



# A study on fish diversity in Pullazhi Kole Wetlands of Thrissur, India after the deluge of 2019

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## Abstract

Kole wetlands are the major fresh water wetlands of Kerala which spread into Thrissur and Malappuram districts. The study was conducted to record the diversity of fishes collected from Pullazhi Kole wetlands, Thrissur district, Kerala during the period from November 2019 to March 2020, after the deluge of 2019. 25 species of fishes belonging to 8 orders were identified. The species recorded are *Channa striatus*, *Channa marulius*, *Etroplus suratensis*, *Etroplus maculatus*, *Oreochromis mossambicus*, *Anabas testudineus*, *Nandus nandus*, *Puntius parrah*, *Puntius dorsalis*, *Dawkinsia filamentosa*, *Rasbora dandia*, *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*, *Amplypharyngodon melettinus*, *Mystus armatus*, *Mystus montanus*, *Wallago attu*, *Heteropneustes fossilis*, *Belone belone*, *Hemiramphus far*, *Anguilla bengalensis*, *Mastacembelus armatus*, *Valamugil seheli* and *Pygocentrus nattereri*. The presence of exotic predatory fish *Pygocentrus nattereri* is a significant observation in the present study which would result in the absence of 8 native fish species after the deluge. A significant reduction in number of native species and increase of exotic species was noticed during the study period.

**Keywords:** Kole wetlands, fish diversity, species composition, numerical abundance.

## Introduction

Kole wetlands are ecologically one of the richest areas with great diversity of biological species. They are highly productive ecosystems and comprised of small as well as large Kole habitats. These delicate ecosystems are destroyed mainly by anthropogenic stress caused by habitat destruction and floods. Fishes are considered as biological indicators of environmental degradation. Fishes are sensitive to changes in water quality due to its deterioration. So this study is undertaken to assess the fish diversity in Kole wet lands of Thrissur.

Sayed Ahmadreza Hashemi *et al.*<sup>1</sup> pointed that the study has shown that fish species composition, distribution and abundance in Shadegan Wetland. Md. Abusayed Jewel *et al.*<sup>2</sup> conducted a study of fish assemblage and diversity indices in Lakhandaha Wetland and Atari River of Bangladesh. Nur Hasyimah *et al.*<sup>3</sup> conducted study on the water quality, diversity and distribution of freshwater fishes in Negeri Sembilan. Pallavi Shukla and Ajay Singh<sup>4</sup> conducted study to compare fish diversity and physicochemical parameters in Aami river. The present study focus on the impact of the recently occurred floods on the distribution of indigenous as well as exotic fish species in the Kole wet lands of Thrissur.

## Materials and methods

Fishes were collected from Kole wetlands of Pullazhi (Valliyapaalam, Chilanka) with the help of local fisherman using gill net and cast net. Collected fishes were fixed in 10%

formalin solution. Photographs were taken and specimens identified by referring Day<sup>5</sup>.

## Results and discussion

The study indicates that Kole wetlands of Pullazhi show biological diversity with a few numbers of endangered species. When comparing with the species composition before the deluge, there was a decrease in the number of native species and increase in the number of exotic fish species due to the mixing up of water in the nearby place. 25 species belonging to 8 orders including 14 families were recorded in the study. Order Perciforme was represented with more families and species of fish in the study area. The species recorded are *Channa striatus*, *Channa marulius*, *Etroplus suratensis*, *Etroplus maculatus*, *Oreochromis mossambicus*, *Anabas testudineus*, *Nandus nandus*, *Puntius parrah*, *Puntius dorsalis*, *Dawkinsia filamentosa*, *Rasbora dandia*, *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*, *Amplypharyngodon melettinus*, *Mystus armatus*, *Mystus montanus*, *Wallago attu*, *Heteropneustes fossilis*, *Belone belone*, *Hemiramphus georgii*, *Anguilla bengalensis*, *Mastacembelus armatus*, *Valamugil seheli* and *Pygocentrus nattereri*. The most abundant order was Cypriniformes based on the total individuals recorded. The most abundant family was Cyprinidae. The most abundant genus was *Puntius*. Table-1 represents the detailed list of species.

A total number of 33 species of fishes belonging to 7 orders were recorded before the floods as given in Figure-1 and Table-2. The species identified were *Belone belone*, *Hemiramphus*

*far*, *Puntius parrah*, *Puntius dorsata*, *Puntius mahecola*, *Dawkinsia filamentosa*, *Catla catla*, *Amplypharyngodon melettinus*, *Cyprinus carpio*, *Labeo rohita*, *Danio malabaricus*, *Cirrhinus mrigala*, *Channa straita*, *Channa marulius*, *Channa gachua*, *Eetroplus maculatus*, *Eetroplus suratensis*, *Oreochromis mossambicus*, *Anabas testudineus*, *Parambassis dayi*, *Parambassis thomasi*, *Nandus nandus*, *Mystus armatus*, *Mystus oculatus*, *Mystus montanus*, *Arius arius*, *Wallago attu*, *Ompok bimaculatus*, *Heteropneustes fossilis*, *Clarias macrocephalus*, *Anguilla bengalensis*, *Mastacembelus armatus* and *Valamugil seheli*.

Analysing the numerical abundance of species in both sites *Pygocentrus nattereri* was the dominant species. In site 1 (Table-3) *Hemiramphus georgii* was the second dominant Food & Ornament allowed by *Oreochromis mossambicus* and *Belone belone*. *Wallago attu* was the least represented species in this site. In site 2 (Table-4) *Dawkinsia filamentosa* was equally dominant as *Pygocentrus* spp. *Puntius dorsalis* and *Puntius paraah* were the next dominant ones and *Anguilla bengalensis* was the least represented species.

The Fishes of India, the classical work contributed by Francis Day<sup>6</sup>, is the milestone in the history of Ichthyology in Kerala. Inasu<sup>7</sup> studied the systematic and bionomics of some inland fishes in Thrissur District. Easa and Shaji<sup>8</sup> made a description about the freshwater fish biodiversity in Kerala. Biju *et al.*<sup>9</sup> and Mercy *et al.*<sup>10</sup> conducted studies on the freshwater fish fauna of Kerala in recent years.

Sebastian *et al.*<sup>11</sup> conducted fish faunal survey of Kolleru lake and reported 92 species of fishes belonging to 13 orders, 34 families and 57 genera. In the present study also Cypriniformes was the dominant group with 8 species. A total of 115 species belonging to 58 genera of 27 families and 10 orders of fishes were previously recorded from the rivers of Kerala. The most abundant family was Cyprinidae with representative from 20 genera. The most abundant genus was *Puntius*<sup>12</sup>. The present study also agrees with his findings. The study conducted by A G Devi Prasad *et al.*<sup>13</sup> showed that there were 40 species of fish endemic in the wetlands of Mysore, their number decreased with introduction of more exotic species. The findings of the study also support the present study. The introduction of *Oreochromis mossambicus* and *Pygocentrus nattereri* caused the reduction in the number of native fish species which is a significant observation in the present study.

The study of Bam Bahadur Oli *et al.*<sup>14</sup> on the seasonal variation in water quality and fish diversity of Rampur Ghol, Central Nepal showed that Rampur Ghol is rich in fish fauna with 22 species included in 13 families and 5 orders and also the study showed significant decline of fish species as well as their abundance from the past studies. In the present study the wetland fish fauna is comprised of 26 species belonging to 8 orders. The findings of Oli agree with the decline in the fish species in the study area from past studies. The findings of Arun

kumar Shetty *et al.*<sup>15</sup> shows that the species composition varied longitudinally in relation to the environmental factors of the habitat. Diversion of water, discharge of domestic sewage invasion of alien species and agricultural runoff fish were prominent among the disturbances that alter habit quality. Present study agrees with his findings.

Archis R Grubh and Kirk O Winemiller<sup>16</sup> reported *Chanda nama*, *Pseudotropheus maculatus*, *Rasbora daniconius* and *Danio aequipinnatus* as dominant species in their study. In the present study only *Rasbora daniconius* was reported and others were not recorded. In the present study the dominant species include the genus *Puntius*, *Belone*, *Hemiramphus* and exotic species *Oreochromis mossambicus*, *Pygocentrus nattereri*, and carp.

Pallavi Shukla and Ajay Singh<sup>4</sup> reported 18 fish species belonging to 6 order, 11 family and 17 genera. Order Cypriniformes was the most abundant, besides this order Beloniformes, Synbranchiformes, Perciformes; Siluriformes were present but in reduced number. The present study agreed with their findings. Of this order Characiformes, Mugiliformes and Anguilliformes were also reported in the present study.

Biju *et al.*<sup>9</sup> made a survey of hill stream fishes of Kerala and collected this from Chalakudy, Periyar, Karuvannur, Muvattupuzha, Pamba, Valapattanam, Kuttiyadi, Chaliyar and Bharathapuzha rivers in Kerala. During the study the fish species *Wallago attu*, *Clarius batrachus*, *Heteropneustes fossilis*, *Pangasius pangasius*, *Macropodus*, *Aplocheilichthys*, Gourami, Common carp, Silver carp, Guppy, Tilapia, Grass carp were collected in large numbers from the two study sites.

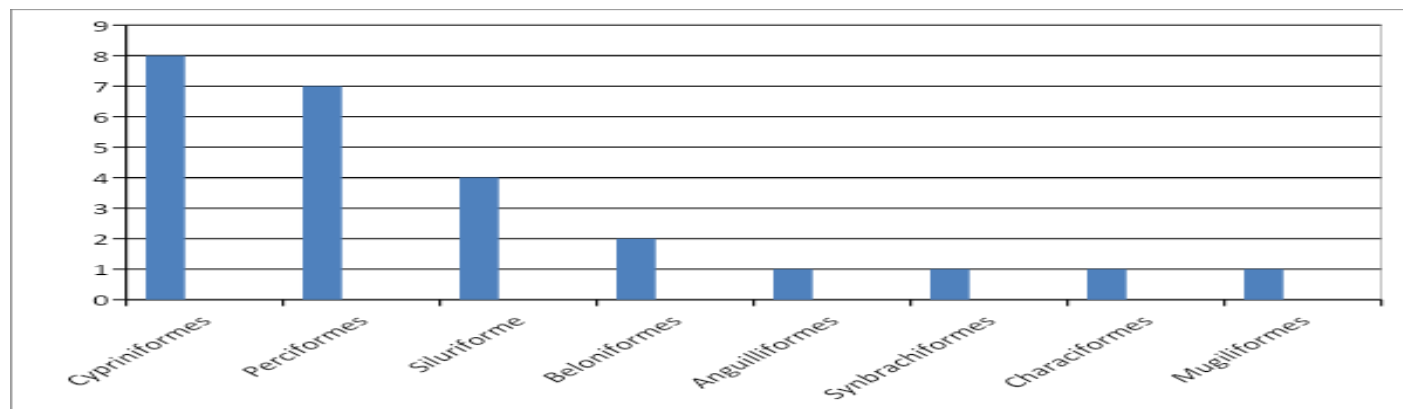
## Conclusion

The present study on the fish diversity in Pullazhi Kule wetlands of Thrissur after the deluge during the period November 2019 to March 2020 recorded 25 species of fishes belonging to 8 orders. The species are *Channa striatus*, *Channa marulius*, *Eetroplus suratensis*, *Eetroplus maculatus*, *Oreochromis mossambicus*, *Anabas testudineus*, *Nandus nandus*, *Puntius parrah*, *Puntius dorsalis*, *Dawkinsia filamentosa*, *Rasbora dandia*, *Catla catla*, *Labeo rohita*, *Cirrhinus mrigala*, *Amplypharyngodon melettinus*, *Mystus armatus*, *Mystus montanus*, *Wallago attu*, *Heteropneustes fossilis*, *Belone cancellata*, *Hemiramphus georgii*, *Anguilla bengalensis*, *Mastacembelus armatus*, *Pygocentrus nattereri* and, *Valamugil seheli*. Among the 25 species, six have been identified as vulnerable species. They are *Puntius parrah*, *Heteropneustes fossilis*, *Mystus armatus*, *Labeo rohita*, *Cirrhinus mrigala*, *Oreochromis mossambicus*. After the flood a significant decline in the number of native species was observed. A predatory fish named as *Pygocentrus nattereri* is reported for the first time in this study area. The increase in number of this fish causes the decline in the native species and they proliferate in the Kule wetlands. *Puntius mahecola*, *Channa gachua*, *Parambassis dayi*, *Parambassis thomasi*, *Mystus oculatus*, *Arius arius*, *Ompok bimaculatus* and *Clarias macrocephalus* were not observed during the study period after the deluge which is a significant observation.

**Table-1:** List of fish species identified from Kole wetlands station I and II during the study period.

| Family               | Scientific Name                                   | Conservation (IUCN status) | Vernacular Name     | Potential Value   | Status in Kole wetland      |
|----------------------|---------------------------------------------------|----------------------------|---------------------|-------------------|-----------------------------|
| Order- Perciformes   |                                                   |                            |                     |                   |                             |
| Channidae            | <i>Channa striata</i>                             | Least concern              | Varayan varal, Bral | Food & Ornamental | Common (100≤500)            |
|                      | <i>Channa marulius</i>                            | Least concern              | Cheeran, Pullivaka  | Food & Ornamental | Common (100≤500)            |
| Cichilidae           | <i>Eetroplus suratensis</i>                       | Least concern              | Karimeen            | Food & Ornamental | Common (100≤500)            |
|                      | <i>Eetroplus maculatus</i>                        | Least concern              | Pallathi            | Food & Ornamental | Common (100≤500)            |
|                      | <i>Oreochromis mossambicus</i>                    | Vulnerable                 | Tilapia             | Food & Ornamental | Abundant (number above 500) |
| Anabantidae          | <i>Anabas testudineus</i>                         | Endangered                 | Karippidi, Kalluthi | Food & Ornamental | Common (100≤500)            |
| Nandidae             | <i>Nandus nandus</i>                              | Least concern              | Porikk, Muthukila   | Food & Ornamental | Common (100≤500)            |
| Order- Cypriniformes |                                                   |                            |                     |                   |                             |
| Cyprinidae           | <i>Puntius parrah</i>                             | Vulnerable                 | Parapara            | Food & Ornamental | Abundant (number above 500) |
|                      | <i>Puntius dorsalis</i>                           | Least concern              | Paral               | Food & Ornamental | Abundant (number above 500) |
|                      | <i>Dawkinsia filamentosa</i>                      | Least concern              | Poovali paral       | Food & Ornamental | Abundant (number above 500) |
|                      | <i>Rasbora dandia</i>                             | Least concern              | Thupalam kothi      | Ornamental        | Abundant (number above 500) |
|                      | <i>Catla catla</i>                                | Least concern              | Catla               | Food & Ornamental | Common (100≤500)            |
|                      | <i>Labeo rohita</i>                               | Least concern              | Rohu                | Food & Ornamental | Common (100≤500)            |
|                      | <i>Cirrhinus mrigala</i>                          |                            | Mrigal              | Food & Ornamental | Common (100≤500)            |
|                      | <i>Amplypharyngodon melettinus</i>                | Least concern              | Vayambu             | Ornamental        | Common (100≤500)            |
| Order- Siluriformes  |                                                   |                            |                     |                   |                             |
| Bagridae             | <i>Mystus armatus</i>                             | Least concern              | Kallankoori         | Food & Ornamental | Common (100≤500)            |
|                      | <i>Mystus montanus</i>                            | Vulnerable                 | Malayankoori        | Food & Ornamental | Common (100≤500)            |
| Siluridae            | <i>Wallago attu</i>                               | Least concern              | Attuvala            | Food & Ornamental | Rare (10≤99)                |
| Heteropneustidae     | <i>Heteropneustes Food &amp; Ornamentalssilis</i> | Vulnerable                 | Kadu                | Food & Ornamental | Common (100≤500)            |
| Order- Beloniformes  |                                                   |                            |                     |                   |                             |
| Belonidae            | <i>Belone cancila</i>                             | Least concern              | Kolan               | Food & Ornamental | Abundant (number above 500) |

|                         |                              |                 |           |                   |                             |
|-------------------------|------------------------------|-----------------|-----------|-------------------|-----------------------------|
| Hemiramphidae           | <i>Hemiramphus georgii</i>   | Least concern   | Half beak | Food & Ornamental | Abundant (number above 500) |
| Order- Anguilliformes   |                              |                 |           |                   |                             |
| Anguillidae             | <i>Anguilla bengalensis</i>  | Near Threatened | Malinjal  | Food & Ornamental | Rare (10≤99)                |
| Order- Synbranchiformes |                              |                 |           |                   |                             |
| Mastacembelidae         | <i>Mastacembelus armatus</i> | Least concern   | Aral      | Food & Ornamental | Rare (10≤99)                |
| Order- Characiforms     |                              |                 |           |                   |                             |
| Serrasalminae           | <i>Pygocentrus nattereri</i> | Not evaluated   | Nutter    | Food & Ornamental | Very rare(less than 10)     |
| Order- Mugiliformes     |                              |                 |           |                   |                             |
| Mugilidae               | <i>Valamugil seheli</i>      | Least concern   | Mullet    | Food & Ornamental | Very rare(less than 10)     |



**Figure-1:** Order wise composition of the fish species in the Kole wetlands of Pullazhi.

**Table-2:** Species composition before the deluge of 2019.

| Order         | Family        | Scientific Name                   |
|---------------|---------------|-----------------------------------|
| Beloniformes  | Belontiidae   | <i>Belone belone</i>              |
|               | Hemiramphidae | <i>Hemiramphus far</i>            |
| Cypriniformes | Cyprinidae    | <i>Puntius parrah</i>             |
|               |               | <i>Puntius dorsalis</i>           |
|               |               | <i>Puntius mahecola</i>           |
|               |               | <i>Dawkinsia filamentosa</i>      |
|               |               | <i>Catla catla</i>                |
|               |               | <i>Amplypharngodon melettinus</i> |
|               |               | <i>Cyprinus carpio</i>            |
|               |               | <i>Labeo rohita</i>               |
|               |               | <i>Danio malabaricus</i>          |
|               |               | <i>Cirrhinus mrigala</i>          |
| Perciformes   | Channidae     | <i>Channa striatus</i>            |
|               |               | <i>Channa marulius</i>            |
|               |               | <i>Channa gachua</i>              |

|                  |                  |                                |
|------------------|------------------|--------------------------------|
|                  | Cichlidae        | <i>Etroplus maculatus</i>      |
|                  |                  | <i>Etroplus suratensis</i>     |
|                  |                  | <i>Oreochromis mossambicus</i> |
|                  | Anabantidae      | <i>Anabas testudineus</i>      |
|                  | Ambassidae       | <i>Parambassis dayi</i>        |
|                  |                  | <i>Parambassis thomassi</i>    |
|                  | Nandidae         | <i>Nandus nandus</i>           |
| Siluriformes     | Bagridae         | <i>Mystus armatus</i>          |
|                  |                  | <i>Mystus oculatus</i>         |
|                  |                  | <i>Mystus montanus</i>         |
|                  | Ariidae          | <i>Arius arius</i>             |
|                  | Siluridae        | <i>Wallago attu</i>            |
|                  |                  | <i>Ompok bimaculatus</i>       |
|                  | Heteropneustidae | <i>Heteropneustes fossilis</i> |
|                  | Claridae         | <i>Clarias macrocephalus</i>   |
| Anguilliformes   | Anguillidae      | <i>Anguilla bengalensis</i>    |
| Synbranchiformes | Mastacembelidae  | <i>Mastacembelus armatus</i>   |
| Mugiliformes     | Mugilidae        | <i>Valamugil seheli</i>        |

**Table-3:** Numerical abundance of fish species at Site 1–Valliyapaalam.

| Taxa (sps)                         | Numbers |
|------------------------------------|---------|
| <i>Etroplus maculatus</i>          | 56      |
| <i>Puntius parrah</i>              | 90      |
| <i>P.dorsalis</i>                  | 82      |
| <i>Dawkinsia filamentosa</i>       | 94      |
| <i>Rasbora dandia</i>              | 74      |
| <i>Catla catla</i>                 | 25      |
| <i>Amplypharyngodon melettinus</i> | 40      |
| <i>Mastacembelus armatus</i>       | 24      |
| <i>M. montanus</i>                 | 25      |
| <i>Wallago attu</i>                | 9       |
| <i>Belone belone</i>               | 140     |
| <i>Hemiramphus georgii</i>         | 168     |
| <i>Oreochromis mossambicus</i>     | 150     |
| <i>Pygocentrus nattereri</i>       | 190     |
| <i>Valamugil seheli</i>            | 22      |
| <i>Cirrhinus mrigala</i>           | 34      |
| <i>Mystus armatus</i>              | 45      |

**Table-4:** Numerical abundance of fish species at Site 2 Chilanka.

| Taxa                               | Numbers |
|------------------------------------|---------|
| <i>Oreochromis mossambicus</i>     | 39      |
| <i>Pygocentrus nattereri</i>       | 96      |
| <i>Anguilla bengalensis</i>        | 12      |
| <i>Channa striatus</i>             | 39      |
| <i>C.marulius</i>                  | 36      |
| <i>Etroplus maculatus</i>          | 52      |
| <i>E.suratensis</i>                | 69      |
| <i>Anabas testudineus</i>          | 74      |
| <i>Nandus nandus</i>               | 48      |
| <i>Puntius parrah</i>              | 89      |
| <i>Puntius dorsalis</i>            | 92      |
| <i>Dawkinsia filamentosa</i>       | 96      |
| <i>Catla catla</i>                 | 48      |
| <i>Amplypharyngodon melettinus</i> | 39      |
| <i>Mastacembelus armatus</i>       | 29      |
| <i>M. montanus</i>                 | 23      |
| <i>Heteropneustes fossilis</i>     | 28      |
| <i>Labeo rohita</i>                | 32      |

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