

## **Fishes of Chikkere water body of Sira, Tumkur**

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### **Abstract**

Fish diversity in Chikkere water body of Sira in Tumkuru district has been studied. The study revealed the presence of 15 species of fish belonging to 04 orders (Cypriniformes, Siluriformes, Perciformes and Anabantiformes). The predominant orders of fishes are Cypriniformes. The highest number of (07) species was recorded in the order Cypriniformes. The fishes recorded were found to be widely distributed and were present in good numbers in northeast monsoon season in the Chikkere. Water quality of the water body is within permissible limit except the Electrical conductivity, total dissolved solids and BOD. However, more studies should be carried out to reduce the pollution status and eutrophication of the water body and conservation of aquatic biodiversity.

**L**akes are dynamic inland aquatic systems that support & maintain a balanced adaptive community of organisms having diverse species composition and the functional organization of all the organisms supports a unique biotic integrity. These major life support systems are facing ecological degradation today due to undesirable anthropogenic activities. Fish is responsive to alterations in water quality due to various anthropogenic processes from their catchment<sup>10</sup>. Freshwater rivers, lakes, and wetlands include about 18,000 fish species, with hundreds of new species described each year<sup>7</sup>. Freshwater ecosystems and their biodiversity are increasingly threatened by human activities, including habitat alteration, water pollution, overfishing, exotic species introduction, river diversions, fragmentation and flow regulation, expansion of agricultural and urban landscapes, rising sea levels and altered precipitation regimes<sup>6</sup>. One main reason for the remarkable species

richness in freshwaters is the heterogeneous distribution of freshwater habitats across biogeographic space and through evolutionary time<sup>1</sup>.

Fish assemblages have widely been used as ecological monitors to assess & determine the level of degradation and health of water bodies at different scales<sup>16</sup> monitored that there are many advantages of using fish diversity as a biological indicator. In the present work an attempt was made to prepare a consolidated list of freshwater fish species, to evaluate fish species diversity and suggest appropriate conservation and management strategies.

Every month samples were collected from four different stations (Fig. 1) from Chikkere water body. It is a perennial water body which is located at Sira, Tumkuru district, along the national highway No. 4 at an elevation of 662 meters from mean sea level. which falls under 13°75' 25" N Latitude and 76° 90' 70" E Longitude Water samples collected for the purpose of estimation of various parameters, were brought to the laboratory and subjected to analysis immediately.

Standards Methods for Estimation of Water and Waste water 22<sup>nd</sup> Edition, (2012) (APHA,<sup>2</sup> AWWA) were referred for estimation of parameters viz., total dissolved solids, pH, electrical conductivity, dissolved oxygen, total alkalinity, total hardness, calcium, magnesium, chloride and BOD.

*Collection of Fish Fauna:* The primary survey of fish fauna of Chikkere water body was made at different intervals of

during the period of February 2020 to January 2022. The samples were collected from different parts of the water body by using cast net, gill net and circular net and from the local fisherman collection. Samples were preserved in 10% formalin and brought to the laboratory for their identification. The identification was done according to Jayram<sup>8</sup>.

*Species Richness* Species richness was used as an index for estimation of species diversity. The species diversity is categorized into abundance (A), common (C), rare (R), very rare (VR) and endemic (E) on the basis of their number in each catch. Calculated Productivity Point (CPP) Fish diversity is measured in terms of calculated productivity point (CPP). That was given by Dobriyal and Singh<sup>5</sup> by allotting 3-points to abundance species, 2-points to common species and 1-point to rare species. The fish species with respect to its commercial utilization as food, sports, and ornamental were also evaluated based on specific criteria.

The criterion adopted for food fishes was the consumer acceptability of the food fishes; those that showed adequate growth in unit time and attained maximum size were brought under cultivable category. Fishes have been identified as a sports fishes based on preference of anglers. The potential ornamental fishes have been identified based on the ornamental criteria like colour, shape, size, banding patterns, adhesive sucker, hardness, preying habit and transparent body.

The present study reveals the values of physicochemical is showed in Table-1. The periodical survey of the ichthyofauna revealed the occurrence of total of 15 species belonging

to 4 orders, 6 families, 11 genus, and its phylogenetic account presented in the Table 2. The fishes of the Chikkere water body reflect the composition of the Chikkere. The

present study explains (Table-3) only the availability of variety of fishes, economically important of fishes (Table-4), status and CPP of fish species.

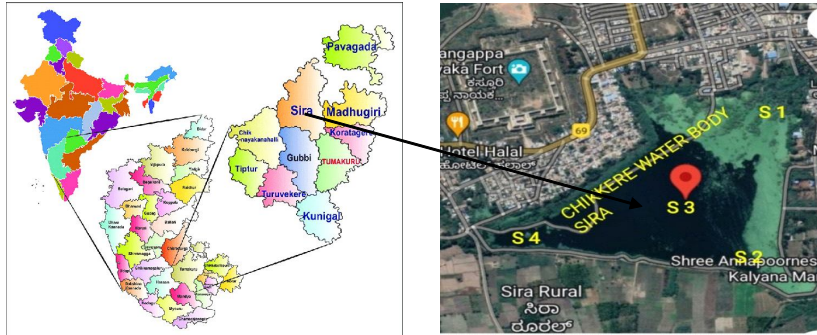


Fig. 1. Map showing the Chikkere water body of Sira

Table-1. Monthly variations of physic-chemical parameters of Chikkere water body, Sira

Months	AT	WT	Turbidity	TDS	TSS	EC	pH	DO	TA	TH	Ca	Mg	Cl	BO D	NO 3	SO 4	P
Feb.2020	24.2	22.1	48	657	70	2056	8.1	2.2	456	356	262	132	310	38	3.2	130	0.3
Mar.2020	24.8	23.2	70	858	68	2104	8.2	1.9	414	374	236	138	290	26	4.1	128	0.3
Apr.2020	24.9	23.4	76	1152	62	2290	8.2	2.5	432	382	228	162	286	32	4.6	112	0.29
May2020	25.1	22.5	86	1107	54	2112	7.9	2.8	398	390	204	144	272	20	3.9	96	0.3
June2020	23.2	21.1	46	1052	48	2012	8.3	2.1	406	278	174	128	232	14	6.2	64	0.6
July.2020	24.1	22.2	38	1058	38	1806	8.5	3.6	382	284	182	126	254	18	9.8	52	0.7
Aug.2020	24.5	22.1	42	978	42	1502	8.9	3.5	372	298	168	138	262	20	8.9	66	0.6
Sep.2020	24.7	22.3	56	896	36	1608	8.9	3.2	360	356	138	152	256	18	8.5	68	0.5
Oct.2020	22.1	20.2	32	454	29	828	8.3	4.9	191	156	144	88	135	8	3.5	45	0.5
Nov.2020	22.3	20.1	25	568	38	960	8.2	5.2	199	198	138	96	156	10	2.9	38	0.4
Dec.2020	22.5	20.2	26	785	24	1502	8.1	5.8	209	280	152	86	180	18	3.1	46	0.3
Jan.2021	22.7	21.2	78	1005	61	2055	7.3	2.2	424	366	222	92	271	31	3.2	145	0.3
Feb.2021	23.1	22.1	81	1006	62	2070	8.0	2.0	432	366	207	147	274	31	3.9	140	0.2
Mar.2021	24.2	23.1	88	1002	62	2098	8.1	1.8	429	364	203	143	266	32	4.2	134	0.3
Apr.2021	24.8	22.3	71	1046	62	2085	8.6	1.6	426	362	201	138	265	32	4	128	0.3
May2021	25.3	23.1	90	1136	18	1825	7.8	2.0	512	352	185	140	252	27	2.8	138	0.3
Jun.2021	24.4	22.2	20	989	07	1578	8.2	3.7	442	303	159	136	258	14	4.7	68	0.3
July.2021	24.7	22.3	25	895	83	1478	8.6	4.1	307	295	155	136	234	11	4.7	86	0.1
Aug.2021	23.5	22.1	40	1095	26	1670	8.9	3.8	370	378	196	182	266	25	3.5	104	0.5
Sep.2021	23.3	22.2	56	1002	32	1526	9.3	3.0	354	420	158	136	272	19	21.7	80	0.6
Oct.2021	23.1	22.1	14	550	11	714	8.3	4.8	398	187	105	82	105	12	17.7	49	1.65
Nov.2021	22.9	22.1	15	434	6	616	8.0	5.7	201	173	95	77	79	3	9.5	49.5	0.6
Dec.2021	22.8	21.1	15	406	23	647	7.9	6.5	181	154	92	62	65	4	4.3	45.5	0.77
Jan.2022	22.5	21.2	42	615	14	929	7.2	4.9	358	294	160	135	138	17	3.5	55.2	0.67

Table-2. Phylogenetic account of fish diversity in Chikkere water body

Sl. No.	Order	Family	No. of genus	No. of species
1	Cypriniformes	Cyprinidae	5	7
2	Siluriformes	Bagridae	1	2
	Siluridae	1	1	
	Claridae	1	1	
3	Perciformes	Cichlidae	2	2
4	Anabantiformes	Channidae	1	2
<b>Total</b>	<b>4</b>	<b>6</b>	<b>11</b>	<b>15</b>

Table-3. IUCN Status and CPP of fish species in Chikkere water body

Sl. No.	Species Name	Vernacular Name	Status	CPP	IUCN status
1	<i>Catla catla</i>	Doddagende meenu	A	3	LC
2	<i>Cirrhinus mrigala</i>	Mrigal meenu	C	2	LC
3	<i>Cyprinus carpio</i>	Kannadi meenu	A (ES)	3	VU / AIS
4	<i>Labeo rohita</i>	Rahu meenu	A	3	LC
5	<i>Labeo kontius</i>	Kari meenu	C	2	LC
6	<i>Labeo batabata</i>	Kemmi meenu	C	2	LC
7	<i>Puntius chola</i>	Parake meenu	A	3	LR-lc
8	<i>Mystus cavasius</i>	Girlu meenu	A	3	VU
9	<i>Mystus seenghala</i>	Surgi meenu	A	3	NA
10	<i>Clarius batrachus</i>	Murugodu meenu	R	1	VU
11	<i>Wallago attu</i>				VU
12	<i>Oreochromis mossambicus</i>	Gelabi meenu or Bachanika meenu	A (ES)	3	VU /AIS
13	<i>Etroplus maculatus</i>	Julabi menu			LR-lc
14	<i>Channa punctatus</i>	Aul menu	C	2	LR-nt
15	<i>Channa straitus</i>	Aul menu	C	2	LR-nt

A = Abundance ; R= Rare ; C = Common ; VR = Very rare ; CPP = Calculated Productivity Point ES = Exotic species ;

LR-lc –Low risk Least concern ; LR-nt – Low Risk Near Threatened ; AIS – Alien Invasive Species ; VU – Vulnerable

Table-4. Economically important species of Chikkere water body

Family	Species	Category			
		C	F	S	O
Cyprinidae	<i>Catla catla</i>	+	+	-	+
	<i>Cirrhinus mrigala</i>	+	+	-	+
	<i>Cyprinus carpio</i>	+	+	-	+
	<i>Labeor ohita</i>	+	+	-	+
	<i>Labeo kontius</i>	+	+	-	+
	<i>Labeo bata</i>	-	+	-	-
	<i>Puntius chola</i>	-	-	-	+
Bagridae	<i>Mystus cavasius</i>	+	+	-	+
	<i>Mystus seenghala</i>	+	+	-	+
Siluridae	<i>Wallago attu</i>	-	+	-	+
Claridae	<i>Clarius batrachus</i>	+	+	-	+
Cichlidae	<i>Oreochromis mossambicus</i>	+	+	-	+
	<i>Etroplus maculatus</i>	-	+	-	+
Channidae	<i>Channa punctatus</i>	-	+	-	+
	<i>Channa striatus</i>	-	+	-	+

+ = Positive ; - = Negative ; C = Cultivable fishes  
F = Food fishes ; S = Sports fishes ; O = Ornamental fishes

In the present study average values of water quality parameters obtained monthly basis during February 2020 to January 2022 is depicted in table-1. Atmospheric temperature varied from highest 25.1°C and 25.2°C in the May 2020 and 2021 lowest values recorded 21.1°C and 22.9°C October 2020 and November 2021 respectively. Water temperature highest recorded 23.4°C and 23.1°C in the month of April 2020 and May 2021 respectively. Similarly lowest values 20.1°C in November 2020 and 21.1°C in December 2021. The pH values ranged from 7.3 to 8.9 in the year 2020-21. Similarly 7.2 to 9.3 in the year 2021-22. Maximum values observed during monsoon season might be due to increased photosynthetic activity.

The values of Dissolved oxygen values varied from 41.9 mg/l in February 2020 to 5.8 mg/l in December in 2020 and 1.6 mg/l in April 2021 to 6.5 mg/l in the month of December-2021. Total alkalinity values obtained higher 456 mg/l in October 2020 and 512mg/l in May 2021 and lower values in 191 mg/l in October 2020 and 181 mg/l in the month of December 2021 respectively. The total hardness values ranged from 390 mg/l in the month of May 2020 and minimum 156 mg/l in the month of October 2020 and subsequently higher values obtained 420 mg/l in Sept 2020 and lowest 154 mg/l in the month of December 2021, respectively. The total dissolved solids were more during 1152 mg/l in April 2020 and 1136 mg/l in May 2021 summer and monsoon

season and lower values 454 mg/l in October 2020 and 406 mg/l in December 2021 recorded in Northeast monsoon season.

The chloride has been recorded highest 310 mg/l and 274 mg/l in the month of February 2020 and 2021 respectively, similarly lowest 135 mg/l and 65 mg/l in the month of October 2020 and December 2021 respectively. The turbidity values maximum observed highest 86 mg/l and 90 mg/l during May 2020 and 2021. Lower values has been recorded 25 mg/l in November 2020 and 14 October 2021. Araoye<sup>3</sup> had also reported that high flood results in increased turbidity and this reduces dissolved oxygen.

Biological Oxygen Demand observed highest 38 mg/l in February 2020 and 32 mg/l April 2021 respectively and 8mg/l in October 2020 and 3mg/l in November 2021 respectively.

In the present investigation 15 species of fishes belonging to 11 genus and 7 families are recorded from the Chikkere water body has highest 7 species recorded from family Cyprinidae, Bagridae 02, Siluridae 01 species, Claridae 01 species, Cichlidae 02 and Channidae 02 species.

Cyprinids dominated the species list comprising most of the endemic species as has been reported previously by other studies<sup>12,13</sup>. in South Asian streams. The dominance of cyprinids in the tropical Indian rivers is due to their high adaptive variability<sup>9</sup>. The diversity of fishes is mainly depending on the biotic and abiotic factors and types of ecosystem (lentic and lotic habitat), age of the water body, mean depth, water level fluctuations, bottom

topography and hydrobiological features have great ecological implications<sup>4,15</sup>. Similar results were observed by Sanjay & Prakash<sup>11</sup> Yadav and Sharma<sup>17</sup>.

The study could be concluded that physicochemical parameters of the Chikkere water body are within the permissible limit except electrical conductivity, total dissolved solids and BOD. 15 species of fish fauna belonging to 4 family, 11 genus are observed still better fisheries activities can be managed by the interest of the government and local fisherman provided it is monitored for eutrophication. As the Dissolved oxygen concentration is comparatively low in summer it needs to be maintained towards little higher concentration. Though the physicochemical parameters are within permissible limit but the Chikkere water body is moderately eutrophicated. The study was to document the diversity of fish fauna, economically important of fishes, status and CPP of fish species of Chikkere water body. We recommend the adoption of scientific fishery management.

#### **Conflict of interest**

There is no conflict of interest.

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