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Fish composition in the back water of Tunga reservoir near Mandagadde fish camp, Shivamogga district, Karnataka

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Abstract
The fish fauna of the back water of Tunga reservoir near Mandagadde Fish camp area, Shivamogga district, Karnataka was studied from August 2018 to July 2019. The water of the reservoir is used for fishery, drinking and irrigation. A total of 26 fish fauna belonging to 18 genera, 06 orders and 11 families were recorded. Among fish families Cyprinidae consists of 12 species followed by Bagridae, Siluridae, Channidae, Clariidae with 02 species each respectively and rest of the families studied were 01 species each. The order Cypriformes consists of 13 species proceeded by Siluriformes with 07 species. The maximum fishes were recorded in the family Cyprinidae. As far as biodiversity status is concerned, 03 species were Not assessed (11.54%), 04 species under lower risk-near threatened (15.38%), vulnerable with 04 species (15.38%), lower risk least concern by 15 species (57.69%). Therefore, appropriate management and utilization of this fish wealth is necessary to taken up the sustainable steps to monitor and conserve fish health.

Keywords: fish composition, back water, Tunga reservoir, Shivamogga district

Introduction
Fish variety refers to assortment of fish species relying upon context and scale; it may want to allude to alleles or genotypes interior of life constructions interior a fish neighborhood vicinity and to species or existence buildings throughout water structures (Burton *et al.* 1992) [2]. Biodiversity is essential for adjustment of biological gadget protection and normally ecological first-rate for grasp herbal worth of all species on the earth. Fish establishes 1/2 of the all out range of vertebrates on the planet. They live in practically all possible aquatic natural surroundings. As on today, 21,723 dwelling sorts of fish have been recorded everywhere. Out of these 8,411 are freshwater species and 11,650 are marine which are monetarily significant. India is one of the 17 wonderful biodiversity international locations of the world. With simply 2.5% of the land region, India represents 7.8% of the recorded kinds of the world (Anonymous, 2012) [1]. In India 2,500 kinds of fishes (Kar *et al.* 2003) [8] have recorded. Investigations of spatial and temporal examples of variety, dissemination and species composition of freshwater fishes are useful to analyze factors affecting the diagram of the fish community (Galactos *et al.* 2004; Kumar Naik *et al.* 2012) [4, 10]. The damming of rivers and streams is regularly implicated as a purpose for fish population decline and neighborhood extinction of freshwater fish (Christopher *et al.* 2001) [3].
Tunga reservoir is multi cause undertaking as the peak of the dam was raised to supply water for drinking, fisheries and irrigation. The reservoir provides a correct habitat for birds and fish fauna. Its lovely landscape and the surrounding natural surroundings provide a high-quality recreational pull away for prevalent public. More than 900 fishermen families depends for their livelihood by this reservoir. Recent data is not accessible on the fish fauna of Tunga reservoir and hence the modern study has taken up.

Materials and Methods
Study area
Figure 1 depicts the area of Tunga reservoir. Tunga dam is created across the river Tunga which is a main tributary of Tungabhadra river in Shivamogga district, Karnataka. This water body is to be found at 75°40'20"E longitude and 14°0'24"N latitudes and the total water unfold region of the reservoir is about 1600 ha. Fishes were sampled monthly at the fish touchdown middle of the lower back water of the reservoir particularly Mandagadde.

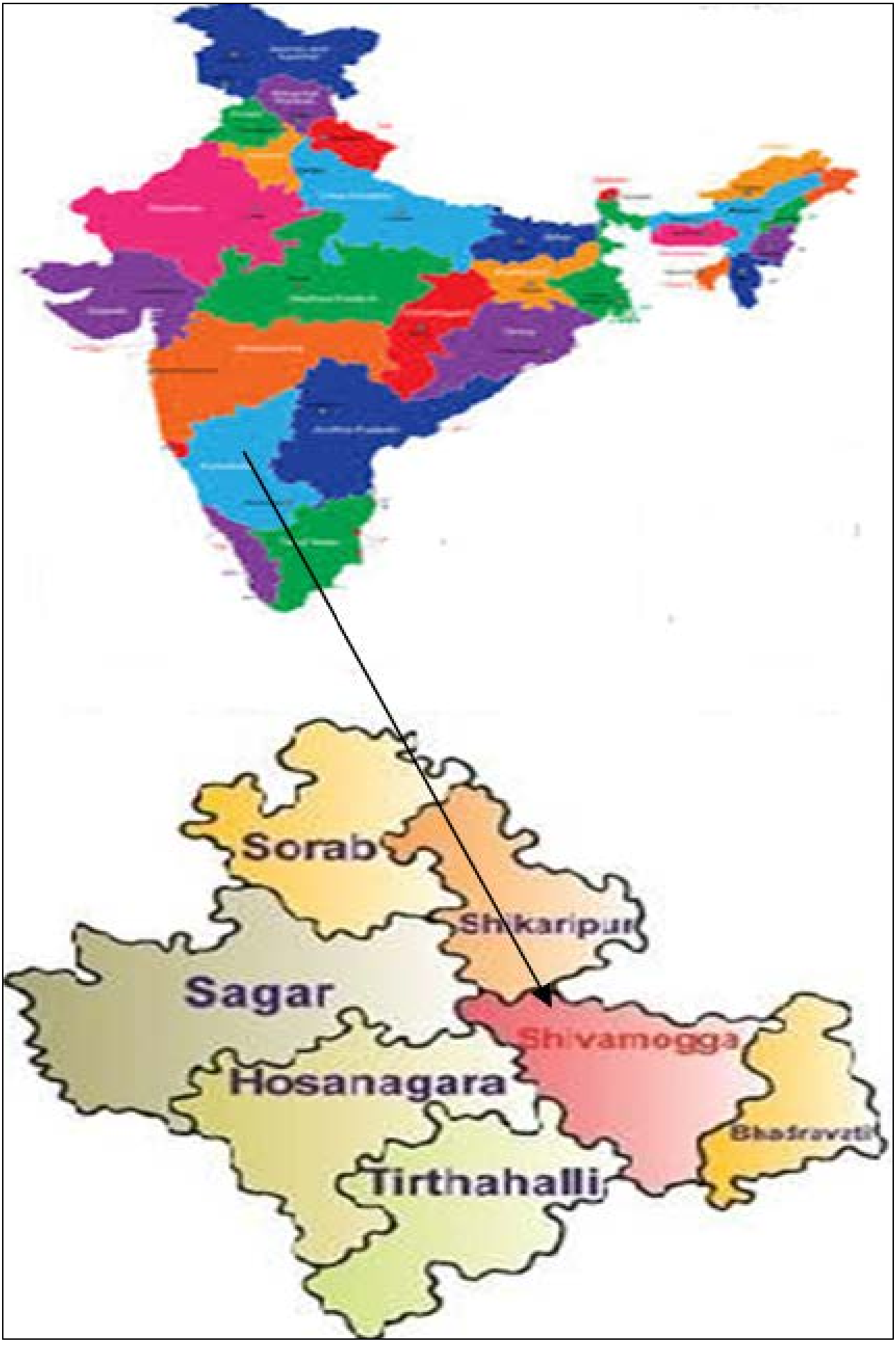

Fig 1: Location of the study area

Fish sampling

Fish samples were collected for one year from August 2018 to July 2019. Fishes were caught by gill nets with the help of local fishermen through the license by the Department of Fisheries, Government of Karnataka and the fishes were preserved in 10% formaldehyde solution for taxonomic analysis.

Identification of fishes was carried out with the help of standard literature (Jayaram, 1999; Talwar and Jhingran, 1991) [7, 20].

Results and Discussion

A complete of 26 fish fauna represented by 18 genera, 11 families of 7 orders were recorded in the back water of Tunga reservoir (Table 1, Figure 2, Figure 3). Amongst fish family, Cyprinidae consists of 12 species observed by way of Bagridae, Siluridae, Channidae, Clariidae with 2 species each respectively and rest of the families studied had been 01 species each. The order Cypriformes consists of 13 species proceeded through Siluriformes with 07 species. Three species such as *Ctenopharyngodon idellus*, *Oreochromis mossambicus* and *Cyprinus carpio* were exotic species.

Among the order Cypriniformes, the Cyprinidae family make contributions (46.15%) represented with *Catla catla, Cirrhinus cirrhosa, C. mrigal, Ctenopharyngodon idella, Cyprinus carpio, Hypophthalmichthys molitrix, Labeo bata, L. calbasu, L. rohita, Puntius. sarana, P. ticto, Salmophasia spp*. The Genus *Labeo* and *Puntius* represented through 03 and 02 species respectively.

In the back water of Tunga reservoir as far as biodiversity status (IUCN-1994) [6] is concerned, 03 species were Not assessed (11.54%), 04 species as lower risk-near threatened (15.38%), vulnerable 04 species (15.38%), lower risk least concern is 15 species (57.69%) (Figure 4).

The present find out about of fish fauna in Tunga reservoir confirmed that most of the fish species recorded have been widely distributed in the streams and rivers of Western Ghats and the contemporary investigation displays that Cyprinid fishes are discovered to be more dominant than others. Wilson (1988) pointed out that bmodifications in habitat due to dam construction often restrict the migratory fish fauna to the top reaches of the river. The fishermen opined that the local carnivorous fishes like *Channa striatus, Channa marulius, Heteropneustes fossilis* were most importantly *Ompok bimaculatus* are turning into rare in the reservoir. Similar scenario used to be reported in Linganamkki reservoir by means of Sreekantha and Ramachandra (2005) [17]. The Indian major carp such as *Catla catla, Labeo rohita, Cyprinus carpio* and *Salmophasia untrahi* had been recorded in the returned water of Tunga reservoir near Mandagadde fish camp area.

The usual variety of fish (26 fish species) discovered in the existing study was notably lower than the number of species (33) pronounced from Bhadra reservoir (Thirumala *et al* 2011) [21]. In Nath Sagar dam (Aurangabad) Hiware and Pawar (2006) have recorded 43 fish species. In a learn about from neighboring state of Andhra Pradesh. Savalla Murli Krishna and Piska (2006) [14] have documented 31 fish species from Secret lake Durgamcheruvu, Ranga Reddy district of Hyderabad.

The fish species recorded so some distance had been all economically necessary and having high commercial importance. 51 fish species of 9 families in Govindsagar reservoir, Himachal Pradesh was recorded by Kumar (1990) [11] which have been commercially important. The present fish study has also proven that most of fish species recorded had been predatory in nature. Sukumaran and Das (2005) [19] have also made the identical observation and cited that majority of the reservoirs of Karnataka state have a large populace of predatory fish species. Shahnawaz Ahmad *et al*. (2011) [15] have recorded 17 fish variety from Sogane and Santhe kadur tanks of Shimoga which were represented with our orders, eleven families and 14 genera.

Scientific fishing trendy and fishing quotas are to be labored out this will play an important position in safety of the tank and its biodiversity. The fisherman's must make acquainted with suitable fishing, appropriate education facilities should availed to the fish farmer society. Fishing of the spawn, fry and immature fish must be avoided. Subsidy mortgage facility might also be supplied on giant scales, which may additionally help in excessive yield of fish production. Thus it is need of each and every person who have to play an lively function to acquire the dreams of sustainable fishery development and handover the sources in healthy stipulations to the future generations. Lakra *et al*. (2010) [12] reported cyprinid fishes were to be dominant than others which is true in the present study.

Thirumala and Kiran (2016) [22] have identified 15 cyprinid fishes in three lentic water bodies of Shivamogga district, Karnataka. All the fishes are useful as food fishes except Puntius which is useful for ornamental purpose.

Thirumala and Kiran (2017) [23] have documented the fish diversity in Nagappanakere tank and Kudligere tank in relation to physico-chemical parameters at Bhadravathi taluk of Karnataka. In their study, Nagappanakere tank supported 13 fish species while, Kudligere tank supported 18 fish species.

The fish abundance of three lentic water bodies (Sogane tank, Navule tank and Tunga reservoir) were studied by Naik and Kiran (2017) [13]. In their study, Sogane tank supported 16 fish species while, Navule tank supported 13 fish species but Tunga reservoir supported 32 fish species In this water body Cyprinid fishes were dominant. In Tunga reservoir most of the fish species recorded were widely distributed in the lotic habitats of Western Ghats.

Table 1: Fish variety in the back water of Tunga reservoir, Karnataka

Sl. No.	Species	Population status	Biodiversity status (IUCN,1994) [6]
A.	Order: Cypriniformes Family: Cyprinidae		
1.	*Catla catla*	Common	LR-lc
2.	*Cirrhinus mrigala*	Fairly common	LR-lc
3.	*Cyprinus carpio**	Common	VU
4.	*Labeo rohita*	Common	LR-lc
5.	*Labeo bata*	Fairly common	LR-lc

6.	*Labeo calbasu*	Fairly common	LR-lc
7.	*Puntius ticto*	Rare	LR-lc
8.	*Puntius sarana*	Fairly common	LR-lc
9.	*Salmophasia untrahi*	Common	LR-lc
10.	*Cirrhinus cirrhosa*	Common	VU
11.	*Ctenopharyngodon idella**	Fairly common	NA
12.	*Hypophthalmichthys molitrix*	Common	LR-nt
	Family: Rasboridae		
13.	*Rasbora daniconius*	Rare	LR-nt
B.	Order: Perciformes Family:Channidae		
14.	*Channa striatus*	Fairly common	LR-lc
15.	*Channa marulius*	Rare	LR-lc
C.	Order: Siluriformes Family: Bagridae		
16.	*Sperata aor*		LR-nt
17.	*Sperata seenghala*		NA
	Family: Clarridae		
18.	*Clarias batrachus*	Rare	LR-lc
19.	*Wallago attu*	Rare	VU
	Family: Siluridae		
20.	*Ompok pabda*	Rare	NA
21.	*Ompok bimaculatus*	Fairly common	LR-nt
	Family: Heteropneustidae		
22.	*Heteropneustes fossilis*	Fairly Common	LR-lc
D	Order: Cichliformes Family: Cichlidae		
23.	*Oreochromis mossambicus*	Common	VU
E	Order: Osteoglossiformes Family: Notopteridae		
24.	*Notopterus notopterus*	Fairly common	LR-lc
F	Order: Synbranchiformes Family: Mastacembelidae		
25.	*Mastacembelus armatus*	Rare	LR-lc
G	Order: Beloniformes Family: Belonidae		
26.	*Xentedon cancilla*	Rare	LR-lc

LR-nt= Lower risk near threatened; NA-Not assessed, VU- Vulnerable; LR-lc- Lower risk least concern. * Introduced species

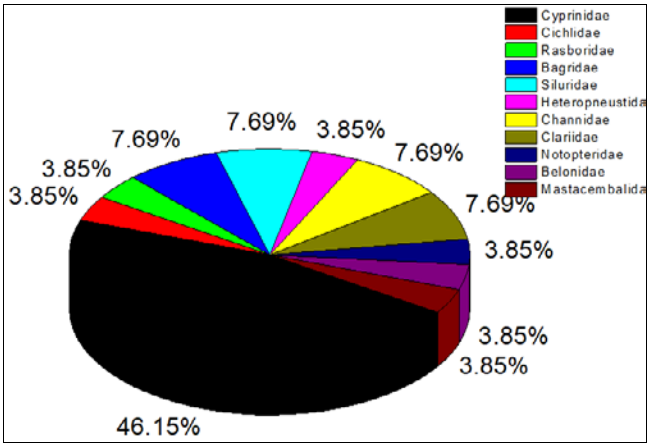

Fig 2: Percentage composition of fish families in the back water of Tunga reservoir near Mandagadde Fish camp, Shivamogga

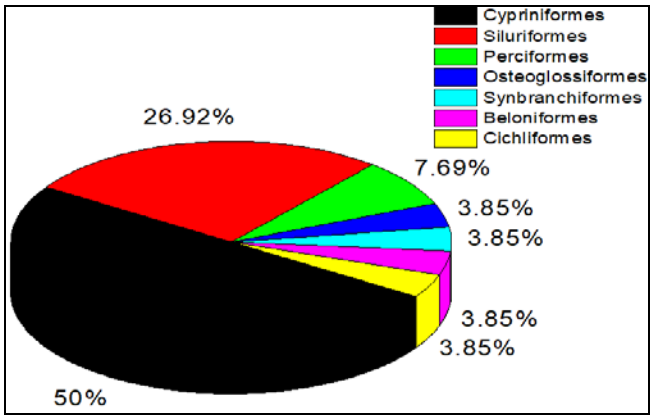

Fig 3: Percentage composition of fish orders in the back water of Tunga reservoir near Mandagadde Fish camp, Shivamogga

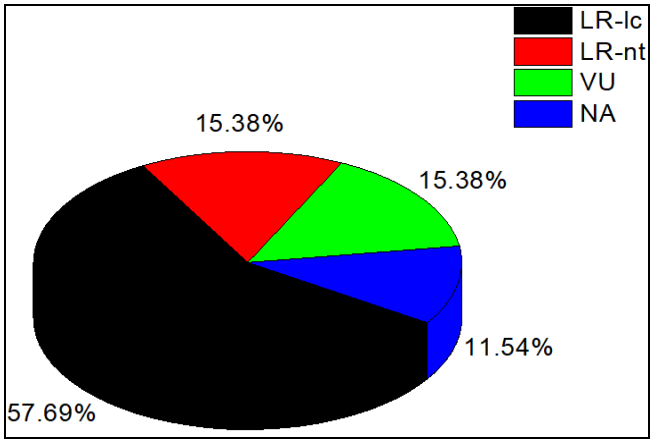

Fig 4: Biodiversity status of fishes in the back water of Tunga reservoir near Mandagadde Fish camp, Shivamogga (VU= Vulnerable; NA = Not assessed; LR- lc = Lower risk - least concern; LR- nt = Lower risk-near threatened)

Conclusion

Habitat loss and ecological debasement has certainly influenced the fish fauna. Protection of fish range expects top most want underneath altering conditions of environment. Information on reachable assets and the biological characters of species serve the benchmark information for extra examinations on asset safety and upkeep. The publish state of affairs of induction of fish stocking plans and its consequences on the fish fauna of the Tunga reservoir ought to be study for additional administration and enchancment of fisheries in this reservoir. The investigation will supply future strategies to development and fish preservation. This investigation shows that this water physique has low fish diversity due to

human things to do and surface run off, which wants to formulate sustainable strategies to discover and retailer fish species. Hence, it is advised to of ten times reveal this reservoir in order to conserve fish fauna.

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