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Fresh Water Fish Distribution and Diversity of the Cauvery River at Mukkombo Region in Tamil Nadu, India

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ABSTRACT

Fresh water is critical to human society and sustains all terrestrial ecosystems. Even though India has a large spread of fresh water resources, most systems are threatened due to anthropogenic activities leading to serious threats to fish diversity. Hence conservation and management are critical to the interests of all humans, nations and governments and hence the present study. Results show that the system recorded 33 species belonging to six orders, 14 families and 19 genera. In terms of percentage, Cypriniformes formed 36.36%, followed by Siluriformes recording 33.33% and Perciformes (21.21%); while Osteoglossiformes, Mugiliformes and Anguilliformes each formed3.03% of the total fish species.

Introduction

Inland waters and fresh water biodiversity constitute a valuable natural resource in economic, cultural, aesthetic, scientific and educational terms (Vijaylaxmi et al., 2010). India has a large spread of fresh water resources in the form of rivers, canals, reservoirs, lakes, etc. with more than 10.86 million people being dependent on these systems and their fisheries (Sarkar et al., 2015). Fish forms the highest species diversity among all vertebral groups apart from its economic importance. India contributes about 11.72% of the global fish diversity (ICAR, 2010).

Fresh water biodiversity has declined faster than either terrestrial or marine biodiversity over the past 30 years (Jenkins, 2003). In parts of earth, declining river flow rates have been a major cause for species loss (Plafkin et al., 1989) and are likely to be further reduced by warming temperatures, reduced precipitation and increased withdrawal for

agricultural and other human uses (Vorosmarty et al., 2000).

Hence to achieve sustainable utilization of these resources, it is imperative to have appropriate planning for biodiversity conservation and management strategies. Thus, it is of utmost importance to have scientific information about the species as well as their ecosystems for moving towards biodiversity conservation. Hence, the present study was attempted to identify the species diversity of the Cauvery River at Mukkombo situated in Tamil Nadu.

Materials and methods

Study area

The aquatic system chosen for the present study was a station of River Cauvery at Upper Anicut, Tiruchirappalli District, Tamil Nadu. River Cauvery which is one of the sacred rivers of southern India, is the source of water for an extensive irrigation system and hydroelectric power. It has supported irrigated agriculture for centuries and served as the life blood of the ancient kingdoms and modern cities in the states of Karnataka and Tamil Nadu. This river is the very life-guard of Central Tamil Nadu's agriculture. The five districts (Karur, Namakkal, Tiruchirappalli, Thanjavur and Nagapattinam) which depend on the river for irrigation, produce over 40 per cent of the food crops of Tamil Nadu (Geethalakshmi et al., 2008). In addition to the agriculture, the rapid industrialization and urbanization along the river bank are the supporting pillars of the economic development of this part of the nation. On the other hand, environmental degradation is felt intensely in this area (Jayaram, 2000; Kalavathy et al., 2011). Thus this system is prone to more pollution.

For the present study the sampling site chosen was Upper Anicut or Mukkombu (Lattitude 10° 89′, Longitude 78° 58′) which is about 18 km west of Tiruchirappalli Junction. Mukkombu is about 685 m long and was built in the 19th century by Sir Arthur Cotton. Mukkombu is a beautiful picnic spot with various tourist attractions such as amusement park, childrens garden, sports, fish facilities, etc. With its cool atmosphere and green surroundings, Mukkombu serves as a perfect picnic destination for thousands of people from neighbouring districts. Usually in this region, water is found throughout the year eventhough the Mettur Dam remains closed for about two months in a year. Hence this region can be treated as perennial.

Data collection and analysis

Fish sampling was performed in 100 m reach of all the three sampling sites. Fishes were collected from different selected localities during the period from December 2016 to September 2017 with the help of local fishermen using different types on nets namely gill nets, cast nets and dragnets. Photographs were taken prior to preservation as formalin decolorizes the fish. Fishes brought to the laboratory were fixed in this solution in separate jars according to the size of species. Smaller fishes were directly placed in the formalin solution while larger fishes were given an incision on the abdomen before they were fixed. The fishes were labeled giving serial numbers, exact locality from where collected, date of collection and the local name of fish used in this region. Identification of fishes where carried out by following Talwar and Jhingran (1991).

Water samples were collected between 8 and 9 am and transported to the laboratory immediately for further analyses. Water temperature was measured at the time of sampling using a mercury thermometer while pH was measured with standard pH meter. Other parameters were analyzed in the laboratory according to the methods suggested by American Public Health Association (APHA, 1992).

Results and discussion

The various physico-chemical variables that were analysed during the period of study are presented in Table 1. With regard to fish diversity (Table 2), the present study recorded a total of 33 species

belonging to six orders (Cypriniformes, Siluriformes, Osteoglossiformes, Mugiliformes, Perciformes and Anguiliformes). The order Cypriniformes comprised of a single family (Cyprinidae) which recorded a total of 12 species belonging to eight genera. The order Siluriformes, however, was represented by six families (Siluridae, Schilbeidae, Sisoridae, Claridae, Heteropreustidae and Bagridae) recording a total of 11 species. Of this, Siluridae was represented by two species belonging to the genus *Ompok*, while Schilbeidae was represented by three species, one each belonging to the genus *Ailia*, *Clupisoma* and *Neotropius* respectively. Family *Claridae* was represented by two species, one each belonging to the genus *Clarius* and *Glyptothorax* respectively. On the other hand, family Sisoridae and Heteropneustidae were each represented by single species belonging to the genus *Bagrius* and *Heteropneustes* respectively.

Table 1. Order and Familywise list of fresh water fish in the Cauvery River at Mukkombo.

Order-wise Percentage	Family-wise Percentage	Total Species
Cypriniformes (36.36)	Cyprinidae (36.36)	12
Siluriformes (42.86)	Siluridae (6.06)	2
	Schilbeidae (9.10)	3
	Sisoridae (3.03)	1
	Claridae (6.06)	2
	Heteropneustidae (3.03)	1
	Bagridae (6.06)	2
Osteoglossiformes (7.14)	Notopteridae (3.03)	1
Mugiliformes (7.14)	Mugilidae (3.03	1
Perciformes (28.57)	Anabantidae (3.03)	1
	Channidae (9.09)	3
	Ambassidae (6.06)	2
	Gobiidae (3.03)	1
Anguilliformes	Anguillidae (3.03)	1

The order Osteoglossiformes and Mugiliformes were each represented by a single species. Osteoglossiformes recorded the presence of the family Notopteridae which in turn was represented by the genus *Notopterus* while Mugiliformes recorded the presence of the family Mugilidae which in turn was represented by the genus *Rhinomugil*. The order Perciformes was represented by seven species belonging to four families; while the family Anabantidae and Gobiidae were each represented by one species, Anabantidae recorded the presence of the genus *Anabas* while Gobiidae was represented by the genus *Glassogobius*. The family Channidae was represented by three species belonging to the genus *Channa* while the family Ambassidae was represented by two species one each belonging to the genus *Chanda* and *Parambassis* respectively. The order Anguilliformes was represented by a single species belonging to the family Anguillidae and recorded by the genus *Anguilla*.

Thus, an overall comparison between the various fishes in the level of Oder reveals that the maximum diversity was represented in Cypriniformes which recorded 12 species of fish followed by Siluriformes which recorded 11 species and then by Perciformes which recorded seven

species. Thus, in terms of percentage occurrence, Cypriniformes recorded 36.36% of the total fish species followed closely by Siluriformes recording 33.33% and then by Perciformes which recorded 21.21% of the total fish species. The other three Orders (Osteoglossiformes, Mugiliformes and Anguilliformes represented only 3.03% each of the total fish species.

Table 2. List of fresh water fish species recorded in the Cauvery River at Mukkombo.

Order : Cypriniformes	
Family : *Cyprinidae*	**Family: Heteropneustidae**
1. *Catlacatla*	21. *Heteropneustes fossils*
2. *Cirrhinusmrigala*	**Family: Bagridae**
3. *Cirrhinusreba*	22. *Mystuscavasius*
4. *Labeo dero*	23. *Mystusvittatus*
5. *Labeorohita*	**Order** : Osteoglossiformes
6. *Osteobramacotio*	**Family** : *Notopteridae*
7. *Punitusconchonius*	24. *Notopterusnotopterus*
8. *Punitusvittatus*	**Order** : Mugiliformes
9. *Raimasbola*	**Family** : *Mugilidae*
10. *Salmostomahorai*	25. *Rhinomugilcarsula*
11. *Schismatorhynchosnukta*	**Order** : Perciformes
12. *Tormussullah*	**Family** : *Anabantidae*
Order : Siluriformes	26. *Anabas testudineus*
Family : *Siluridae*	**Family** : *Channidae*
13. *Ompokbimaculatus*	27. *Channastriatus*
14. *Ompakpobda*	28. *Channa punctatus*
Family : *Schilbeidae*	29. *Channaorientalis*
15. *Ailiacoila*	**Family** : *Ambassidae*
16. *Clupisomagarura*	30. *Chanda nama*
17. *Neotropiuskhavalchor*	31. *Parambassisranga*
Family: Sisoridae	**Family** : *Gobiidae*
18. *Bagariusbagarius*	32. *Glassogobiusgiuris*
Family: Clariidae	**Order** : Antulliformes
19. *Clariasbatrachus*	**Family** : *Anguillidae*
20. *Glyptothoraxtrewavasae*	33. *Anguilla bengalensis*

Table 3. Physico-chemical parameters of the Cauvery River at Mukkombo.

S. No.	Parameter	Unit	Value
1.	pH		7.3 ± 0.7
2.	Water Temperature	°C	24.0 ± 0.8
3.	Air Temperature	°C	27.5 ± 1.1
4.	Turbidity	cm	38.6 ± 2.4
5.	Conductivity	µs/cm	210.5 ± 3.6
6.	Depth	m	4.4 ± 1.5
7.	Water velocity	km/h	13.6

A perusal of literature reveals that Sakhare (2001) while studying the fish diversity of Ujani wetland in Maharashtra recorded more than 21 species of fish with the dominant fish belonging to the order

Cypriniformes (4 species) followed by Osteoglosiformes, Perciformes and Channiformes all recording two species each. Yazdani and Singh (2002) while studying the fish resources of Bhima River in Indapur recorded 54 species of fish belonging to 15 families while Pawar et al. (2003) monitoring Sirur Dam in Nanded recorded 11 species of fish belonging to five orders. However, Menon (2004) while studying the fish diversity of Koyna River recorded 58 species in that system, while Khedkar (2005) studying the fish diversity of Nathsagar Reservoir in Aurangabad was able to record 67 fish species belonging to seven orders and 19 families. Shinde et al. (2009) while studying the fish diversity in Rawanwadi lake in Maharashtra recorded 29 species of fish dominated by Cypriniformes (11 species) followed by Perciformes (3 species). Later, Shinde et al. (2009a, b) while studying fish diversity of Harsool Savangi Dam in Aurangabad and Pravara River in Ahmednagar record 15 and 41 species respectively; while the Harsool Savangi Dam recorded 11 species of Cypriniformes and three species of Perciformes, the Pravara River recorded seven orders, 14 families and 26 genera. Among the various orders Cypriniformes formed the bulk (50%) followed by Siluriformes (19%), Perciformes (14%), Osteoglossiformes and Synbranchiformes (4.76%) and Mugiliformes and Beloniformes forming 2.38% each of the total fish species.

Vijayalaxmi et al. (2010) while monitoring the fish distribution in Mullameri River in Karnataka suggested that Cypriniformes formed the dominant group followed by Siluriformes, Channiformes, Mastacembiformes and Osteoglossiformes while Ubharhande et al. (2011) reported the ichthyofauna of Ambadi Dam comprised of 27 species belonging to eight orders, 11 families and 22 genera of which Cypriniformids dominated with 13 species forming 48.16% of the total fish species. On the other hand, Sanjay et al. (2012) while studying the Krishna River at Wai reported a total of 51 species belonging to 14 families and 13 genera while Sarkar et al. (2013) studying the fish diversity of River Gerua in Uttar Pradesh recorded a total of 87 species of fish belonging to six Orders, 22 families and 52 genera of which Cypriniformes comprised 12 species followed by Siluriformes(4 species) and Siluriformes (3 species) of fish. Ravindra et al. (2014) while reviewing the fish diversity of Maharashtra reported a total of 165 fish species belonging to nine Orders, 26 families and 82 genera.

A comparison of the fish fauna in the present study with that of others reveals comparable results with the studies of Slunde et al. (2009) and Ubharhande et al. (2011) and higher than the studies of Pawar et al. (2003), Shinde et al. (2009a) and Sakhare (2001) and lower than the studies of other workers. Nevertheless, it appears that all the workers reported the dominance of Cypriniformes in all the systems as was also noticed in the present study. Thus, it appears that the most common species that appears in Indian fresh water systems belong to this Order. However, there were differences in the composition of the species as well as with other Orders and families which suggests that each systems are unique thus necessitating to study each and every system however close they may be.

Conflict of interest statement

Authors declare that they have no conflict of interest.

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