An overview on fish composition in the water bodies of Tumakuru District of Karnataka, India

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Abstract

The present review have a look at the fish composition in various lentic water bodies of Tumakuru district, Karnataka as carried out by using various researchers in India. Fish is a great indicator of fitness of aquatic ecosystem and represents the balanced atmosphere. Hence, inside the Durgadahalli lake, 10 species of fishes belonging to 09 genera, 03 families and 02 orders had been recorded. The order Cypriniformes become determined to be dominant accompanied by means of Perciformes among fish assemblage. In Bhimasandra pond, 24 species belonging to 20 genera, 10 families and 6 orders had been recorded. Among the gathered species Cyprinidae was the most dominant constituting 41.66% accompanied with the aid of Bagridae with 12.50% of the entire fish species. Carp fishes 34.78%, Catfishes 39.13% and miscellaneous fishes 26.09% have been located. A overall of 15 species of fishes belonging to 6 families and 13 genera were recorded from the Mydala Lake. On the percent composition, order Cypriniformes became dominant (10 species) observed by Perciformes (three species), Siluriformes (2 species) respectively. Chikkere water frame has 15 species belonging to 4 orders, 6 families, 11 genera. The main orders of fishes became Cypriniformes (07 species). Within Bugudanahalli lake, 08 species of fishes belonging to 2 orders, 7 genera and 02 families. The fishes of Markonahalli reservoir of Tumakuru was 28 species belonging to 08 orders and 10 families, out of which 23 are indigenous, 04 stocked and 01 exotic species. Among, family Cyprinidae was represented by 15 species followed by Channidae with 3 species and Siluridae with 2 species. The fishes belonging to order Cypriniformes have been found to be dominant in all of the water bodies.

Key words : Fish composition, Chikkere, Bhimasandra pond, Bugudanahalli lake, Mydala lake, Durgadahalli lake, Markonahalli reservoir, Tumkuru.

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Fishes are the poikilothermic animals allowing their frame temperature to vary with external temperature change. The freshwater fish biodiversity has seen a constant decline in latest years because of the destruction of habitat attributable to numerous threats and anthropogenic factors. The fish populace in the international is about half of of the entire number of vertebrates and about 21,730 species of fishes have been recorded inside the world wherein most effective 11.7% are located in Indian water bodies[18]. Fisheries is without delay associated with the economic system of the USA and provide change resource of food for the developing populace and also play an critical function in health and production values in many nations of the sector[5].

Lakes are dynamic inland aquatic systems that helps and keep a balanced adaptive community of organisms having numerous species composition and the useful business enterprise of all of the organisms helps a unique biotic integrity. These principal existence help systems are going through ecological degradation today due to undesirable anthropogenic activities. Fish is responsive to changes in water exceptional due to diverse anthropogenic tactics from their catchment[12]. Freshwater rivers, lakes, and wetlands consist of approximately 18,000 fish species, with masses of new species defined every 12 months[3]. Freshwater ecosystems and their biodiversity are more and more threatened through human sports, consisting of habitat alteration, water pollution, overfishing, exceptional species introduction, river diversions, fragmentation and go with the flow law, growth of agricultural and concrete landscapes, rising sea levels and altered precipitation regimes[2]. One fundamental motive for the extraordinary species richness in freshwaters is the heterogeneous distribution of freshwater habitats across biogeographic space and thru evolutionary time[1].

Fish assemblies have extensively been used as ecological monitors to examine & decide the extent of decay and health of water bodies at distinctive scales sixteen monitored that there are numerous blessings of the use of fish variety as a organic indicator. In the present study an attempt has made to prepare a consolidated list of freshwater fish species, to evaluate fish species range and endorse appropriate conservation and management techniques.

Hence, biodiversity is critical for stabilization of surroundings protection and environmental best for expertise intrinsic worth of all species on this planet. Fishes are the keystone species which can be good signs of the water pleasant and the fitness of the surroundings[10]. Fishes are valuable resources of excessive grade protein and that they occupy a enormous function within the socio-financial area by means of imparting the populace not most effective the nutritious food but additionally income and employment opportunities. In addition to this, they are ecologically essential as they form the fundamental hyperlink in meals chain of all aquatic animals[9].

Considerable work on the fresh water fishes in different water bodies of India and Karnataka has been carried out by Mishra[9]; Jayaram[6]; Jhingran[7]; Kiran et al.[8]; Thirumala

et al.[31]; Thirumala and Kiran[22-23], Thirumala and Kiran[24-29] and Thirumala and Kiran[30], Hence, the existing review work is undertaken with the intention to look at the fish diversity in various water our bodies of Tumakuru of Karnataka.

Study area :

Durgadahalli lake is situated within the North-East of Tumakuru taluk, at a distance of 15 km from Tumakuru of Karnataka. The district has geographical place covers approximately 4% of the forest. The lake lies at 13° 13' 56" N latitude, 77° 25' 30" E longitude and water spread location is set 15.60 hectares and common depth of lake is 1.8 to 2.0 meters along the bund. It gets water in particular from rain fall and via Jayamangalli river. The water is specially used for cultivation in and round the lake location. The general catchment location of the Durgadahalli lake is 17.25 sq. Km and top is about 10.4 to 10.6 m with a median rain fall 620 mm as well as soil texture inside the catchment location is sand/gravel kind.

Mydala lake is located 20 km from centre of Tumakuru metropolis towards North East. It lies a 13°18'46''N latitude and 77°11'37''E longitude and water spread region is 370 hectares. The average intensity of the lake is 3.0 to 4.4 meters alongside the bund. The lake is rain fed in the course of monsoon length and this water is especially used for ingesting motive and cultivation of paddy vegetation in and across the lake place. Besides, washing interest is generally visible and many aquatic weeds are gift. The general catchment area of the Mydala lake is 62.96sq. Km and peak is about 13 to 14.8m with an

average rain fall 640.27mm, temperature about 24°C to 26°C and soil in the catchment place is black clay/loamy. This lake is taken into consideration as fisheries useful resource in Tumakuru in terms of fish manufacturing.

Chikkere water body is a perennial water frame positioned in Sira, Tumkuru district, along the elevation of 662 meters from suggest sea stage. Which falls underneath 13°75'25"N Latitude and 76°90'70" E Longitude.

Bhimasandra pond is geographically located at 13°202 37'' N latitude and 77°032 59ºE longitude. It is within the 860 meters to 678 meters elevation variety. Highest temperature turned into recorded in between 29°C -37°C. The Bhimasandra pond is diagnosed as a heaven for water birds in Tumkur .This pond attracts uncommon migratory birds all through the year. Besides numerous home and agricultural uses, it's far a prime source of fishing, which takes vicinity throughout early hours of every day.

Bugudanahalli Lake which is located in the south-east of Tumakuru district, at a distance of 8 km from Tumakuru .It lies at 13° 36' 69" N latitude and 77° 04' 78" E longitude. It receives water from rain fall. This underutilized fishery resources after immense scope and potential for generating additional national income by adopting appropriate management measures and fishery regulation principles. At present there fish productivity is considerably low.

Markonahalli reservoir is situated at 12⁰ 55' N latitude and 76⁰ 56' 15" E. It is a minor irrigation project constructed on river Shimsha in the district of Tumkuru of Karnataka. The impoundment has been

formed in 1939 to provide irrigation for about 4400 ha of land in the districts of Tumkur and Mandya.

One way ANOVA calculation :

One way ANOVA is calculated for fish genera, order and families in the water bodies of Tumakuru district by using stats kingdom software.
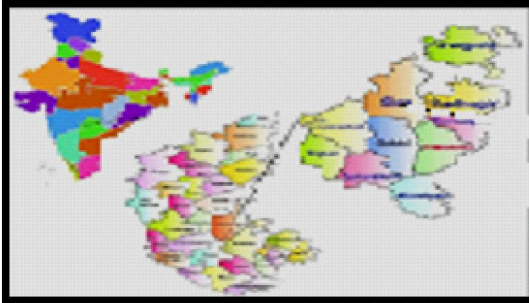

Figure 1. Study area map

Figure 2. Views of Durgadahalli lake (Top) and Mydala lake (Bottom) of Tumakuru

Shivaraju et al.,[20] have studied fish composition in Durgadahalli Lake. In their study, a total of 10 species of fishes belonging to 09 genera, 03 families and 02 orders were recorded by theme. They reported that order Cypriniformes was dominant followed by Perciformes. Sreedhara Nayaka[21] has selected Bugudanahalli lake for fish diversity. He recorded 08 species of fishes having 07 genera and 02 orders.

Parimala[13] has assessed the fish diversity profile in Bhimasandra pond in Tumakuru, Karnataka. She recorded 24 species belonging to 20 genera, 10 families and 6 orders. The fishes encompass major carps, minor carps , carp minnows, Cat fishes, ornamental, larvicidal fishes, snake fishes, murrels and other fishes. Among the families, Cyprinidae become most dominant preceded by Bagridae.

Fish variety in Chikkere of Sira in Tumkuru district has been studied by Satishagouda et al.[17]. They recorded 15 species of fish belonging to 04 orders like Cypriniformes, Siluriformes, Perciformes and Anabantiformes. The major order is Cypriniformes.

The creation of amazing fish like *Oreochromis* might be one of the foremost threats to native fish species and therefore a continuous tracking strategies is needed to avoid the endangered outcomes on local fish species[4,11]. The identical statement become also recorded with the aid of Shivaraju et al.[19] in Mydala lake. Other elements like over fishing and anthropogenic sports may also contribute to reduction in abundance of fishes in this lake apart from four mentioned fish species. Parith Bhanu and Deepak[14] have stated that human intervention was responsible for less distribution and abundance of fishes. Moreover, pollution load throughout the month of summer season may additionally help in
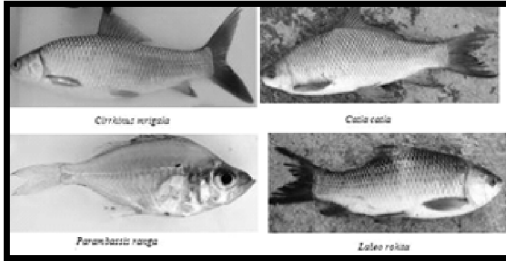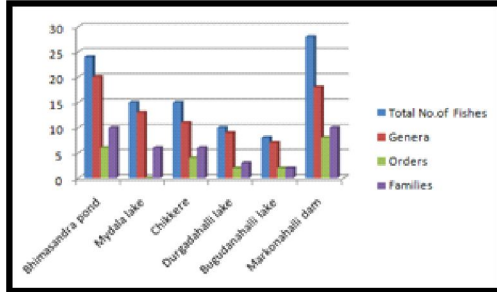
Figure 3. Fishes of Tumakur district

Figure 4. Fish composition with their genera, order and families in the water bodies of Tumakuru district

converting the physiological adaptations in fishes to acclimatize the environment. Therefore, the species having greater adaptive skills showed extra range and abundance. Hence, it is recommended that the continuous monitoring is wished to store the fish range of this lake for sustainable improvement. Moreover, it is encouraged that the fishing ought to be banned for breeding season and mesh sizes be regulated for correct boom and length of fishes[15].

Ramakrishnaiah *et al.*,[16] have recorded the fishes of Markonahalli reservoir of Tumakuru. They recorded 28 species belonging to 08 orders and 10 families, out of which 23 are indigenous, 04 stocked and 01 exotic species. Among, family Cyprinidae was represented by 15 species followed by Channidae with 3 species and Siluridae with 2 species. Other families were represented by single species only.

Therefore, by means of adopting such measures we can save this lake from deterioration for sustainable improvement as it plays an essential role in generating the economy of Tumakuru district, Karnataka. Strict control measures with massive public focus would be crucial to shop the fishes and it is time to make right guidelines and take necessary moves to enhance the conservation measures so that the destiny generations get the fish live on the earth as an alternative than the snap shots inside the literature.

Table-1. Fish composition with their genera, order and families in different water bodies of Tumakuru district as worked out by various researchers

Name of the water bodies	Total No.of Fishes	Genera	Order	Families	Reference
Bhimasandra pond	24	20	6	10	Parimala, 2021
Mydala lake	15	13	0	6	Shivaraju *et al.*, 2017
Chikkere	15	11	4	6	Satishagouda *et al.*, 2022
Durgadahalli lake	10	09	2	3	Shivaraju *et al.*, 2018
Bugudanahalli lake	08	07	02	02	Sreedhara Nayaka, 2018
Markonahalli reservoir	28	18	8	10	Ramakrishnaiah *et al.,* 1998

One way ANOVA :

Table-2. One way ANOVA for fish genera, order and families in the water bodies of
Tumakuru district

Source	DF	Sum of Square	Mean Square	F Statistic	P-value
Groups (between groups)	3	649.125	216.375	8.0512	0.001031
Error (within groups)	20	537.5	26.875		
Total	23	1186.625	51.5924		

Since p-value<α, H_0 is rejected. Some of the groups' averages consider to be not equal. In other words, the difference between the averages of some groups is big enough to be statistically significant.

p-value equals **0.00103139**, [p(x≤ F) = 0.998969]. It means that the chance of type1 error (rejecting a correct H_0) is small: 0.001031 (0.1%). The smaller the p-value the stronger it support H_1

The test statistic F equals **8.051162**, which is not in the 95% region of acceptance: [-∞ : 3.0984]. The observed effect size f is **large** (1.1). That indicates that the magnitude of the difference between the averages is large.

The η^2 equals 0.55. It means that the **group** explains 54.7% of the variance from the average (similar to R^2 in the linear regression).

The fish community in the water our bodies of Tumakuru includes the native and wonderful species, delivered for the purpose of fish yield. The present review study is the first documentation of ichthyofaunal and ecology in the aquatic structures of Tumakuru, Karnataka. Invasive species like *Oreochromis* is becoming a threat to the native Indian foremost carps, indigenous fishes and this have to be checked out. Over exploitation ought to be averted with the aid of following a fishing banned for approximately three months at some stage in the breeding season in order to allow the proper increase of fishes and mesh regulation in fishing is also an essential factor which ought to be also properly ensured. The low variety and declining populace density of the fish species were attributed to the interactions of many factors in the pond which includes over exploitation of the species, low price of breeding, adverse habitat, pollution, advent of exclusive species. To prevent similarly decline of the species from the water our bodies, numerous conservation measures viz., stoking the species, habitat re-status quo, control of invasive species, public recognition and education need to be geared toward the species to beautify the fisheries, enhance aesthetical, monetary cost and maintain the genetic diversity of the species. In the polluted water body tolerant species like *O. mossambicus* is prospering properly and commercially vital and sensitive local species such as *Labeo* and *Puntius* sp. Are taken into consideration to be threatened by increasing water pollutants. Therefore sustainable fish production by taking appropriate steps for sustaining variety is vital to preserve these sources.

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