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# Fish Diversity in Bugudanahalli Lake of Tumakuru, Karnataka, India

**BM Sreedhara Nayaka**
Karnataka State Pollution Control Board, Bangalore, Karnataka, India

**Abstract**
The fish diversity is a good indicator of health of aquatic ecosystem and represents the balanced ecosystem. The present study was conducted in Bugudanahalli Lake which is located in the south-east of Tumakuru district, at a distance of 08 km from Tumakuru city of Karnataka. It lies at 13° 36' 69" N latitude and 77° 04' 78" E longitude. It receives water mainly from rain fall an average of 620 mm. This underutilized fishery resources after immense scope and potential for generating additional national income by adopting appropriate management measures and fishery regulation principles. In recent years due to varied climatic conditions and disturbed rain fall impacts of human activity increases variations in ecosystem. At present there fish productivity is considerably low. No much reports are available on Bugudanahalli lakes. Keeping all these views, we have selected Bugudanahalli lake for study on fish diversity. Total 08 species of fishes belonging to 07 genera and 02 orders were identified from the lake. The order *Cypriniformes* was found to be dominant among fishes. Hence the protection of this lake is mandatory for sustainable fishery.

**Keywords:** diversity; ecology; environment; Bugudanahalli Lake; tumkur

## 1. Introduction
Fish is one member of a paraphyletic group of organisms that consist of all gill bearing aquatic craniates animals that lack limbs with digits. Fish are cold-blooded animal allowing their body temperature to vary as ambient temperatures change. Contemporary freshwater fish biodiversity has seen a constant decline in recent years due to destruction of habitat on account of various threats and anthropogenic factors. The Bugudanahalli lake used by the various fish species for breeding, feeding and spawning purpose at one stage or the other in their life cycle. The objective of the study was to give recent data regarding fish diversity, aiming to contribute fish diversity of the Bugudanahalli Lake of Tumakuru. 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 as many countries have been staple items of diet of many people in the world (N Indira Devi, *et al*., 2014) [3].

In a few lakes where some efforts have been made, the yield has not satisfactory. Fish yield from lakes has remained at a low level. In Indian lakes the fish yield levels never exceeds 0.2% of gross production and energy fixation rate range from 0.0 to 0.68% of available light energy (Natarajan and Pathak, 1983). A gross production of 0.2% may be considered as potential yield in the lakes investigated. Karnataka have low productivity with a production level of 25-58kg/ ha. Freshwater comprises a vital component of the ecosystem in developing countries since they provide a high level of public interface. India is endowed with a vast expanse of open inland waters. These are about 31,53,366 hectare reservoirs, 2,02,213 hectare lakes, 22,00,000 hectare ponds besides 29,000km length of rivers (Sugunan, 1999). The aquatic plants and animals include phytoplankton and zooplankton etc., are regarded as the indicators of water bodies and hence, indicate the health of the ecosystem as a whole. In addition to this, they are ecologically important as they form the basic link in food chain of all animals (Mishra, 1962) [7].

The freshwater native fishes of Bugudanahalli Lake are currently facing an alarming decline in fish diversity and production as a result, a sizeable portion of freshwater fishes have been threatened. Another problem is the introduction of invasive alien species, the Tilapia *Oreochromis mossambicus* for commercial purposes, which has replaced many native fish species. The same problems were identified in Mydala lake and Durgadahalli lakes of Tumkur with minimal diversity of fishes (Shivaraju *et al*., 2017 and 2018) [17, 18]. The sharp decline in the native fish in the lake primarily on account of reduction in the natural water spread area. This emphasizes an immediate need for the management to protect and conserve the aquatic ecosystem. Bugudanahalli lake is comparatively smaller with limited catchments and medium rain fall. At present there fish productivity is considerably low. This underutilized fishery resources after immense scope and potential for generating additional national income by adopting appropriate management measures and fishery regulation principles. In recent years due to varied climatic conditions and disturbed rain fall impacts of human activity increases variations in ecosystem. The biodiversity offers works for many of the variation in environment from time today. Proper scientific study about fish diversity in lakes of Karnataka is lacking and also has been neglected. No reports are available on Bugudanahalli Lake. Keeping all these views, we have selected Bugudanahalli Lake for study on fish diversity.

## 2. Methodology
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 5-10% formalin according to 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 with taxonomic keys of Jayaram (1999) [1] and Jhingran (1991) [2].

## 3. Results

About 08 species of fishes were recorded during the present study (Table 1). Fishes belong to 2 orders, 9 genera and 08 species. The fishes belonging to order *Cypriniformes* were found to be dominant and abundant then *Perciformes*. The order *Cypriniformes* represented by 6 different species with 75% contribution of the total species (chart 1). The order *Perciformes* represented by 2 different species with 25% contribution of the total species (chart 1). The study as recorded the presence of both native and exotic fishes. As for as abundance of fishes is conserved fish species viz., Tilapia, Grass carp, catla and mrigala were observed more abundant than other species respectively. The study highlights that invasive species like Tilapia and grass carp may be the threatening factors for species reduction in this lake. Other factors like over fishing and anthropogenic activities must be maintained in order to save the fish diversity of this lake for sustainable development more ever, 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. Hence, by adopting such measures we can save this deterioration as it plays an important role in generating the economy of Karnataka state.

**Table 1:** List of lake fish species of Bugudanahalli Lake.

| Sl. No | Order | Scientific Name | Common Name |
|---|---|---|---|
| 1 | Cypriniformes | Labeo Fimbriatus | Fimbriatus |
| 2 | Cypriniformes | Ctenopharyngodon Idella | Grass Carp |
| 3 | Cypriniformes | Cirrhinus Mrigala | Mrigal |
| 4 | Cypriniformes | Hypophthalmichthys Molitrix | Silver Carp |
| 5 | Cypriniformes | Catla Catla | Catla |
| 6 | Cypriniformes | Labeo Rohita | Rohu |
| 7 | Perciformes | Oreochromis Mossambicus | Tilapia |
| 8 | Perciformes | Oreochromis Nilotica | Tilapia |

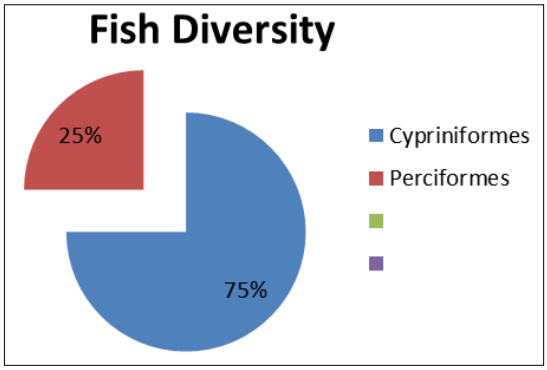


**Fig 1:** Percentage occurrence of fish orders in Bugudanahalli lake.

## 3. Discussion

Biodiversity is essential for stabilization of ecosystem protection of overall environmental quality for understanding intrinsic worth of all species on the earth (Ehrlich and Wilson, 1991). Fish diversity essentially represents the fish faunal diversity and their abundance. Fishes are the keystone species which determine the distribution and abundance of other organisms in the ecosystem they represent and are good indicators of the water quality and the health of the ecosystem (Moyle & Leidy, 1992) [4]. In the present Ichthyofaunal study, 08 species were recorded from the Bugudanahalli Lake. The high quantity of fish obtained during the post monsoon season could be attributed to the breeding pattern of the lake fishes in the tropics. many of the lake fishes breed during the monsoon season (Mary, 1970) and juveniles and sub adult of these fishes may contributed to the fishery during post monsoon season. 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 ichthyofauna in the Bugudanahalli Lake of Tumakuru, Karnataka. Invasive species like Tilapia are becoming a threat to the native Indian major carps here, 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. Sustainable fish production by taking appropriate steps for sustaining diversity is necessary to conserve these resources. In the present study have 2 different order like *Cypriniformes* and *perciformes*, out of two orders *Cypriniforms were* more dominant and grass carp, mrigal and catla were more abundant then the others and in *Perciformes* comparatively both *Oreochromis mossambicus* and were abundant.

The information collected from the fisherman and local people show that the number and species of fishes in Bugudanahalli lake is decreasing year after year. The present study shows that the Bugudanahalli lake is hosts for number of freshwater fish species. But the fish fauna of this lake are being declining due to several anthropogenic activities including introduction of exotic fish species, habitat degradation, pollution, irrational fishing. Due to different anthropogenic activities the fish diversity of this water body is in declining mode. To conserve this species, effective implementation on the regulation on mesh size and fishing gear is much needed to prevent over exploitation. Strict management measures with large public

awareness would be essential to save the fishes and it's time to make proper policies and take necessary actions to improve conservation measures so that the future generations get the fish live on the earth rather than the photographs in the literature.

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