition to this, they are ecologically important as they form the basic link in food chain of all aquatic animals (Mishra, 1962) [5]. Hence**,** the present study was undertaken with the aim to study the fish diversity in Durgadahalli lake. This study would definitely be a basic and helpful research data in order to sustain the fishery resources of this lake.

2. Materials and Methods
2.1. Study Area: The Durgadahalli Lake (Fig 1) is located in the north-east of Tumakuru taluk, at a distance of 15 km from Tumakuru city of Karnataka. The district geographical area covers about 4% of the forest. The lake lies at 13° 13' 56" N latitude, 77° 25' 30" E longitude and water spread area is about 15.60 hectares and average depth of lake is 1.8 to 2.0 meters along the bund. It receives water mainly from rain fall and by Jayamangalli river. The water is mainly used for cultivation in and around the lake area. The total catchment area of the Durgadahalli lake is 17.25 sq. km and height is about 10.4 to 10.6 m with an average rain fall 620 mm as well as soil texture in the catchment area is sand/gravel type (Table 1).

Fig 1: showing the study area of Durgadahalli lake

Table 1: Physical Characteristics of Durgadahalli Lake, Tumakuru

S. No	Physical Characteristics	Values/Parameters
1	Location of the Reservoir	13° 13' 56" N, 77° 25' 30" E
2	Nearest city	Tumakuru
3	District	Tumakuru
4	State	Karnataka
5	Size	Small sized lake in Tumakuru
6	Purpose	Irrigation and Drinking
7	Year of completion	1980-81
8	Total catchment area (Sq. Km)	17.25 sq. Km
9	Total water spread area (WSA) (Hactare)	15.60 hectares
10	Water source	Monsoon run-off and Jayamangalli river
11	Average rain fall (mm)	620 mm
12	Soil type	Sand/gravel

2.2. Methodology

The fish sampling was done by using gill nets of different mesh sizes varied from 10 to 100 mm with the assistance of local fishermen. Immediately photographs were taken prior to preservation for the identification of fishes and some of the collected specimens were preserved in 5-10% formalin according to size range. Plastic jars were used for collection and preservation of the fishes. The collected and preserved fishes were labeled by giving serial numbers, site location date of the collection and taxonomic position along with vernacular name. The fishes were identified with taxonomic keys of Jayaram (1999) [3], Jhingran (1991) [4] and Qureshi and Qureshi (1983) [9].

3. Result and Discussion

About 10 species of fishes belonging to 2 orders, 3 families and 9 genera were recorded during the present study (Table 2 and Fig 2). The fishes belonging to order Cypriniformes were found to be dominant followed by Perciformes. The order Cypriniformes was represented by 8 different species with 80% contribution of the fish species and the order Perciformes was represented by 2 different species with 20% contribution in fish abundance respectively (Fig 3). The study recorded the presence of both native and exotic fishes. As for as abundance of fishes is concerned, fish species viz. Tilapia, Grass carp, Catla and Mrigala were observed more abundant than other species. The study highlights that invasive species like Tilapia and Grass carp which may be the threatening factors for other species reduction in this lake. The introduction of exotic fish like *Oreochromis* in the lakes would be one of the major threats to native fish species and therefore a continuous monitoring strategies is needed to avoid the endangered effects on native fish species (Mukherjee *et al*., 2002; Galib, *et al*., 2013) [7, 1] The same observation was also recorded by Shivaraju *et al*., (2017) [11] in Mydala lake. Other factors like over fishing and anthropogenic activities may also contribute to reduction in abundance of fishes in this lake other than four mentioned fish species. Parith Bhanu and Deepak (2015) [8] also stated that human interference in lakes and rivers were the main responsible factors for less distribution and abundance of fishes. Moreover, pollution load during the month of summer may help in changing the physiological adaptations in fishes to acclimatize the environment. Therefore, the species having more adaptive capabilities showed more diversity and abundance. Hence, it is recommended that the continuous monitoring is needed to save the fish diversity of this lake for sustainable development. Moreover, it is recommended that the fishing should be banned for breeding season (July to September) and mesh sizes be regulated for proper growth and size of fishes. Therefore, by adopting such measures we can save this lake from deterioration for sustainable development as it plays an important role in generating the economy of Tumakuru district, Karnataka. Strict management measures with large public awareness would be essential to save the fishes and it is time to make proper policies and take necessary actions to improve the conservation measures so that the future generations get the fish live on the earth rather than the photographs in the literature.

Table 2 Fish diversity of Durgadahalli lake

S. No	Species	Vernacular name	Order
1	*Garra gotyla*	Nilgiris garra	Cypriniformes
2	*Labeo fimbriatus*	Fimbriatus	Cypriniformes
3	*Ctenopharyngodon idella*	Grass carp	Cypriniformes
4	*Cirrhinus mrigala*	Mrigal	Cypriniformes
5	*Amblypharyngodon mola*	Mola carplet	Cypriniformes
6	*Hypophthalmichthys molitrix*	Silver carp	Cypriniformes
7	*Catla catla*	Catla	Cypriniformes
8	*Labeo rohita*	Rohu	Cypriniformes
9	*Oreochromis mossambicus*	Tilapia	Perciformes
10	*Parambassis ranga*	Glass fish	Perciformes

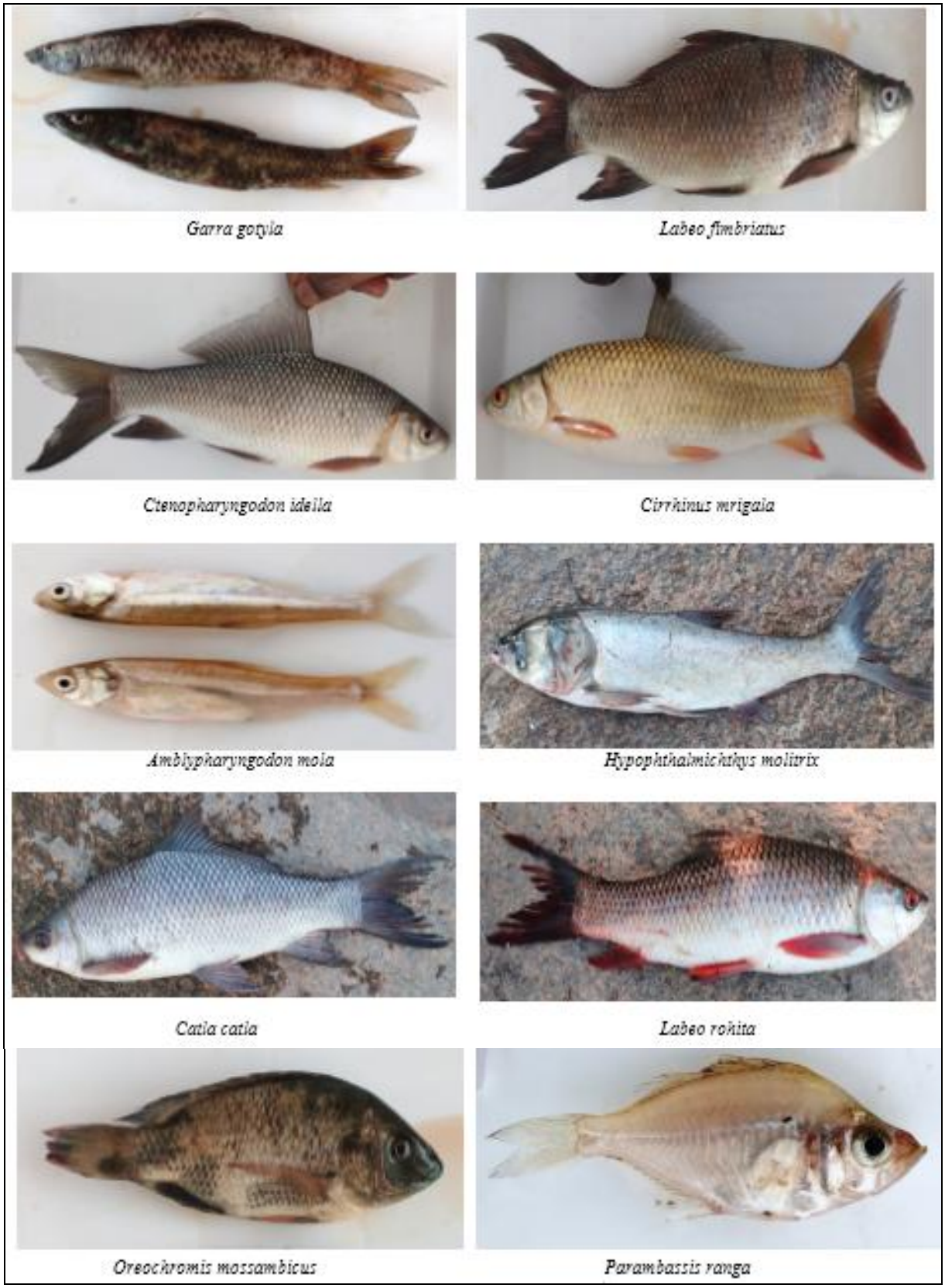

Fig 2: Fish diversity of Durgadahalli lake, Tumakuru

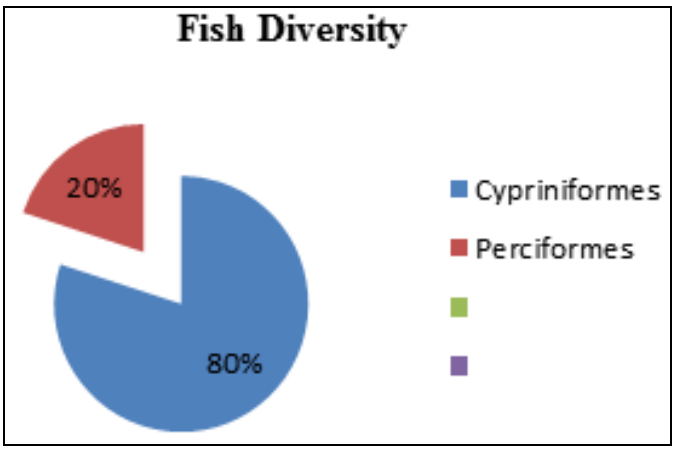

Fig 3: Percentage occurrence of fish orders in Durgadahalli lake

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