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Fish Diversity, Abundance and Traditional Fish Harvesting Methods at Kole Wetlands of Thrissur, Kerala

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***Abstract:** Kole wetlands are the lungs of freshwater biodiversity. It protect wide range of biological diversity in earth. The fish diversity and abundance of Thrissur kole wetlands- part of Vembanadkole wetlands, Ramsar site were studied along with Traditional fish harvesting methods. The fish diversity and abundance of the kole wetlands were analysed on the monthly basis from December 2015 to August 2016. The identification of specimen's was carried out using standard methods. The study revealed that fish diversity of two kole wetlands of Thrissur were congenial for 29 fish species, belonging to 7 orders and 13 families. The Traditional fish harvesting methods employed by the fisherman folks were the Ottal, Koodu (Pathayakuruthy), Lines and Hooks, Spearing , Hand Picking and Hunting. The Shannon- Wiener diversity index and Simson's diversity index of different sampling sites was documented. The highest species diversity was recorded from site1. In this study out of 29 species, the Cypriniformes were dominant and most abundant order, followed by Perciformes, Siluriformes, Beloniformes, Synbranchiformes, Cyprinodontiformes and Anguilliformes. Regarding their conservation status (IUCN), fish diversity of Thrissur includes 21 species of Least concern, 2 species were of endangered, 5 species of vulnerable and one species of near threatened. This study reveals the necessity of the conservation of Thrissurkole wetlands has rich fish diversity.*
***Key words:** Fish diversity, Kole wetlands, Traditional fish harvesting method, Diversity index, Thrissur.*

I. INTRODUCTION

Wetlands are important and very crucial supporting places for biological diversity. Kole wetlands harbours large biological diversity provide many ecosystem services contribute to well being and proverty alleviation. There are three wetlands recently included in Ramsar site are the Vembanad Kole, Ashtamudi and Sasthamkotta. The import and fresh water kole wetland of Kerala lies from Thrissur to Malapuram district. Nowadays wetlands are diminished by human activity and it is true that the biological diversity decreased and many organisms get endangered. Wetland filling, pollution, sewage discharge causes the dangerous effects on the faunal community. Fishes are the best fresh water indicator organisms. the conservation of fish populations, ecosystem involves extensive surveys of fish population after and before the change occur. There are more places in kole wetlands than the other wetlands like rivers, streams and ponds for the organisms. In kole wetlands there are two types of conditions in which there are some water filled regions and partially water filled regions and land regions. In additional to this the kole wetlands flooded in monsoon and provides breeding season for fishes and some other organisms. This particular features than the other wetlands make the kole wetlands rich with biological diversity. There are so many fishes, birds, insects, mollusc, and other organisms than the other wetlands. Wetland ecosystems, including rivers, lakes, marshes, rice fields and coastal areas are provide good wealth to the diversity. In kerala there are a few wetlands of national importance. Thrissurkole wetlands are the part of Vembanadkole wetland (Ramsar site), provide 40% kerala's rice requirement and include small and large kole systems. These wetlands are the one of the great threatened wetlands in Kerala. So this study aimed to determine the fish diversity, abundance and traditional fish harvesting methods in Thrissurkole wetlands. Two collection sites were fixed covering the parts of the Thrissurkole lands. The selected sites were Edakkalathur and Puzhakkal.

Fishes are very important from the biodiversity point of view enjoying different ecosystems, habitats and niches of aquatic environment. Biodiversity indicates the potential of any aquatic system and also depicts its trophic status[32].Biological assessment is a useful alternative tool for assessing the ecological quality of aquatic eco systems since biological communities integrate the environmental effects of water chemistry[31].

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II. METHODOLOGY

Fishes were collected from the kole wetlands of Thrissur for a period of months(December 2015 – August 2016). The specimens collection was performed in 100 m reach of the sampling site during the study period. Fish were collected with the help of local fishermen using different types of nets namely gill nets and cast nets. Fishes brought to the Laboratory were fixed in 10% formalin solution in separate jars according to the area of collection. Photographs were taken in the field prior to preservation. The specimens were identified by referring the book of Day. F. (1865) and also with the help of taxonomists. Classification based on IUCN categorization was also done. The Traditional fish harvesting methods are observed and documented from kole wetlands a operation by direct visit. The diversity indices and evenness were calculated using suitable formula.

Shannon Wiener diversity index (H')

$H' = \sum pi \ln pi$

Where,

pi = Probable number of individual for i^{th} species.

n1= Abundance of the i^{th}species

N=The total abundance of species.

ln = Natural log.

Dominance can be calculated using the formula

$D = \sum pi^2$

Simson diversity index (S)= 1-D

Species evenness can be calculated by this formula

$E = H'/H_{max}$

A. Study Area

Thrissurkole wetlands is located kmat 10.35.35.3868" N, 76.8.8.9016 E from Thrissur town. Puzhakkalkole (site-I) is located at 10.485587 , 76.129288 covering an area of 9,522.35 hector kole wetland. Edakkalathurkole (site-I1) wetlands covers an area of 93.53 hector of paddy cultivating fields, located at 10.582806, 76.124572. This is the kole land is in Edakkalathur village and Kaiparambu village in Thrissur. These are the parts of Thrissurkole wetland, designated as Vembanadkole wetland, Ramsar site.

B. Map: Showing The Kole Wetlands Of Thrissur





III. RESULTS

A total of 29 species belonging to seven orders were recorded during the sampling period (December 2015- August 2016). The detailed list of species was represented in TABLE 1. The calculation of diversity index of the fish fauna during the sampling period have been presented in TABLE 2 .

TABLE 1

SL.NO	Scientific name	Conservation status (IUCN)	Vernacular names of fishes	Potential value
A	ORDER : PERCIFORMES			
	A. FAMILY : CHANNIDAE			
1	Channastriatus (Bloch, 1793)	LC	VarayanVaral, Bral.	FF*
2	Channagachua(Hamilton 1822)	LC	Itti, Vatton,Vattudi.	OT*
3	Channamarulius(Hamilton, 1822)	LC	Cheeran, Pullivaka	FF
	B. FAMILY : CICHLIDAE			
4	Etroplusmaculatus (Bloch, 1795)	LC	Potta, Pallathi	FA*
5	Etroplussuratensis	LC	Karimeen	FF
	C. FAMILY : AMBASSIDAE			
6	Parambassisthomassi(Day, 1870)	LC	Attunandan	FF
7	Parambassis day(Bleeker, 1874)	VU	Karunandan	FA*
	D. FAMILY: ANABANDIDAE			
8	Anabas testudineus(Bloch,1792)	EN	Karipidi, Kalluthi	FA*
	E. FAMILY : NANDIDAE			
9	Nandusnandus(Hamilton-buchanan, 1822)	LC	Porikk, Muthukkila	FF
B	ORDER : CYPRINIFORMES			
	F. FAMILY: CYPRINIDAE			
10	Esomusbarbatus(Halmilton, 1844)	LC	Paranparal, Vellimeeshaparal	OT*
11	Puntiusparrah(Day, 1865)	VU	Paraparal	FA*
12	Puntiusdorsalis(Jerdon, 1849)	LC	Paral	FA*
13	Puntiusfilamentosus (Valenciennes, 1844)	LC	Poovalliparal	FA*
14	Puntiusmahecola(Valenciennes, 1844)	EN	UrulanParal	FA*
15	Pethiavittatus(Day , 1865)	VU	KadumaliParal	OT
16	Rasboradandia(Hamilton – buchanan,1822)	LC	Kananon, Thupalamkothi	OR*
17	Amplypharyngodonmelettinus(Valenciennes, 1844)	LC	Vayambu	OR
18	Barbodessudnasutus (Valenciennes, 1842)	LC	Kadanna	OT
19	Catlacatla(Hamilton, 1822)	LC	Ctla	FF
20	Daniomalabaricus(Jerdon, 1849)	LC	Paral	FA
C	ORDER : CYPRINODONTIFORMES			
	G. FAMILY: APLOCHEILIDAE			
21	Aplocheiluslineatus(Arnold,1911)	LC	Manathukanni	OR*
D	ORDER : SILURIFORMES			
	H. FAMILY : BAGRIDAE			
22	Mystusarmatus(Day , 1865)	LC	Kallankoori	FA
23	Mystusmontanus (Jerdon, 1849)	VU	Malayankoori	FA
	I. FAMILY : SILURIDAE			
24	Wallagoattu(Schnider, 1801)	LC	Vala, Attuvala	FF

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25	Ompakbimaculatus(Bloch, 1794)	LC	Thomivala	FA
	J. FAMILY: HETEROPNEUSTIDAE			
26	Heteropneustesfossilis(Bloch ,1794)	VU	Kadu	FA
E	ORDER: BELONIFORMES			
	K. FAMILY : BELONIDAE			
27	Xenendodoncancila(Hamilton, 1822)	LC	Kolan	FA
F	ORDER: ANGUILLIFORMES			
	L. FAMILY : ANGUILLIDAE			
28	Anguilla bengalensis(Grey and Hardwicke, 1844)	NT	Malinjal	FF
G	ORDER: SYNBRACHIFORMES			
	M. FAMILY: MASTACEMBELIDAE			
29	Mastacembelusarmatus(Lacepede, 1800)	LC	Aral	FF

LC-Least concern, VU-Vulnerable, NT-Near threatened, EN-Endangered.
FF- Food fish, *FA*-Food and ornamental, *OR*-Ornamental, *OT*-Others
*Larvicidal

TABLE III
Diversity Indices of Two Different Kole Wetland Sites

	Site 1	Site 2
Taxa.species	25	23
Individuals	316	314
Dominance D	0.047810	0.050080
Simpson 1-D	0.9522	0.9499
Shannon H	3.2	3.143
Evenness e^H/S	0.7665	0.7476

A. Traditional Fish Harvesting Methods In Kole Wetlands Of Thrissur

1) Ottal: Ottal is a popular traditional fish harvesting method used in Thrissur. The ottal is made up of 100-150 bamboo (Bambusaarundinaceae) sticks. The bamboo is soaked in water for 20-25 days and sun dried. There by it becomes more strong and long lasted. Metal iron ring is used to tie the bamboo sticks. Iron ottals are also available now. The curing make the ottal more strong and insect resistant. The bamboo sticks are tied on iron ring and made into circular . The ottal is very common to the fisherman folks. They catch the fishes with a light. It is used to catch large fishes like Channastriatus, Wallagoattu, Channamarulius, Heteropneustes fossilis and Puntius species.

2) Koodu (Pathayakuruthi): Koodu is made up of Bamboo and Palmyra. It is also called as Kuruthi or Pathayakuruthi consisting of the two parts Thallakoodu or main body and Pillakoodu or extended broad tail and has 10 mm mesh size with 4-6 feet hight. Time and effort are essential for the manufacture of koodu and it can be operated with 3 or more persons. All type fishes can be obtained by this trap. It is operated at monsoon traditional fishery folks fix the koodu in the main canals. They fixed in the Fishes migratory path and the water current faces the moth of koodu. The dipped koodu operated with suitable water flow by which the fishes were entered along with the water current and get trapped in the koodu. Fishes are collected by lifting the koodu from the water flow.

3) Lines And Hooks: Lines and Hooks are also a common traditional fish harvesting method performed in thrissur. the fishing gear is small and lengthy, even a child can operate this gear. It consist of a long plastic line with hook at the bottom and a natural feed attached with there. The body is of slightly blended wooden pole operated by a person. The lines and hooks dipped in water and wait patiently for trapping. Fishes are entangled in hooks and suddenly the lines along with the hooks are lifted. The fish was removed from the hooks and again used. Only one fish is available at a time by this trap. The yield is small and mostly not commercial.

4) Spearing: Spearing is traditional fishing method. It is a long iron pole shooted a person to catch a fish. Mouth spearing is also practised the fisherman folks in which the spear is operated with mouth. Spearing requires only a strong iron pole (1-2m

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length) with a sharp end for penetrating fish body by hit. The spearing require skill and effort to locate and hit a fish. Large fishes like Channids, Clarids are appropriate for spearing. It is a selective fishing method with minimum yield.

5) *Hand Picking And Hunting:* Hand picking and hunting are the small scale traditional fish harvesting methods. It is performed for 3-5 days when water level is low and dried . The fishes like Channids, Heteropeustids, Anabas, etc. are collected from the clay mud bottom by Hand picking and Hunting. It usually played at night and large catches may obtain only by full night hunting.

IV. DISCUSSION

In the present study, 29 species of fishes belonging to 7 orders and 13 families were recorded from three kole wetlands of Thrissur during the period, December 2015 to August 2016. The most dominant order was group Cypriniformes. This order consisting of 11 species followed by order Perciformes with 9 species contributed and Siluriformes consisting of 5 species. Also recorded the order Beloniformes, Anguilliformes, Cyprinodontiformes and Synbranchiformes represented by single species. Some species such as Anabas testudineus and Puntiusmahecola were found to be endangered and 5 species of vulnerable were recorded. The Pethiavittatus, Puntiusparrah, Parambass is day, Heteropneustesfossilis and My stusmontanus are the vulnerable species got recorded. The Anguilla bengalensis is the Near Threatened species reported in this study. The status of some species contributing the fish diversity of the study area indicated that they faced a very high risk of extinction, but the area inhabited by such species, is the essential conservation part of an ecosystem which imparts the survival of threatened species as well. Nowadays Thrissurkolewetlands highly faces the habitat modifications and other anthropogenic activities. The Traditional fishing methods employed in Thrissurkole wetlands explore the Traditional wisdom. The Traditional fish harvesting methods employed in Thrissur by the fisherman folks were the Ottal, Koodu(Pathayakuruthy), Lines and Hooks, Spearing , Hand Picking and Hunting. Intervention of modern nets like gill net and cast net decrease the use of Traditional harvesting methods. These common methods are found eco- friendly and exert small pressure on the ecosystem. Conservation of Traditional knowledge is very essential in conservation of Traditional knowledge. So an urgent attention of conservationists and fishery science is required. The Shannon-Wiener diversity index (ranges 3.14-3.207) and Simson's diversity index (ranges .9499-.9522) of different sampling indicated that they showed short variation and were related. The highest species diversity was recorded from site I.

V. CONCLUSION

The present study reveals that kole wetlands of Thrissur is rich with 29 species of fishes caught from the two sites has rich diversity. Today many modification and degradation of kole wetlands of Thrissur by the civilisation and various modification results the extensive land degradation and disappearance of endangered fishes. Urgent conservation strategies are requiredand will help conservation of the ecosystem and fish fauna.

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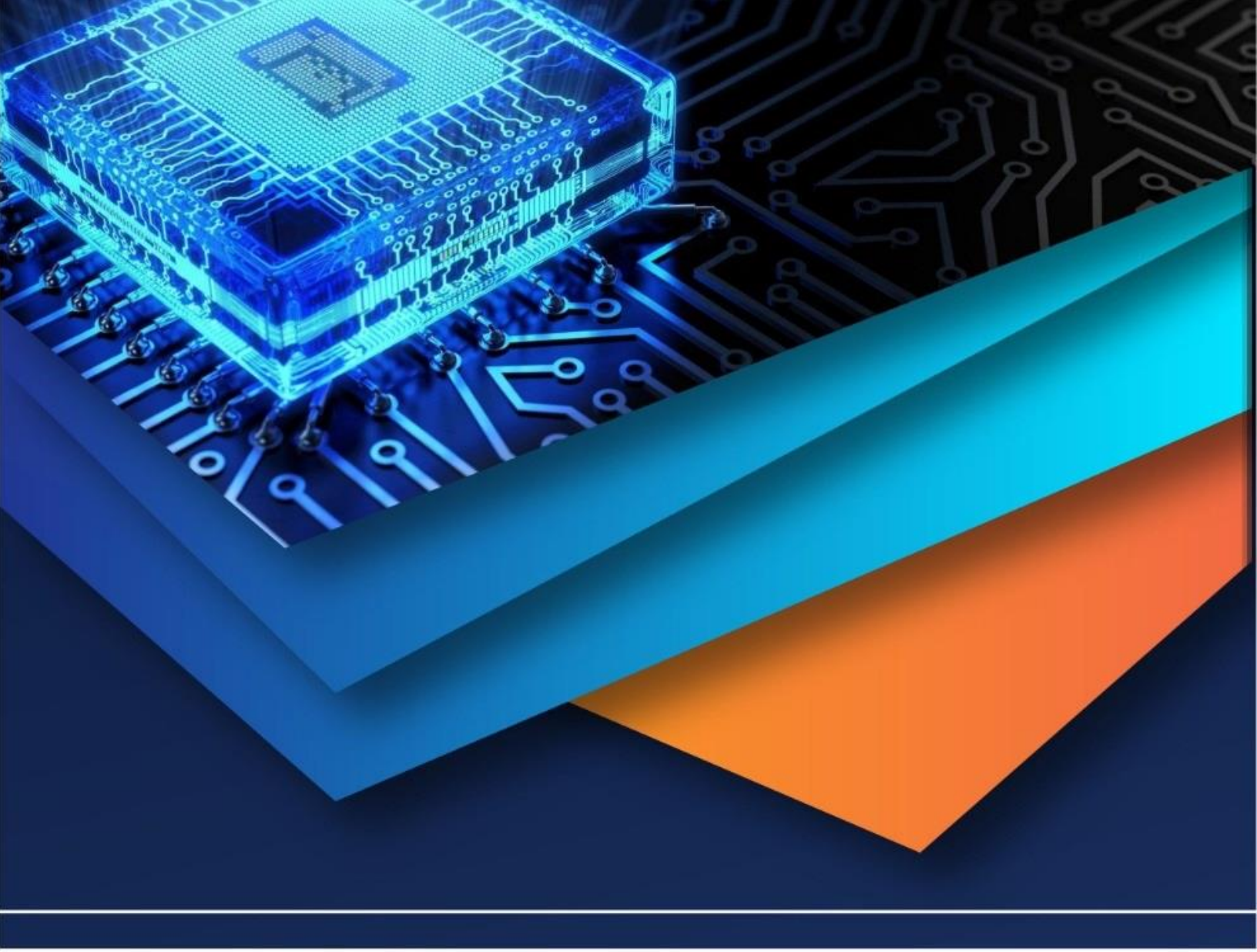
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