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First Report on Fishry Resources From Four Estuaries in Trivandrum District, Kerala, India

Fisheries

KEYWORDS : Back waters, Fishery resources, Fish landings, Conservation

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ABSTRACT

First report on the status of fisheries and seasonal variation in fish diversity in four selected estuaries (Pozhiyoor,Adimalathura,Poonthura and Kappil) of Trivandrum district, Kerala are included. During the present study, 134 species of fin fishes (belonging to 51 fin fish families), 6 species of Penaeid shrimps, 3 species of Palaemonid prawns, 7 species of crabs , 5 species of bivalves (4 mollusca families) were noticed. Fin fishes were the major group. Some of the fish species in the estuaries were observed as 'threatened' (Horabagrus brachysoma, Channa striatus, Channa marulius, Heteropneustes fossilis, Wallago attu and Parambassis thomasi). The study implies that temporal changes in fish landing pattern of the estuaries were mainly due to environmental variability, habitat modification and fish migration; under the influence of south-west monsoon and anthropogenic activities. Assessment is urgently needed on the spatial scales and dynamics of species richness from point samples to assemblages, impact on habitat and landscapes, especially in coastal areas of the tropics where threats to diversity are the greatest.

INTRODUCTION

The diversity of natural populations is partially dependent on the environmental variables which always affect the competing populations. Estuaries fulfill key roles in the life histories of a wide range of fish species, including sites for spawning, feeding, nursing, and migration. Throughout the world, estuaries are among the most modified and threatened environments. The brackish water environment is a unique ecosystem of high fertility, supporting natural fishery and having significant role in the rural economy of India (Thampi, 1973).

The south west coast of India is blessed with a series of wetland systems popularly referred to as backwaters and these kayals in Kerala are declining drastically in their quality due to anthropogenic interferences and this has resulted in decline in fish stocks mainly due to overfishing, in sufficient management and habitat degradation reduces the chances of sustainability and conservation. Estuaries are repository for several species of fin fishes and shell fishes. They are one of the finest nurseries and breeding grounds for a number of commercially as well as ecologically important species of fishes, prawns, crabs and mollusca of high nutritive (Bond, 1979) and pharmaceutical values (Pandey and Shukla, 2005). Estuaries are known to be an indispensable habitat to a variety of biologically and economically important resident and migratory aquatic fauna. A large variety of fishes inhabit the estuarine environment. Most of them are migratory marine species, which use this habitat in their early life cycle as a necessity. Some others are permanent residents which spend their entire life cycle in this ecosystem. Still others like anadromous and catadromous fishes use estuaries as a transitory abode during their migration from their spawning and their main feeding areas (Haedrich, 1983; Dando, 1984).

Backwaters are a preferred habitat for about 200 resident or migratory fish and shell fish species (Anon, 2005). India produces an average of 4.6 million t of fish annually from inland water bodies (Sugunan, 2010). The average yield of estuarine fish production in India was estimated to vary from 45 to 75 kg/ha (Sugunan, 2010). A substantial part of fish production in India is contributed by the estuaries, backwaters, coastal creeks and large brackish water tracts bordering the coast of India (Nair et al., 1983). The backwaters are found to be prominently existent in the southern half of Kerala coast, and most of the inland fishermen depend on these water bodies for their livelihood. Abundance and diversity of biotic community in back waters are influenced by the interaction of a series of physico chemical factors. In tropical estuaries, the fishery resources are characterized by economically, ecologically and biologically important resources and they provide food and income to common man. However, the health status of most of these estuaries in India, the present status of fishery resources with reference to the biomass, numbers and diversity of most of the backwaters in Kerala are lacking and hence it was thought worthwhile to conduct a detailed study on the total fishery resources (both fin fishes and shell fishes) of certain selected not yet studied back water system along the south west coast of India. As the first phase of the study four systems are surveyed and the present data on fishery resources were collected along with the compilation of existing information is made and included in this paper.

MATERIALS AND METHODS

For the present study four estuaries in Trivandrum district was selected and they are Pozhiyoor(PZR), Adimalathura(ADA), Poonthura(PTA) and Kappil(KPL). All these estuaries are comparatively small and shallow systems and are categorized under the bar-built/closed/blind estuary types except Kappil pozhi which is a permanently open system. The major turbulence in these shallow systems is caused by the wind and therefore, salinity variation is effected additionally by the inflowing stream of fresh water and due to the tidal influx. The sand bars of these estuaries will be either open due to monsoonal floods or in some cases they will be cut open manually and establishes their connection with the sea. Since there was not much information available on the fishery resources of some of the smaller estuaries prompted to do this study. Four estuaries which are little explored with reference to their fishery resources were selected as the study system and the details are presented in Figs. 1a-f.

Figs. 1a-f Location map showing study site

All the estuaries were surveyed and three different zones such as the fresh water zone (Head Estuary), brackish water zone (Mid Estuary) and the bar mouth region (End Estuary) was identified for detailed investigation and collection of fish samples. A landing center approach (LCA) was also adopted for collecting information on different species of fishes landed. Fish collection was done by visiting landing centers, local fish markets and interaction with fisher men community. Samples were also collected from the sites at the time of collection by way of gillnet and cast net operations. Samples were preserved in 10% formalin and identified using standard identification keys (Munro, 2000; Talwar and Jhingran, 1991; Fischer and Bianchi, 1984, www.fish base.com and Worms).This paper includes the data on the fin fishes and shell fishes collected along with the compilation of existing information on the fishery resources in four backwaters of Trivandrum district, Kerala during August 2013 to July 2014 based on availability of resources.

RESULTS AND DISCUSSION

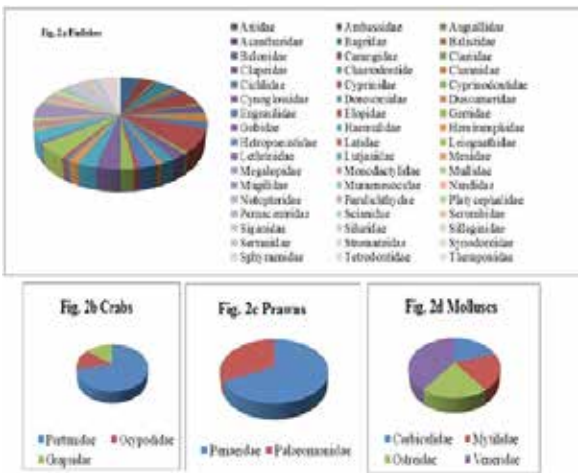
Apart from a few large estuaries (Cochin and Ashtamudi), only very little or in some cases virtually no information is available on the fishery resources and catch composition of other estuaries of Kerala mainly because of the traditional fishing methods used and the small daily catches compared to commercial fisheries. An attempt was made to fill this lacuna by way of collecting information on the fishery resources of 4 estuaries of Trivandrum district and the results are discussed in this paper. The collected and identified fishes were categorized in to four groups such as abundant, moderate, frequent and occasional. During the present study 134 species of fin fishes belonging to 51 family, 7 species of crabs, 9 species of prawns and 5 species of molluscs were collected from four estuaries selected (Table 1) Fishes like Etroplus maculatus, Etroplus suratensis, Mugil sp., Oreochromis mossambicus, Gerres spp., Caranx spp.,and Puntius spp., support good fishery in these estuaries.

Table, 1. Fish and shell fish resources in four back waters indicating their abundance

Sl No.	Family	Species name	Habitat	Abu	Mode	Freq	Rare	Occ
1	Ariidae	*Nemapteryx coelata* (Valenciennes)	E	A				
2		*Arius maculatus* (Thunberg)	E	A				
3		*Plicofollis platystomus* (Valenciennes)	M,E	A				
4		*Plicofollis dussumieri* (Valenciennes)	M,E	A				
5		*Arius subrostratus* (Valenciennes)	E	A				
6		*Arius jella* (Day)	E	A				
7	Ambassidae	*Ambassis ambassis* (Lacepede)	E,R	A				
8		*Ambassis gymnocephalus* (Lacepede)	M,E	A				
9		*Chanda nama* (Hamilton)	E,R	A				
10		*Parambassis thomasi* (Day)	E,R	A				
11	Anguillidae	*Anguilla bicolorbicolor* (McClelland)	M,E	A				
12	Acanthuridae	*Acanthurus mata* (Cuvier)	M		M			
13	Bagridae	*Horabagrus brachysoma* (Gunther)	E,R		M			
14		*Mystus keletius* (Valenciennes)	E	A				
15		*Mystus malabaricus* (Jerdon)	E	A				
16		*Mystus oculatus* (Valenciennes)	E	A				
17		*Mystus gulio* (Hamilton)	E	A				
18	Balistidae	*Odonus niger* (Ruppell)	M		M			
19		*Balistes retundatus* (Marion de Procé)	M	A				
20	Belonidae	*Xenentodon cancila* (Hamilton)	M,E	A				
21		*Strongylura strongylura* (Van Hasselt)	M,E	A				
22	Carangidae	*Atule mate* (Cuvier)	M,E	A				
23		*Alepes melanoptera* (Swainson)	M,E	A				
24		*Carangoides praeustus* (Bennett)	M,E	A				
25		*Caranx sexfasciatus* (Quoy &Gaimard)	M,E	A				
26		*Caranx ignobilis* (Forsskal)	M,E	A				
27		*Scomberoides lysan* (Forsskl)	M,E	A				
28		*Trachinotus blochii* (Lacepede)	M		M			
29	Clariidae	*Clarias brachysoma* (Gunther)	E,R	A				
30	Clupeidae	*Sardinella longiceps* (Valenciennes)	M,E	A				
31		*Tenualosa reevesii* (Richardson)	M,E	A				
32		*Escualosa thoracata* (Valenciennes)	M,E	A				
33		*Pellona ditchela* (Valenciennes)	M,E	A				
34		*Nematalosa nasus* (Bloch)	M,E,R	A				
35	Chaetodontide	*Chaetodon xanthocephalus* (Bennett)	M	A				
36	Channidae	*Channa channa* (Forsskal)	M,E		M			
37		*Channa marulius* (Hamilton)	R		M			
38		*Channa striata* (Bloch)	R	A				
39		*Channa micropeltes* (Cuvier)	R		M			
40	Cichlidae	*Oreochromis mossambicus* (Peters)	E,R		M			
41		*Etroplus suratensis* (Bloch)	E,R	A				
42		*Etroplus maculatus* (Bloch)	E,R	A				
43	Cyprinidae	*Puntius dorsalis* (Jerdon)	E,R	A				
44		*Dawkinsia filamentosa* (Valenciennes)	E,R	A				
45		*Puntius mahecola* (Valenciennes)	E,R	A				
46		*Puntius Sahyadrensis* Silas	E,R	A				
47		*Labeo dussumieri* (Valenciennes)	E,R	A				
48		*Labeo rohita* (Hamilton)	R	A				
49		*Amblypharyngodon mola* (Hamilton)	R	A				
50		*Cyprinus carpioi Linnaeus)*	R			F		
51		*Catla catla* (Hamilton- Buchnan)	R			F		
52		*Hypselobarbus curmuca* (Hamilton)	R			F		
53		*Barilius canarensis* (Jerdon)	E	A				
54	Cyprinodontidae	*Aplocheilus lineatus* (Valenciennes)	E,R			F		
55	Cynoglossidae	*Cynoglossus bilineatus* (Lacepede)	M,E	A				
56		*Cynoglossus puncticeps* (Richardson)	M,E	A				
57		*Cynoglossus cynoglossus* (Hamilton)	M,E	A				
58	Dorosomidae	*Anodontostoma chacunda* (Hamilton)	M		M			
59	Dussumieriidae	*Dussumieria hasseliti* (Bleeker)	M,E	A				
60	Engraulidae	*Thryssa malabarica* (Bloch)	M,E	A				
61		*Thryssa mystax* (Bloch & Schneider)	M,E	A				
62		*Stolephorus commersonii* (Lacepede)	E,R	A				
63		*Stolephorus indicus* (Van Hasselt)	M	A				
64	Elopidae	*Elops machnata* (Forsskl)	E			F		
65	Gerreidae	*Gerres setifer* (Hamilton)	M,E	A				
66		*Gerres filamentosus* (Cuvier)	M,E	A				
67		*Gerres oyena* (Forsskl)	M,E	A				
68	Gobiidae	*Oxyurichthys formosanus* (Nichols)	E			F		
69		*Oxyurichthys tentacularis* (Valenciennes)	E			F		
70		*Glossogobius giuris* (Hamilton- Buchnan)	E		M			
71		*Oligolepis acutipennis* (Valenciennes)	M,E				R	
72		*Oxyurichthys microlepis* (Bleeker)	M,E	A				
73	Haemulidae	*Pomadasys furcatus* (Bloch & Schneider)	M,E	A				
74		*Pomadasys maculatus* (Bloch)	M,E		M			
75		*Pomadasys argenteus* (Forsskl)	M,E	A				
76		*Plectorhyncus niger* (Cuvier)	M	A				O
77	Hemiramphidae	*Zenarchopterus dispar* (Valenciennes)	E,R					
78		*Hyporhamphus xanthopterus* (Valenciennes)	E		M			
79	Heteropneustidae	*Heteropneustes fossilis* (Bloch)	R		M			
80	Latidae	*Lates calcarifer* (Bloch)	M,E,R	A				
81	Leiognathidae	*Gazza achlamys* (Jordan & Starks)	M,E	A				
82		*Gazza minuta* (Bloch)	M,E	A				
83		*Secutor insidiator* (Bloch)	M,E	A				
84		*Leiognathus brevirostris* (Valenciennes)	M,E					
85		*Eubleekeria splendens* (Cuvier)	M,E			F		
86		*Leiognathus dussumieri* (Valenciennes)	M,E			F		
87		*Leiognathus equulus* (Forsskl)	M,E				R	
88	Lethrinidae	*Lethrinus reticulatus* (Valenciennes)	M,E			F		
89	Lutjanidae	*Lutjanus argentimaculatus* (Forsskl)	M,E	A				
90		*Lutjanus johni* (Bloch)	M,E	A				
91		*Lutjanus russellii* (Bleeker)	M,E	A				
92		*Lutjanus lutjilamma* (Forsskal)	M,E	A				
93		*Lutjanus kasmira* (Forsskal)	M,E		M			
94	Mensidae	*Mene maculata* (Bloch & Schneider)	M				R	
95	Mugilogidae	*Mugilogi cyprinoides* (Broussonet)	M,E,R	A				
96	Monodactylidae	*Trypauchen vagina* (Bloch & Schneider)	M,E				R	
97		*Monodactylus argenteus* (Linnaeus)	M,E	A				
98	Mullidae	*Upeneus vittatus* (Forsskl)	M	A				
99		*Parupeneus indicus* (Shaw)	M,E	A				
100	Mugilidae	*Liza parsia* (Hamilton)	M,E	A				
101		*Moolgarda seheli* (Forsskal)	M,E		M			
102		*Valamugil speigleri* (Bleeker)	M,E			F		
103		*Chelon planiceps* (Valenciennes)	M,E	A				
104		*Chelon macrolepis* (Smith)	M,E	A				
105		*Rhinomugil corsula* (Shaw)	M,E		M			
106		*Mugil cephalus* (Linnaeus)	M,E				R	

During the study a total number of 133 species were collected from Pozhiyoor, 146 spp.from Adimalathura, 140 spp.from Poonthura, and 139 spp.from Kappil. Among these estuaries, Adimalathura showed the highest number of species (140 spp.) and Pozhiyoor showed the least species diversity (133 spp.). The abundance of fish species in these estuaries were shown in Figs. 2a-d.

The species richness of fin fishes and shell fishes differs between estuaries and fresh water systems. Nair et al. (1983) reported 67 species of fishes belonging to 34 families from Kadinamkulam backwater and 97 species from Ashtamudy estuary. Kurup and Samuel (1987) recorded 150 species of fishes from Vembanadu Lake. Paravur Lake is reported to support 24 species (Shibu, 1991). George Thomas (1995) reported 23 species of fishes belonging to 18 families and 5 species of prawns under 2 families from the mangroves of Quilon, Kumarakom and Veli areas. Biju Kumar and Sushama (2000) gave the first report on the icthyo fauna of Ponnani estuary; it represented 112 species belonging to 14 orders, 53 families and 80 genera. Raju Kumar (2005) recorded 38 species from Anchuthengu back waters and Santhamma Jaishnimol Bhargavan (2007) 37 Species from Thottappally back water, Alleppey.



Figs. 2a-d Number of species in each family of fin- and shell-fishes

Shell fishes such as the prawns, crabs, and the molluscs like the clams and oysters constitute the major shell fish and molluscan resources of these estuaries. They are widely exploited for both meat as food and shell as raw material for industrial purposes (Appukkuttan et al., 1999) and hence are important income resource for local people. Perna viridis, Villorita cyprinoides and Crassostrea madrasensis are widely distributed and are important component of molluscan fauna of coastal waters of India.

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Diversified techniques and methods are employed in the estuaries for harvest of the fishery resources. Traditional fisherman change the gear and the different gears used for fishing in Kerala estuaries are gill nets, cast nets, pole and line, hook and line (angling), seine, scoop nets and traps. Diving, dredging and hand picking are also common practices particularly for crabs and molluscan harvest. Gill net is the major gear operated in all estuaries in Kerala, a variety of gill nets are used for different types of fishes and they are njanduvala, chemmeenvala, choodavala (Netholivala) and cast nets. In Kappil region, chooda vala, neetu vala, chala vala and nandal vala were most widely used. Chinese nets and stake nets/unni vala are the two main destructive methods of fishing nets employed in some back waters; however, the present study areas are free of these kinds of nets.

It is a well established fact that there are several anthropogenic interventions affecting the sustainability of floral and faunal resources. These include effluent discharge from factories/industries, organic pollution from various sources and land reclamation. Several stretches of backwaters are subjected to extreme organic or industrial pollution. A considerable area of the backwaters has already been lost due to reclamation for agricultural, mining, urban area development and similar activities, and therefore further encroachment or reclamation should be strictly curtailed.

The present study clearly indicated that these back waters contribute to a substantial quantity of the inland fish production of the region both for internal consumption and for export. While the shell fish fishery largely support the export markets (except M. dobsonii), the fishes satisfy the needs of the local populace. The unscientific operation of most of the indigenous fishing operation and the gears should not be encouraged and above all there should be clear guidelines and regulation for mesh size of nets operated along the backwaters. The unscientific method of fish catch should be controlled and a constant vigil on backwater fishing operation should be promoted and an authority with strict guideline on back water protection and sustainable utilization of its resources should be urgently implemented.

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REFERENCE

Anon, (2001). Ecology and fishery investigation in Vembanad Lake, CIFRI Bull.No.107, ISSN 0979-616X, p38. | [2]Anon, (2005). Fisheries and Environment Assessment in Selected Backwaters on the Southwest Coast of India, CIFRI (ICAR), Bulletin.139:144 . | [3]Appukuttan, K. K., Aravindan C.M., Yohannan T.M. and Balasubramaniam, N.K. (1999). Population dynamics of an exploited stock of Clam, P. malabarica of Ashtamudy Estuary (South India). In: Asian Fisheries Society, Indian branch, Mangalore, Karnataka, India. | [4]Bijukumar, A and Sushama, S. (2000). Ichthyo fauna of Ponnani estuary, Kerala. J. Mar. biol. Ass. India, 42(1&2): 182-189. | [5]Bond C. E. (1979). Biology of Fishes, Saunders College Publication, Philadelphia, 514pp. | [6]Dando, P.R. (1984). Reproduction in estuarine fish. Fish Reproduction In: POHS, G.W& Wotton,R.J. (eds.). American Press, London, 155-170pp. | [7]Fischer, W. and Bianchi, G. (1984). FAO species identification sheets for fishery purposes,Western Indian Ocean (Fishing area 51).FAO, Rome Volume 2. | [8]George Thomas(1995). Comparative Ecology of Three Selected Mangrove Ecosystems of Kerala, Southwest Coast of India. Ph. D.Thesis, University of Kerala. | [9]Haedrich, R. L.(1983). Estuarine Fishes. Estuaries and Enclosed Seas. Ecosystems of the World 26. In Ketchum, B.H.(ed.) Elsevier,Amsterdam,183-207. | [10] Kurup, B. M., and Samuel, C.T.(1987). Ecology and fish distribution pattern of a tropical estuary. Proc.Natn.Sem.Estuarine Management, 4-5 June, 1987. Trivandrum. | [11]Muguran,T., Divakaran, O., Nair, N.B. and Padmanabhan, K.G.(1980). Distribution and seasonal variation of the benthic fauna of the Veli Lake, south west coast of India, Indian J. Mar. Sci., 9: 184-188. | | [12]Nair, N. B., Krishnakumar, K., Rajasekharan Nair, J.R., Abdul Azis, P.K., Dharmaraj, K. and Arunachalam, M.(1983). Ecology of Indian estuaries XI. A preliminary survey of the fishery resources of Ashtamudi estuarine system. Fish. Technol., 20: 75-83. | [13]Pandey, K. and Shukla, J. P.(2005). Fish and Fisheries. Rastogi Publication, Meerut, 504. | [14] Rajukumar, B. (2005). Studies on the Fishes of Anchuthengu Backwater. Ph.D. Thesis, Univ. of Kerala, Kerala, India. | [15]Santhamma Jaishnimol Bhargavan, Tresa Radhakrishnan and Radhakrishnan, S.(2008). A preliminary account on the fishery resources of Thottappally Spillway Canal, Alappuzha, Kerala, Indian. J. Fish., 55(4):345-347 | [16]Shibu S. (1991). Ecology of Paravur Lake, Ph.D. Thesis, University of Kerala, Kerala, India. | [17]Sugunan, V. V.(2010). Inland fisheries resource enhancement and conservation in India. In: Miao, W., Sena, D. S., Brian, D. (Eds.), Inland Fisheries Resource Enhancement and Conservation -Asia, FAO, 22: 35-60 | [18]Talwar, P.K. and Jhingran, A. G. (1991). Inland Fisheries. Oxford and IBH Pub.Co.,New Delhi. | [19]Thampy, P.R.S.(1973). Culturable fish fry resources from brackish water environment. Proceedings of the Symposium on Living Resources of the Seas around India. CMFRI, Cochin. | [20]Vimal Raj, R. V., Binushma Raju, Soumya, W., Shibu, A., Lekshmi, S., Shibu Vardhanan, Y., Sruthi, S. and Tresa Radhakrishnan (2014). Fishery Diversity of Ashtamudi Lake, Kerala, India, J. Aquat. Biol. Fish., 2: 297-303. |