AVIAN FAUNA IN SELECTED KOLE WETLAND AREA OF THRISSUR

Project Work By
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Submitted to St. Teresa's College (Autonomous) Ernakulam Affiliated to Mahatma Gandhi University, Kottayam in partial fulfillment of requirement for the degree of Bachelor in Science in Zoology

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CERTIFICATE

This is to certify that the project entitled "***AVIAN FAUNA IN SELECTED KOLE WETLAND AREA OF THRISSUR*** " submitted in partial fulfilment of the requirement for the award of the degree of Bachelor of Science in Zoology to the Department of Zoology, St. Teresa's College affiliated to M.G University, Kerala, done by Ms. Zithara Binzi Reg. No: AB21ZOO029 is an authentic work carried out by her at Enfys Lifesciences Pvt. Ltd, Kochi under my guidance and supervision during the period of Nov 2023 - Dec 2023. The matter embodied in this dissertation has not formed the basis for the award of any Degree/Diploma/ Associateship/Fellowship to the best of my knowledge and belief.

Dr.Jasmin C
Director (Research)
Enfys Lifesciences Pvt Ltd

CERTIFICATE

This is to certify that the project entitled "***AVIAN FAUNA IN SELECTED KOLE WETLAND AREA OF THRISSUR***" submitted by Ms.Zithara Binzi, Reg no - AB21ZOO029 in partial fulfillment of the requirement of Bachelor of Science of science in Zoology to the Department of Zoology. St. Teresa's College affiliated to Mahatma Gandhi University Kottayam is a bonafide work under my guidance and supervision and to my best knowledge, this is her best effort.

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EXAMINERS

1.

2.

DECLARATION

I hereby declare that project work titled "***AVIAN FAUNA IN SELECTED KOLE WETLAND AREA OF THRISSUR***" submitted to St. Teresa's College (Autonomous), Ernakulam affiliated to Mahatma Gandhi University, Kottayam in the partial fulfillment of the requirements of Bachelor of Science degree in Zoology, is a record of original project work done by me under the guidance and supervision of Dr. Akhila , Associate Professor, Department of Zoology, St. Teresa's College (Autonomous), Ernakulam.

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Reg. No: AB21ZOO029

Signature

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CONTENTS

INTRODUCTION

The Kole wetlands, covering an area of 13,632 ha are spread over Thrissur and Malappuram districts extending from the northern bank of Chalakudy river in the south to the southern bank of Bharathapuzha river in the north (Johnkutty and Venugopal 1993). The name Kole refers to the peculiar cultivation practice carried out from December to May. “Kole”, a Malayalam word, indicates a field that gives a bumper crop, so long as floods do not damage it (Nameer 2002). Rice cultivation in Kole started as early as the 18th century by reclaiming the Trichur kayal lands (backwaters) by erecting temporary earthen bunds. The water pumped out from the field is stored in a network of canals in the area. The Kole areas are low-lying and have a central, narrow strip covering a long expanse, with many pockets running into cultivated land on either side. The region is naturally subject to salt-water ingression. During the monsoon, the entire region, which gets submerged under water, is cultivated by draining the water and by erecting bunds. Regulators are provided at certain strategic points to prevent the intrusion of salt water into the Kole wetlands during the cultivation period. Grasses and sedges are found in shallow and drier zones. The main activity in and around Kole is paddy cultivation. As Kole is a large sprawling wetland, with human habitation all around, there are coconut and arecanut plantations, gardens and cultivated plants.

Thrissur-Ponnani kole wetland lying in Thrissur and Malappuram districts in Kerala, India. It gives 40 percent of Kerala's rice requirement and acts as a natural drainage system for Ponnani city, Thrissur city, Thrissur District, and Malappuram district. The Kole Wetlands is one of largest, highly productive and threatened wetlands in Kerala and it comes in the Central Asia Flyway of migratory birds. The main threat to Kole Wetlands is expansion of cities and towns like the city of Thrissur. The boom in construction industry, especially the real estate business in Central Kerala, has rung the alarm bell for the Kole wetlands. Coconut cultivation, construction of buildings and houses, conversion of fields for sand and clay mining and brick kilns, hunting of wetland birds are the main threats for the Kole wetlands. Fresh water shortage and quality of water due to water intrusion from the Canoly Canal has been reported from various parts of Kole wetlands in Thrissur district.

MIGRATORY BIRDS OF KERALA

Many of these birds are being spotted in Kerala throughout the year. Sharp switches in the weather, changing climatic conditions and receding waterbodies restrict their possibility of migration and force them to continue in mid-way halts for long, far away from their homelands. They are the grater flamingos, spot billed pelican, black tailed godwit, garganeys, lesser whistling duck, gulls, spot billed duck, cotton pygmy goose.

THREATS TO MIGRATORY BIRDS

Birds face many threats to their survival in the wild. Like all animals, they are totally dependent on their environment for existence and are very sensitive to changes in the ecosystems. Many populations of bird species are on the decline. To place the blame for this decline on a single factor would be wrong. There are combinations of causes which need to be addressed in order to turn the trend of demise. Below is a summary of a number of these threats and some links to further resources.

Climate change: One cause of the decline in populations is climate change caused by global warming. As temperatures rise, birds are thrown from their migration cycle.

Habitat loss: By far the largest threat to birds is the loss of habitat. Deforestation, the draining of wetlands, planting of non-native trees, the loss of areas to urban developments and intensive agriculture are major threats to birds. Numbers of many species are in serious decline as a result of habitat loss and these losses are particularly serious on islands, where bird populations are often small and very fragile.

Oil spills: Oil spills constitute a major threat to birds too, particularly for those that spend a lot of time on the surface of the water such as loons, alcids and waterfowl. But also other migratory birds are at risk; having just started their annual migration, many birds pass through contaminated sites which are important staging areas for them. Large scale oil spills often kill thousands of birds.

Unsustainable harvest: Unsustainable harvest and poorly enforced laws lead to the killing of millions of birds around the world. Especially across the tropics commercial harvest for trade is decimating many bird populations and may be one of the gravest threats presently facing birds in rainforests.

AIM AND OBJECTIVES

AIM

The present study was conducted to record the avian diversity in the selected Kole wetland of Thrissur.

OBJECTIVES

- To understand the Avian species diversity in the Kole wetlands
- To identify the bird species found in the Kole wetlands
- To understand the presence of migratory birds in Kole wetlands.

REVIEW OF LITERATURE

The Kole wetlands of Kerala are part of India's largest Ramsar site, spread across the districts of Thrissur and Malappuram, Kerala, India. Agriculture is the primary economic activity undertaken in the wetlands, and in recent times, human activities like land encroachment, hunting, and unsustainable agricultural practices have jeopardised the ecology of the wetlands. Wetlands are generally considered to be fragile ecosystems which are of prime importance due to them being biodiversity hotspots around the world. They are described as 'complex hydro-ecological systems, whose structure provides us with goods or products involving some direct utilisation of one or more wetland characteristics, while wetland ecosystem processes provide us with hydrological and ecological services, supporting or protecting human activities or human properties without being used directly. (Aravindh, P., Nair, D. R., & Harikumar, S. (2019). Conservation of Kole Wetlandsâ€"Willingness to Pay Approach. *Indian Journal of Economics and Development*, 1-10.)

The main objective of the paper was to conduct a study on the species richness and composition of avian fauna present in the Palakkal kole wetland Thrissur, which is part of Vembanadu Kole. The study helps to know more about the ecosystem and its functioning. Wetland is a highly productive ecosystem which provides suitable living conditions for a wide variety of native and migratory birds. The birds utilize the habitat for their activities like breeding, nesting and rearing the young ones. These suitable conditions attract a large number of migratory birds. The study was conducted during the period from November 2015 to April 2016. 65 species belonging to 12 orders and 28 families were identified during the study period. In this 58 belong to the least concern category, 5 are near threatened species and 2 are vulnerable. In the 65 species identified 20 species are long distance migrants,15 species are short distance migrants and 30 species were residents to the area. (Kuruvilla, K., & Maria, K. A. (2017). Research Article A Study on the Avifauna of Palakkal Kole Wetland, Thrissur: A Ramsar Site of South India).

A total of 57 species of birds belonged to 16 families were recorded from the Mavoor wetland. 17 species of migrants were also recorded. Of these migratory birds 3 were ducks, 5 waders and 2 terns. Mavoor wetland is also an abode of many passerine species also. Highes number of birds were recorded during the month of January and lowest in June. Little Egret *Egreta garzeta*, Little Cormorant *Phalacrocorax niger*, Purple Moorhen *Porphyrio porphyrio*, Purple Heron *Ardea purpurea*, Blackcrowned Night-Heron *Nycticorax nycticorax*, Indian Pond-Heron *Ardeola grayii*, Little Grebe *Tachybaptus ruficollis*, Whistling-Duck *Dendricygna*

javanica, River Tern *Sterna aurantia*, Whiskered Tern *Chlidonias hybridus*, Garganey *Anas querquedula* etc

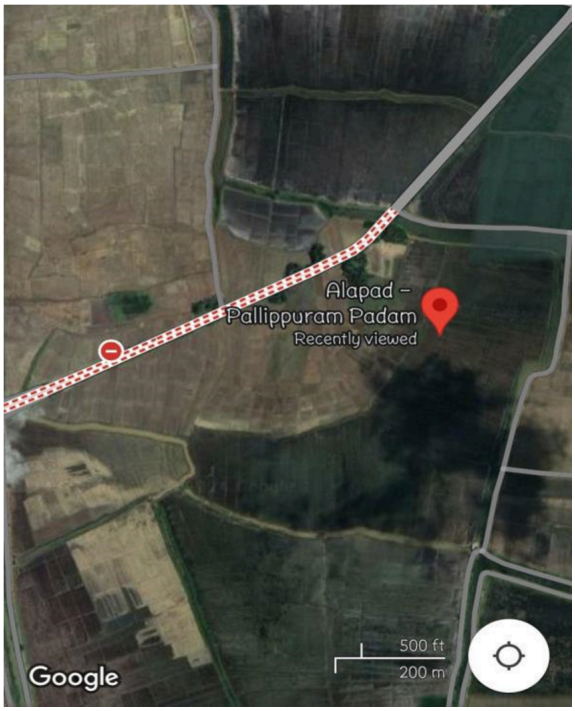
The main aim of the study was to understand and study about the diversity of waterbirds in Koothapar Periyakulam wetland during August 2013 to July 2014. The study shows that the Koothapar Periyakulam wetland act as a refuge site for many varieties of birds. The birds mainly include different types of waders, waterfowl, migratory birds and threatened species. Among the various types of habitat wetlands faces major threat. During the last century nearly 50% of wetlands have been lost due to various kinds of human activities. So strict measure have to be taken to protect the present wetlands. Protection of the wetlands also help in conserving the flora and fauna of the area. During the course of study 43 species of water birds were identified which belongs to 7 orders and 14 families. Most birds identified in study belongs to the order Peliconiformes, Charadriiformes, Anseriform, Gruiformes and of the families Ardeidae, Anatidae, Rallidae, Scolopacidae and Threskiornithidae. The survey was conducted in the morning around 6.00 hours to 10.00 hours. Birds were counted by "direct count" and "total count" methods. The abundance and species richness of the waterbirds in the wetland varies during different months and season. (Teneson, R., & Ravichandran, C. (2015). Diversity of Water birds in Koothapar Periyakulam Wetland in Tiruchirappalli District, Tamil Nadu, India. International Research Journal of Environment Sciences, 4(11), 32-41).

In a study of kole wetlands of Thrissur in 1998, a total of 167 species of birds, belonging to 16 orders and 39 families were recorded from the area during the period. Among them, 53 species of birds were winter visitors. Highest number of birds was recorded in the month of January and the lowest was observed in June. Little Egret, Cattle Egret, Little Cormorant, Pond Heron, Median Egret and Whiskered Tern were the most abundant resident and local migrant species found in the Kole wetlands. Among them 81 species are wetland birds. During the study, 53 species of winter visitors were also recorded. Of these migratory birds, nine were ducks, 31 waders, three gulls and two terns. Among the species recorded, Spot-billed Pelican (Pelecanus philippensis) is a species included in the Red Data Book and another species Rufous Babbler (Turdoides subrufus) is endemic to Western Ghats. (Sivaperuman, C., & Jayson, E. A. (2000). Birds of kole wetlands, Thrissur, Kerala. Zoos' Print Journal, 15(10), 344-349.)

METHODOLOGY

The study area

The study was conducted in the selected Kole wetland area of Thrissur. The selected area was Alapad- pallipuram padam, C5XF+G5P, Thrissur, Kerala. The geographical location of area is 10°26'55.9"N 76°10'23.2"E.



Satellite image of study area (source: Google maps)

Period of study

The present study was conducted during the month of January, February, March and April. Field visits were done during these months. Time of the field visit was from 7.30 am to 10. 30 am.

Methods of data collection

Photographs of birds spotted during field visit were taken using Nikon d5600 camera. The bird identification is done using these photographs. The identification of bird species from images can be done using algorithm of deep learning, Convolutional neural networks (CNNs). (Raj, Satyam, et al. (2020))

We have used the application 'Picture Bird - Bird Identifier' (Platform: Google play). It is a bird identification application that utilizes Convolutional Neural Network (CNN) to recognize bird species from images. The results were analyzed by the physical features and identification is done with the help of field expert and references texts.

We have proposed a method to predict the bird species from images using the most sought algorithm of Deep Learning, Convolutional Neural Network. We developed the entire CNN Model from scratch, imparted training to it and finally tested its efficacy. The application developed is generating results, with a high accuracy of 93.19% on training set and 84.91% on the testing set.

Raj, Satyam, et al. "Image based bird species identification using convolutional neural network." International Journal of Engineering Research & Technology (IJERT) 9.6 (2020): 346.

Bird identification apps that utilize Convolutional Neural Networks (CNNs) to recognize bird species from images:

Bird Identification: Bird Identifier, Species Birds:

Platform: Available on Google Play.

A preliminary study on avian fauna in the selected Kole wetland area of Thrissur.

RESULT

A total of 32 species of birds belonging to 8 orders and 18 families were identified in this study.

Class	Order	Family	No	Species Identified	Common name
Aves	Coraciiformes	1. Meropidae	1	*Merops philippinus*	Blue - tailed Beeeater
			2	*Merops orientalis*	Asian green Bee – eater
		2. Alcedinidae	3	*Halcyon smyrnensis*	Whitethroated kingfisher
			4	*Ceryle rudis*	Pied king fisher
			5	*Alcedo atthis*	Common kingfisher
	Ciconiiformes	3. Ciconiidae	6	*Anastomus oscitans*	Asian open bill
			7	*Ciconia episcopus*	Asian wollynecked stork
	Pelecaniformes	4. Threskiornithidae	8	*Threskiornis melanocephalus*	Black - headed ibis
		5. Ardeidae	9	*Ardea cinerea*	Grey heron
			10	*Ardea purpurea*	Purple heron
			11	*Ardeola grayii*	Indian pond heron

			12	*Nycticorax nycticorax*	Black - crowned night heron
			13	*Egretta garzetta*	Little egret
			14	*Ardea intermedia*	Intermediat e egret
			15	*Ardea alba*	Great egret
		6. Anhingidae	16	*Anhinga melanogaster*	Oriental darter
	Charadriiformes	7. Charadriidae	17	*Vanellus indicus*	Red - wattled lapwing
		8. Scolopacidae	18	*Tringa glareola*	Wood Sandpiper
		9. Laridae	19	*Chlidonias hybrida*	Whiskered tern

	Passeriformes	10. Estrildidae	20	Lonchura striata	Whiterumped munia
		11. Oriolidae	21	Oriolus xanthornus	Blackhooded oriole
		12. Cisticolidae	22	Prinia socialis	Ashy prinia
		13. Motacillidae	23	Prinia inornata	Plain prinia
		14. Dicruridae	24	Motacilla flava	Western yellow wagtail
		15. Hirundinidae	25	Cecropis daurica	Redrumped swallow
	Accipitriformes	16. Accipitridae	28	Haliastur indus	Brahminy kite
			29	Hieraaetus pennatus	Booted eagle
			30	Milvus migrans	Black kite

	Suliformes	17. Phalacrocoracidae	31	Microcarbo niger	Little cormorant
	Cuculiformes	18. Cuculidae	32	Eudynamys scolopaceus	Asian koel

Table 1: List of birds identified during this study

1. *Merops philippinus* (Blue-tailed Bee-eater): This striking bird with a vibrant plumage and elongated tail is known for its aerial acrobatics while hunting insects, especially bees. Found in tropical Asia, they are social birds often seen in small flocks perched on wires or branches. (Plate 1 – Fig 1)
2. *Merops orientalis* (Asian Green Bee-eater): Recognizable by its green plumage and slender curved bill, these bee-eaters are skilled at catching flying insects, including bees. They inhabit open areas across Asia, often seen perched on wires or branches, occasionally in small colonies. (Plate 1 – Fig 2)
3. *Halcyon smyrnensis* (White-throated Kingfisher): This large, striking kingfisher with a turquoise-blue back and chestnut underparts is a common sight near water bodies across Asia. It preys on fish, crustaceans, and insects with its sharp beak and is known for its loud, piercing calls. (Plate 1- Fig 3)
4. *Ceryle rudis* (Pied Kingfisher): Identified by its black and white plumage and large head, pied kingfishers are adept fishers found near water bodies across Asia and Africa. They hover before diving to catch prey, mainly fish, with their sharp beaks. (Plate 1 – Fig 4)

5. *Alcedo atthis* (Common Kingfisher): With its striking azure-blue and orange plumage, this small kingfisher is a familiar sight along rivers and streams. Known for its swift dives to catch fish, it nests in burrows near water bodies and is widely distributed across Eurasia. (Plate 1 – Fig 5)

6. *Anastomus oscitans* (Asian Openbill Stork):These large wading birds are named for the unique gap in their beaks. They feed primarily on aquatic snails and mollusks, using their specialized beaks to extract prey. Found in wetlands, they often forage in shallow water. (Plate 1 – Fig 6)

7. *Ciconia episcopus* (Asian Woolly-necked Stork):Recognizable by its black and white plumage and distinctive woolly neck, these storks inhabit wetlands and fields across Asia. They feed on small fish, frogs, and insects, often seen wading in shallow water. (Plate 2 – Fig 7)

8. *Threskiornis melanocephalus* (Black-headed Ibis): Characterized by its black head and neck and white body, these ibises are often found in wetlands and marshes. They forage for aquatic invertebrates and small vertebrates by probing mud with their long, curved bills. (Plate 2 – Fig 8)

9. *Ardea cinerea* (Grey Heron): With its tall stature and grey plumage, the grey heron is a common sight near water bodies worldwide. It feeds on fish, amphibians, and small mammals, using its long neck to strike quickly at prey.
(Plate 2 – Fig 9)
10. *Ardea purpurea* (Purple Heron):This heron species is named for its purplishbrown plumage during breeding season. It frequents wetlands, hunting fish, frogs, and small reptiles with its sharp beak and long legs, often standing motionless before striking. (Plate 2 – Fig 10)

11. *Ardeola grayii* (Indian Pond Heron): This small heron is often seen near water bodies across India. Its plumage varies from white to grey, adapting for camouflage. It stalks shallow waters for fish, frogs, and insects, using its sharp bill for precise strikes. (Plate 2 – Fig 11)

12. *Nycticorax nycticorax* (Black-crowned Night Heron):Nocturnal and solitary, these herons are identifiable by their black-capped heads and grey bodies. They inhabit wetlands and hunt fish, crustaceans, and small mammals at night using their keen eyesight. (Plate 2 – Fig 12)

13. *Egretta garzetta* (Little Egret):With its elegant white plumage and slender black bill, the little egret wades in shallow waters across Asia and Europe. It feeds on fish,

frogs, and crustaceans, using its stealth and long neck to capture prey. (Plate 3 – Fig 13)

14. *Ardea intermedia* (Intermediate Egret): This medium-sized egret has an intermediate size between the great egret and the little egret. It displays similar feeding behavior, wading in shallow waters and preying on fish, amphibians, and insects. (Plate 3 – Fig 14)

15. *Ardea alba* (Great Egret): A majestic sight with its tall stature and all-white plumage, the great egret is a common wetland bird globally. It hunts by patiently stalking prey, primarily fish, frogs, and small reptiles, using its long neck to strike swiftly. (Plate 3 – Fig 15)

16. *Anhinga melanogaster* (Oriental Darter): Also known as snakebird, this water bird dives underwater to hunt fish, using its sharp bill to spear prey. Its distinctive long neck and slender body aid in underwater maneuvering, found in freshwater habitats across Asia. (Plate 3 – Fig 16)

17. *Vanellus indicus* (Red-wattled Lapwing): Named for its red facial wattles, this ground-dwelling bird is often seen in grasslands and wetlands. It forages for insects and small invertebrates, emitting distinctive calls and performing distraction displays near nests. (Plate 3 – Fig 17)

18. *Tringa glareola* (Wood Sandpiper): This migratory wader frequents wetlands and mudflats during migration. Identified by its brown plumage and long bill, it probes mud for invertebrates. It nests in Arctic regions, undertaking long-distance flights annually.(Plate 3 – Fig 18)

19. Chlidonias hybrida (Whiskered Tern): These agile terns with distinctive blackacial markings are skilled aerial hunters. They catch fish and insects in mid-flight over water bodies. During breeding, they form colonies near shallow freshwater habitats across Eurasia and Africa. (Plate 4 Fig 19)

20. Lonchura striata (White-rumped Munia): Also known as white-rumped mannikin, this small finch is identified by its black and white plumage and a white patch on the lower back. Found in grasslands and agricultural areas, it feeds on seeds and small insects. (Plate 4-Fig 20)

21. Oriolus xanthorn Black-hooded Oriole): This striking oriole features a black hood contrasting with bright yellow plumage. Known for melodious calls, it inhabits

woodlands and gardens across Asia, feeding on insects, fruits, and nectar. Its beautiful appearance and vocalizations make it a favorite among birdwatchers. (Plate 4- Fig 21)

22. Prinia socialis (Ashy Priniak A small, plain-colored warbler, the ashy prinia is found in grasslands and scrub habitats. It has a subtle ashy-brown plumage with a distinctive streaked throat melodious, repetitive song is a common sound in its range across Asia. (Plate Fig 22)

23. Prinia inornata (Plain Prinia): Similar to the ashy prinia but lacking streaks on the throat, the plain prinia is a nondeseript brownish bird found in grasslands and agricultural areas. Its simple appearance contrasts with its cheerful and varied song. (Plate 4-Fig 23)

24. Motacilla flava (Western Yellow Wagtail) This slender, long-tailed bird is known for its yellow underparts and varied plumage across its range. It frequents wetlands and grasslands, wagging its tail while foraging for insects and small invertebrates. (Plate 4-Fig 24)

25. Anthus rufus (Paddyfield Pipit): It is a small bird found in grasslands and agricultural fields across Asia. With its streaked brownish upperparts and pale underparts, it forages for insects on the ground, often perching on low vegetation or wires. (Plate 5- Fig 25)

26. Dicrurus macrocercus (Black Drongo): A glossy black bird with a distinctive forked tail, the black drongo is an agile flyer and skilled insect catcher. It is often seen perched prominently, swooping to catch prey and mimicking calls of other birds. (Plate 5-Fig 26)

27. Cecropis daurica (Red-rumped Swallow): This swallow species is named for its reddish-brown rump and blue-black plumage. It is a skilled aerial insect

hunter, often seen darting over water bodies and open areas during migration. (Plate 5-Fig 27)

28. Haliastur indus (Brahminy Kite): With its reddish-brown plumage and white head and breast, the brahminy kite is a common sight near water bodies. It feeds on fish and carrion, soaring elegantly in the sky with its distinctive forked tail. (Plate 5-Fig 28)

29. Hieraaetus pennatus (Booted Eagle): A medium-sized eagle with feathered legs (hence "booted"), it has varied plumage ranging from dark to light phases. It hunts small mammals and birds, often seen soaring over open landscapes during migration. (Plate 5-Pig 29)

30. Milvus migrans (Black Kite): It is a medium-sized raptor with a wingspan of around 150 cm. Its plumage is mostly dark brown, with a distinctive forked tail. These birds are skilled scavengers and can be found in various habitats from forests to urban areas, often soaring high in search of food. (Plate 5-Fig 30)

31. Microcarbo niger (Little Cormorant): A small cormorant with a glossy black plumage and yellow facial skin, it dives underwater to catch fish. Often seen perched with wings spread to dry, it inhabits freshwater bodies across Asia. (Plate 6-Fig 31)

32. Eudynamys scolopaceus (Asian Koel): A large cuckoo species with a glossy black male and a brown female, the Asian koel is known for its distinctive "ko- el" call. It feeds on fruits and insects, often heard but not easily seen in dense vegetation. (Plate 6 - Fig 32)

DISCUSSION

This is preliminary study that mainly aims to record the avian fauna in the selected kole wetland in Thrissur. In this study 32 species of birds belonging to 8 orders and 18 families were identified. This preliminary study was carried out in the month of January and February. Most number of species were identified from the Orders Pelecaniformes and Passeriformes. 9 species were included in Pelecaniformes and 8 species were recorded in Passeriformes. Of these Family Ardeidae has highest number of species. 7 species were included in Ardeidae.
Least represented Orders were suliformes and cuculiformes, 1 species from each. (Table 1)

11 species of winter visitors were recorded. Wood sand piper (*Anthus rufus*) and booted eagle (*Hieraaetus pennatus*) are migrant species. Wood sand piper was normally seen as single birds wading along the water logged areas of kole wetland. Booted eagle was rarely spotted as flying. Asian openbill, Asian wollynecked stork, Blue- tailed bee- eater, Black-headed Ibis, Whiskered tern (*Chlidonias hybrid*), Red-rumped swallow(*Cecropis daurica*), Black drongo (*Dicrurus macrocercus*), Western yellow wagtail (*Motacilla flava*), oriental darter shows local movement. The winter visitors from Central Asian Countries are included in migrants, whereas winter visitors from other parts of the Indian sub-continent is included in the category of local movement. (Sivaperuman, C., & Jayson, E. A. (2000).

The Kole wetlands of Kerala are part of India's largest Ramsar site, spread across the districts of Thrissur and Malappuram, Kerala, India (Aravindh, P., Nair, D.
R., & Harikumar, S. (2019)). Many factors like poaching of birds, heavy use of pesticides, unregulated fishing from the canals laid in Kole wetland to drain excess water and climate change threaten the wetland ecosystem. (Sivaperuman, C., & Jayson, E. A. (2000).) Climate change was experienced during the study period. Even though the study was conducted during winter season, January experienced rainfall and winter climate was observed during February field visit. This change in climate probably can affect the winter visitors.

This is preliminary study conducted in selected area within a limited period of time. Hence only limited number of species were identified and they are classified according to reference papers. Further long period studies can be helpful to identify the avian fauna in Kole wetland and also about the migratory birds and their conservation.

CONCLUSION

This is a preliminary study which was focused on recording avian fauna in the selected Kole wetland area of Thrissur. More species of birds were observed during the winter season (Tijare, R. V. (2011), Sivaperuman, C., & Jayson, E. A. (2009). The 18 species identified from this study also show the rich species diversity during January and February months. 32 species representing 8 orders and 18 families were recorded. 2 species were included in the IUCN red list as 'near threatened'. During the study, 10 species of winter visitors were recorded. Of these 2 species were migratory birds. 6 species were local migrants. Kole wetlands of Thrissur come under the Central Asian flyway of migratory birds. During the study period, the climate change was obvious. Along with this, many other factors can affect the species diversity of birds in Kole wetlands. Considering all these aspects, the Kole wetland ecosystem has to be protected for the conservation of avian diversity.

REFERENCE

1. Srinivasan, J. T. (2010). Understanding the Kole lands in Kerala as a multiple use wetland ecosystem. Hyderabad, India: Research Unit for Livelihoods and Natural Resources.
2. Aravindh, P., Nair, D. R., & Harikumar, S. (2019). Conservation of Kole Wetlandsâ€“Willingness to Pay Approach. Indian Journal of Economics and Development, 110.
3. Kuruvilla, K., & Maria, K. A. (2017). Research Article A Study on the Avifauna of Palakkal Kole Wetland, Thrissur: A Ramsar Site of South India.
4. Teneson, R., & Ravichandran, C. (2015). Diversity of Water birds in Koothapar Periyakulam Wetland in Tiruchirappalli District, Tamil Nadu, India. International Research Journal of Environment Sciences, 4(11), 32-41.
5. Sivaperuman, C., & Jayson, E. A. (2000). Birds of kole wetlands, Thrissur, Kerala. Zoos' Print Journal, 15(10), 344-349.
6. Panikkaveettil, A., Vijayakumar, A., & Harikumar, S. (2020).Stakeholder perspectives on climate change in the Thrissur kole wetlands, India. Plant Archives, 20(2), 2888-2893.
7. BABU, S. S., & THOMAS, R. K. PRESENT STATUS OF AVIFAUNA IN THE POKKALI WETLANDS OF ERNAKULAM DISTRICT, KERALA, INDIA. BIOLOGIE ANIMALĂ.
8. Kuruvilla, K. (2014). Avian diversity of Vadakkechira area, a green lung of Thrissur. IOSR Journal of Environmental Science, Toxicology and Food Technology, 8(7), 55-60.
9. Aarif, K. M., & Basheer, M. (2012). The Water Birds of Mavoor Wetland, Kerala, South India. World Journal of Zoology, 7(2), 98-101.
10. Narayanan, S. P., Thomas, A. P., & Sreekumar, B. (2011). Ornithofauna and its conservation in the Kuttanad wetlands, southern portion of Vembanad-Kole Ramsar site, India. Journal of Threatened Taxa, 1663-1676.
11. Roshnath, R., & Greeshma, P. (2020). Status of woolly-necked storks in Kerala, southwestern India. SIS Conservation, 2, 55-61.
12. Narayanan, N. (2022). Three Globally Threatened Waterbirds from Pokali Wetland, Central Kerala. International Journal of Science and Research, 11(6), 7-12.
13. Guptha, M. B., Sridharan, N., Vijayan, L., Thiyagesan, K., Sandaliyan, S., & Somasundaram, S. (2011). Status of major wetlands and wetland birds in Kanyakumari, Coimbatore, Thanjavur, Thiruvarur, Perambalur, Cuddalore, Nagapattinam, and Trichy districts in Tamil Nadu. World J. Zool, 6, 235-242.
14. Guptha, M. B., Vijayan, L., Sandaliyan, S., & Sridharan, N. (2011). Status of Wetlands and Wetland Birds in Coimbatore, Trichy, Perambalore and Thiruvarur Districts in Tamil Nadu, India. World Journal of Zoology, 6(2), 154-158.
15. Deepa, K. M., & John George, M. (2017). Ornithofauna of Pokkali Wetlands of Ernakulam District Kerala, South India. Journal of Global Biosciences, 6(9), 5227-5237.
16. Tijare, R. V. (2011). Biodiversity Of Avian Fauna Visited To Wetlands Of Gadchiroli District (Maharashtra). Indian Journal of Applied Research, 1(2), 103- 153 globally threatened species of india.

17. Deepa, K. M., & Geoge, J. (2017). Globally threatened species of birds recorded from Pokkali wetland, Kerala, South India. Journal of Global Biosciences, 6(9), 5222-5226.
18. Mohanraj, S., & Pandiyan, J. (2014). Invasion of shorebirds into inland wetlands of Periyakulam lake, Tiruchirappalli, Southern India. Scientific Transaction in Environmental and Technovation, 7, 113-117).
19. Kumar, A., & Kanaujia, A. (2016). Study of waders diversity from wetlands of Lucknow district, Uttar Pradesh, India. International Journal of Bioassays, 5(4869), 10-217460.
20. NARAYANAN, N. DIVERSITY OF WATERBIRDS IN MUTTARA WETLAND, KOLLAM DISTRICT, KERALA, SOUTH INDIA.

PLATE 1

PLATE 2

PLATE 3