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A Preliminary study of selected fauna from wetlands adjacent to Kumarakom, Kottayam, Kerala

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ABSTRACT

Kumarakom is a marshy mangrove area located on the edge of the Vembanad Lake, the largest backwater in Kerala. It acts as a habitat for many marine and freshwater fish species. It is a home to a wide variety of flora and fauna. Kumarakom bird sanctuary is a noted bird sanctuary where many species of migratory birds visit. The bird sanctuary extends over 14 acres and is a major tourist attraction. Sampling was conducted for one year to study the faunal diversity. Fauna was identified using standard methods and photographs were taken as far as possible. Study on the Icthyofauna in Vembanad Lake adjacent to Kumarakom was conducted in 2013. Three sampling sites (Nasrath, Kumarakom boat jetty and Pallichira- matsya fed) were identified. The fish were caught by local fishermen by operating cast nets during the study and preserved in 4-5% formaldehyde. Birds were identified with the aid of Bushnell 7 × 35 binocular. A total of 65 species of birds belonging to 10 orders and 34 families were identified during the study period. A total of 30 species of fishes belonging to 20 families were identified. These included both migratory and freshwater fishes. 24 species of butterflies belonging to three families Papilionidae, Pieridae, and Nymphalidae were also identified during the study. Management of the wetland is crucial for the conservation of these species, especially the resident water birds that spend the greater part of their life in the wetland.

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1. Introduction

Kumarakom is a marshy mangrove area located on the edge of the Vembanad Lake, the largest backwater in Kerala. It acts as a habitat for many marine and freshwater fish species. It is a home to a wide variety of flora and fauna. Kumarakom bird sanctuary is a noted bird sanctuary where many species of migratory birds visit. The bird sanctuary extends over 14 acres and is a major tourist attraction. Agriculture, fishing and tourism are the major economic activities. Kumarakom's perfectly balanced tropical climate is very conductive to cultivation. The place has expanses of mangrove forests, paddy fields and coconut groves. Kumarakom is situated in the Kuttanad wetlands of Kerala. The Kuttanad is primarily a deltaic low-lying formation of land with backwaters, canals and network of streams. It is a highly fertile tract of land replenished by silt brought down by four river systems, namely the Achankovil, Pamba, Manimala and Meenachil, which are connected to the sea by Vembanad Lake (Padmakumar et al., 2002). The Kumarakom heronry is located in the KTDC Tourist Complex (76°25'–76°26'E, 9°37'–9°38'N) and lies 0.75 to 1 m above sea level. It is one of the biggest heronries in Kerala, and is situated at the eastern fringe of the Vembanad estuary that forms an integral part of the Vembanad-Kole Ramsar site The heronry covers 112 acres (45.3 ha), and is 14 km west of the town of Kottayam. It is bounded to the east by the Kumarakom–Vechoor road, to the north by the Kavanar River, to the south by a farm of the Regional Agricultural Research Station of Kerala Agricultural University, and to the west by the freshwater-dominated southern part of Vembanad estuary. The estuarine zone near the tourist complex contains organically rich sediments, which make it a highly preferred habitat for breeding shrimps. The primary vegetation includes mangroves such as *Avicennia officinalis, Bruguiera gymnorrhiza, Rhizophora mucronata* and *Sonneratia caseolaris,* marshy mangrove associates and hydrophytes. Some of the native vegetation has been converted to coconut *Cocos nucifera* and rubber *Hevea brasiliensis* plantations. The vegetation cover of coastal Kerala is beset with mangrove rich areas, which play a dominant role in shaping various floral and faunal compositions. This niche functions as the breeding place for different types of birds, brackish water fishes, crabs, turtles, shrimps, prawns, etc. Now these mangroves are found isolated and degraded because of population explosion and ill-conceived developmental activities such as coastal engineering structures, tourism, fishery and agriculture. Restoration and regeneration of mangroves should be given utmost importance.

Population explosion and ill-conceived developmental activities such as coastal engineering structures, tourism, fishery and agriculture has led to isolation and degradation of this mangrove ecosystem. The study aims at finding the present status of this ecosystem and to suggest measures that are to be taken to conserve it. The main objective is to identify the faunal diversity. Regular and continuous assessment of the fauna of this fragile ecosystem is important to assertain the impact of developmental activities on its biodiversity.

2. Materials and Methods

Sampling was conducted for one year (2012-13) to study the faunal diversity. Fauna was identified using standard methods and photographs were taken as far as possible. Birds were identified with the aid of Bushnell 7 × 35 binocular. A note book, pen, digital camera and a reference book for identifying birds were carried. Identification of birds was done using 'The book of Indian Birds' by Salim Ali.

Study on the Icthyofauna in Vembanad Lake adjacent to Kumarakom was conducted in 2013. Three sampling sites (Nasrath, Kumarakom boat jetty and Pallichira- matsya fed)

were identified. The fish were caught by local fishermen using cast nets during the study and preserved in 4-5% formaldehyde. The observation and collection were carried out in morning hours from 7.30am-11am. The specimens that could be identified on site were examined to know the vernacular name with the help of fishermen. Unidentified fishes caught during the survey were labelled along with the vernacular names, preserved and brought to the RARS Kumarakom for identification.

Butterflies belongs to various families were identified by using the book "Keralathile chithrashalabangal" (Palot *et.al.,* 2002).

3. Results and Discussion

A total number of 65 species of birds belonging to 10 orders and 34 families were identified during the study period (Table 1). Though it is a wetland dominated area, 55.38 % of birds constituted non-wetland category, whereas only 24.61 % constituted waterbirds and remaining 20% were migratory (Fig. 1). A percentage of 44.61 % of birds from the order Passeriformes possess the most diversified family and from which 29 species of birds were observed during the study.

The composition of birds in major feeding guilds (Fig. 2) showed that insectivores guild (38.46 %) was the most common followed by carnivores 21.53 %. It was also noted that Frugivores (6.15 %), Nectarivores (4.61 %) and Granivores (3.07 %) were lesser in number. The major reason behind this is that the absence of fruit bearing trees and presence of primary vegetation found here includes mangroves and rubber plantation. On other hand, the insectivores, most successful group here, became dominant as a result of plenty of availability of their food, ie, insects and tiny arthropods. This showed that, bird distribution occurred here as a result of availability of their particular food.

14 species of colonial water birds belonging to four

Table 1. List of birds

Sl.no	Common Name	Family	Scientific Name
		I. Order: Ciconiiformes	
1	Little cormorant	Phalacrocoracidae	*Phalacrocorax niger*
2	Indian shag	Phalacrocoracidae	*Phalacrocorax fuscicollis*
3	Great cormorant	Phalacrocoracidae	*Phalacrocorax carbo*
4	Darter	Anhingidae	*Anhinga melanogaster*
5	Little egret	Anhingidae	*Gretta garzetta*
6	Median egret	Anhingidae	*Mesophoyx intermedia*
7	Large egret	Anhingidae	*Casmerodius albus*
8	Indian pond heron	Anhingidae	*Ardeola grayii*
9	Black crowned heron	Anhingidae	*Nycticorax nycticorax*
10	Little green heron	Anhingidae	*Butorides striatus*
11	Purple Heron	Anhingidae	*Ardea cinerea*
12	Chestnut bittern	Anhingidae	*Ixobrychus cinnamomeus*
13	Asian open bill stork	Ciconiidae	*Anastomus oscitans*
14	Black headed ibis	Threskiornithidae	*Thereskironis melanocephalus*
15	Brahminy kite	Accipitridae	*Haliastur Indus*
16	Western Marsh harrier	Accipitridae	*Circus aeruginosus*
17	Whiskered tern	Laridae	*Chlidonias hybridus*
		II. Order : Gruiformes	
1	White breasted water hen	Rallidae	*Amauronis pheonicurus*
2	Purple moorhen	Rallidae	*Porphyrio porphyrio*
		III. Order : Cuculiformes	
1	Cow pheasant	Cuculidae	*Centropus sinensis*
2	Asian koel	Cuculidae	*Eudynamys scolopacea*
3	Pied crested cuckoo	Cuculidae	*Clamator jacobinus*
		IV. Order : Coraciiformes	
1	Small blue kingfisher	Alcedinidae	*Alcedo atthis*
2	Small bee –eater	Meropidae	*Merops orientalis*
3	White breasted kingfisher	Alcedinidae	*Halcyon smyrnensis*
4	Blue tailed bee- eater	Meropidae	*Merops philippinus*
5	Lesser pied kingfisher	Alcedinidae	*Ceryle rudis*
		V. Order : Piciformes	
1	White cheeked Barbet	Capitonidae	*Megalaima viridis*
2	Copper smith Barbet	Capitonidae	*Megalaima haemacephala*
3	Golden backed woodpecker	Picidae	*Dinopium benghalense*
4	Brown capped pygmy woodpecker	Picidae	*Dendrocopos nanus*
		VI. Order : Strigiformes	
1	Spotted owlet	Strigidae	*Glaucidium radiatum*
		VII. Order : Apodiformes	
1	Alpine swift	Apodidae	*Tachymarptis melba*
		VIII. Order : Anseriformes	
1	Lesser whistling teal	Anatidae	*Dendrocygna javanica*
		IX. Order : Psittaciformes	
1	Rose-ringed parakeet	Psittacidae	*Psittacula krameri*

	X. Order : Passeriformes		
1	Jungle crow	Corvidae	*Corvus macrorhynchos*
2	House crow	Corvidae	*Corvus splendens*
3	Indian tree pie	Corvidae	*Dendrocitta vagabunda*
4	Red – vented bulbul	Pycnonotidae	*Pycnonotus cafer*
5	Red whistered bulbul	Pycnonotidae	*Pycnonotus jocosus*
6	Black napped oriole	Oriolidae	*Oriolus chinensis*
7	Eurassian golden oriole	Oriolidae	*Oriolus oriolus*
8	Black headed oriole	Oriolidae	*Oriolus xanthornus*
9	Indian pitta	Pittidae	*Pitta brachyura*
10	Asian paradise fly catcher	Corvidae	*Terpsiphone paradisi*
11	Mountain imperial pigeon	Columbidae	*Ducula badia*
12	Common myna	Sturnidae	*Acridotheres tristis*
13	Rosy starling	Sturnidae	*Sturnus roseus*
14	Purple sunbird	Nectariniidae	*Nectarinia asiatica*
15	Purple rumped sunbird	Nectariniidae	*Nectarinia Zeylonica*
16	Loten's sunbird	Nectariniidae	*Nectarinia lotenia*
17	Tickel's flower pecker	Dicaeidae	*Dicaeum erythrorhynchos*
18	White throated ground thrush	Turdinae	*Zoothera citrina cyanotus*
19	Oriental magpie robin	Turdinae	*Copsychus saularis*
20	Forrest wagtail	Motacillidae	*Dendro nanthus indicus*
21	Black drongo	Dicruridae	*Dicrurus macrocercus*
22	Great racket tailed drongo	Dicruridae	*Dicrurus paradiseus*
23	Great tit	Paridae	*Parus major*
24	Blyth's reed warbler	Sylviinae	*Acrocephalus dumetorum*
25	Paddy warbler	Sylviinae	*Acrocephalus agricola*
26	Greenish leaf warbler	Sylviinae	*Phylloscopus trochiloides*
27	Common tailor bird	Sylviinae	*Orthotomus sutorius*
28	Common swallow	Hirudinidae	*Hirundo rustica*
29	Red rumped - swallow	Hirudinidae	*Hirundo daurica*

families, Anhingidae, Phalacrocoracidae, Ardeidae and Threskiornithidae and one order Ciconiiformes were found to be breeding in the Kumarakom heronry. It was noted that, Little cormorant and Indian cormorant dominated during the entire period of study. The least common species were Little egret and Great egret. Also, the near threatened species like Darter and Black headed ibis were present in a considerable number. Four migratory birds were identified from the Order Passeriformes such as Red-rumped swallows, Asian paradise flycatcher, Wagtail and Eurassian golden oriole. According to (Nameer, 1993) there is an increase in the population of little cormorant, Indian cormorant and pond heron. However the number of Leser whisting teal and little egret has come down from the previous year (Nagaragon. and Thiyagesan, 1996).

A similar report was made by Sashikumar et.al., 2010. The decrease in the number of Lesser whisting teal is due to pollution of water. Mangroves are the ideal roosting site for Little cormorant and Herons and nesting site for certain species of owls.

A total number of 30 species of fishes belonging to 20 families were identified. These included both migratory and freshwater fishes. According to the study Perciformes was the largest order with 7 families represented by 9 species. The various species observed during the investigation have been tabulated in Table 2. 30 species of fresh water fishes are belonging to 20 families and 11 orders were identified (Table 2). Based on the study 17% of the species came under the IUCN status LRnt-Low risk nearly threatened

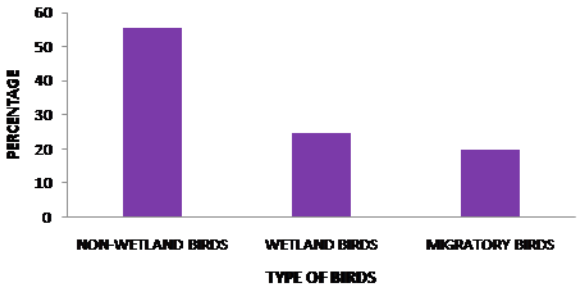

Fig. 1. Percentage of observed birds based on type

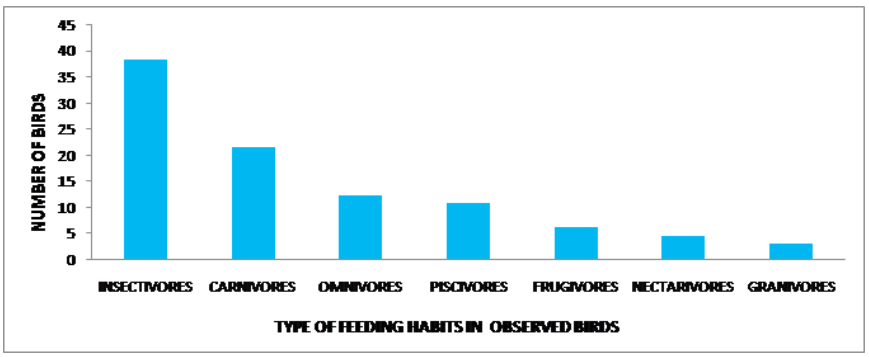

Fig. 2. Percentage of observed birds based on feeding habits

Table 2. List of fish

Scientific Name	Common Name	Vernacular Name	IUCN Status	Economic Importance
Order: Perciformes				
Family: Cichlidae				
Etroplus suratensis	Banded Pearl Spot	Karimeen	LRIc	Edible, Aquarium species
Etroplus maculates	Orange chromide	Pallathi	LRIc	Edible, Aquarium species
Family: Ambassidae				
Parambassis dayi	Day's glassy perchlet	Nandan	VU	Ornamental, Edible
Parambassis thomassi	Western Ghat glassy perchlet	Nandan	LRnt	Ornamental, Edible
Family: Leiognathidae				
Leiognathus species	Pony fish	Kurichi	DD	Edible
Family: Gobiidae				
Glossogobius giurus	Tank Goby	Poolan	LRIc	Aquarium species, edible
Family: Sillaginidae				
Sillago sihama	Silver whiting	Kathiravan	DD	Edible
Family: Nandidae				
Nandus nandus	Mottled leaf fish	Muthuvala	LRnt	Edible, Aquarium species
Family: Anabantidae				
Anabus testudineus	Climbing perch	Kallada	VU	Edible, Aquarium species
Order: Siluriformes				
Family: Heteropneustidae				
Heteropneustes fossils	Stinging catfish	Kaari	VU	Aquarium species, Edible
Family: Bagridae				
Mystus gulio	Longwhiskered catfish	Vellakkoori	LRIc	Edible, Aquarium
Horabagrus branchysoma	Yellow catfish	Manjakkoori	EN	Edible, cultivable
Mystus armatus	Kerala mystus	Chillankoori	LRIc	Edible
Family: Aridae				
Arius maculates	Spotted cat fish	Kachikkoori	LRIc	Edible, Aquarium species
Order: Cypriniformes				
Family: Cyprinidae				
Puntius filanentosus	Black spot Barb	Poovalipparal	LRIc	Edible, Aquarium species
Puntius sarana	Peninsular Olive Barb	Kuruva	VU	Edible, Aquarium species
Puntius sophore	Softfin Barb	Paral	LRnt	Edible, Aquarium
Puntius amphibius	Scarlet banded Barb	Urulanparal	LRIc	Edible, Aquarium species
Labeo dussumieri	Kerala labeo	Pullan	EN	
Family: Aplocheilidae				
Aplocheilus lineatus	Tiger Panchax	Poonjan	LRIc	Poultry feed, Aquarium species
Aplocheilus blocki	Little Panchax	Poonjan	DD	Poultry feed, Aquarium species
Order: Beloniformes				
Family: Belonidae				
Xenentodon cancila	Fresh water Garfish	Kola, Kolan	LRnt	Edible, Aquarium species
Family: Hemiramphidae				
Hyporhamphus xanthopterus	Vembanad Halfbeak	Morasu	CR	Edible, Aquarium species
Order: Clupeiformes				
Family: Engraulidae				
Stolephorus indicus	Hardenberg's anchovy	Vellikozhuva	DD	Edible
Stolephorus commersonii	Commerson's anchovy			Edible, Aquarium species
Order: Tetraodontiformes				
Family: Tertraodontidae				
Carinotetraodon imitator	Puffer fish	Oothiveerppan	DD	Aquarium species
Order: Synbranchiformes				
Family: Mastacembelidae				
Mastacembelus armatus	Tire-trackspiny eel	Aarakan	LRIc	Aquarium spiecies, Edible
Order: Scorpaeniformes				
Family: Scorpaenidae				
Euryglossa species		Kaayal nank	DD	Aquarium species, Edible
Order: Mugiliformes				
Family: Mugilidae				
Mugil cephalus	Mullet	Kanampu	LRnt	Edible, Cultivable
Order: Elopiformes				
Family: Megalopidae				
Megalops cundinga		Kanni	EN	Edible, Aquarium species

CR- Critically endangered; **EN-** Endangered; **VU-** Vulnerable; **LRnt-**Low risk nearly threatened; **LRIc-** Low risk least concern; **DD-** Data deficient; **Intr-** Introduced

Table 3. Feeding habit

SI. NO:	FEEDING HABIT	NUMBER OF FISH
1	CARNIVOROUS	20
2	OMNIVOROUS	8
3	HERBIVOROUS	2

and 14% were reported as Vulnerable (Table 2). Majority of the species (67%) were carnivorous (Table 3). 46% of those collected were edible and 41% were ornamental fishes. Two Western Ghats endemic species and two species endemic to Southern India were identified. Hyporhamphus xanthopterus was considered as endemic to Kerala.

Among the 30 species *Hyporhampus xanthopterus* was critically endangered (CR), *Labeo dussumieri, Horabagrus brachysoma, Carinotetraodon imitator* are endangered (EN) and *Puntius villatus , Anabas testudineus* and *Heteropneutes fossils* come under vulnerable (VU) category. *Nandus nandus* and *Xenentodon cancila* come under lower risk near threatened (LRnt) category. 50% of species reported from the area are currently considered as non-threatened species. Among the fishes used as food, *Etroplus suratensis* is highly priced.

Rapid expansion of back water tourism, destruction of mangroves on the lake shore, construction of salt water exclusion barrage for rice farming and several ecosystem alterations etc. might be the reason that caused the decline of fishes in these ecosystems. The detailed monitoring and comparison with earlier records showed that many species of fish in the lake are declining and some have been disappeared. According to Sahadevan and Shrivastava (2000), fish diversity is declining in the Vembanad Lake.

24 species of butterflies belonging to three families Papilionidae, Pieridae, and Nymphalidae. Out of these 24 species six belongs to papilionidae, five belongs to pieridae, and 14 belongs to nymphalidae.

Maximum number of species diversity was reported from the family Nymphalidae in all the stations. According to earlier reports of Mathew and Rahamathulla (1993) the family Nymphalidae was most predominant in the moist deciduous and evergreen forest. The reason for this extraordinary abundance of Nymphalidae butterflies in the study area can be ascribed to the dominance of their larval food plants in the region. Three endangered species of butterflies (according to Indian wild life protection act -1972) were identified, that are indian common crow, crimson rose and dannied eggfly. There are about 12,000 species of butterflies found all over the world and if we assume that one in ten could be catergorized as threatened, then we are obliged to suspect that more than 1,200 species of butterflies could be facing extinction. It has been estimated that extinction of a single species may set in motion a chain of events, adversely affecting the survival of 10-20 other species which are related to it. Five species of observed butterflies are endemic to Western Ghats, comprising tamil yeomen, common jezebel, blue mormon, southern bird wing, and crimson rose. The findings of the present study indicate that the butterfly species diversity differs with different habitats and it is related with the dense vegetation, host plant appearance and low level of disturbance. The study area harbours endemic and protected butterfly species which highlights importance of conservation.

Table 4. List of Butterflies

Family/Common name	Scientific name	Status
Papilionidae		
Tailed Jay	*Graphium agamemnon*	common
Crimson Rose	*Pachliopta hector*	endangered
Southern Bird Wing	*Triodes minos*	endemic
Common Mormon	*Papilio polytes*	common
Common Rose	*Pachliopta aristolochiae*	Common
Blue Mormon	*Papilio poltmnestor*	Endangered
Pieridae		
Common Emigrant	*Catopsilia pomona*	Common
CommonGrass Yellow	*Eurema hecabe*	Common
Psyche	*Leptosia nina*	Common
Common jezebel	*Delias eucharis*	Endemic
Nymphalidae		
Indian Common Crow	*Euploea core*	endangered
Chocolate Pancy	*Junonia iphita*	common
Common Fivering	*Ypthima baldees*	common
Grey Pancy	*Junonia atlites*	common
Tamil Yeomen	*Cirrochora thias*	endemic
Common Sailor	*Neptis hylas*	common
Rustic	*Cupha erymanthis*	common
Glassy Tiger	*Parantica agleoides*	common
Blue Tiger	*Tirumala limniace*	common
Striped Tiger	*Danaus genutia*	common
Plain Tiger	*Danaus chrysippus*	common
Great Eggfly	*Hypolimnus bolina*	common
Dannied Eggfly	*Hypolimnas misippus*	endangered
Cruiser	*Vindula erota*	common

5. Conclusion

Kumarakom bird sanctuary holds one of the largest breeding colonies and roosts of cormorants, herons, and egret in Kerala and supports important population of two globally near threatened birds – Oriental Darter and Black – headed Ibis. In the breeding season (monsoon) the number of birds in the heronry increases because of the immigration of birds from other areas. Major factors having a detrimental effect on the ecosystem, includes lack of regeneration of mangroves, uncontrolled growth of exotic weeds and release of sewage water into the area. Management of the wetland is crucial for the conservation of these species, especially the resident water birds that spend the greater part of their life in the wetland.

Once the presence of mangrove plants and swamps favoured the egg laying activity of fishes, but because of the destruction of mangrove vegetation, habitat destruction and pollution load, now the fish fauna of this wetland is under threat. Continuous assessment of fish diversity especially in lakes and rivers is needed to enhance proper conservation practices.

Information on the local fauna, the population density of various species as well as the various natural mortality factors affecting species survival should be known. Only detailed faunistic surveys can bring out these details. These studies are essential to bring about conservation of the fauna.

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