Project report

AN INVESTIGATION OF THE AVIAN DIVERSITY IN THE WETLANDS OF KOLLAM DISTRICT

Dissertation submitted to the University of Kerala in partial fulfillment of the requirements for the award of the degree of

Bachelor of Science

in

ZOOLOGY

(*B.Sc Zoology, 2014-17 batch*)

Sl. No.	Name of candidates	Candidate code
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DEPARTMENT OF ZOOLOGY

TKM COLLEGE OF ARTS AND SCIENCE

KOLLAM-5

March - 2017

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CERTIFICATE

This is to certify that the dissertation entitled 'An Investigation of the Avian Diversity in the Wetlands of Kollam District' is an authentic record of the work done by a group of seven students of B. Sc Zoology, 2014-17 batch under my supervision as partial fulfillment of the requirements for the Degree of ***Bachelor of Science*** in **Zoology** and this report has not been submitted earlier for the award of any degree or diploma or any other similar titles anywhere.

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EXAMINERS:

1.

2.

DECLARATION

We do hereby declare that this dissertation '***An Investigation of the Avian Diversity in the Wetlands of Kollam District***' is a bona fide report of the project work carried out by us, under the supervision and guidance of Dr. Jasin Rahman V.K, Asst. Professor, Department of Zoology, TKM College of Arts and Science, Kollam as partial fulfillment of the requirements for the award of the Degree of *Bachelor of Science* in Zoology.

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27.03.2017

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DEDICATED TO OUR PARENTS AND TEACHERS….

INTRODUCTION

INTRODUCTION

Birds enjoy a wide variety of habitats across the globe and assume almost all crucial ecological niches. India has three of the 34 global biodiversity hotspots: the Western Ghats, the Himalayas and the Indo-Burma region. Avian fauna adds to the rich splendor of these ecosystems and plays important role in the maintenance of their balance. The human impact on bird diversity, the importance and need of the conservation of birds and the strategies for the same have to be disseminated among the student community. Indian Peninsula offers rich resources and shelter for a variety of birds. Galushin (1971) pointed out the high number of birds in Indian cities, and suggested that this can be attributed to the amount of food available, the number of trees that can provide breeding sites, and the "traditional goodwill of Indians to all living beings".

The awareness about bird diversity and its conservation are necessary in the context of their valuable ecological roles and the threats faced by them. The extensive use of pesticides in agriculture affects bird health causing endocrine disruption and weakening of the immune mechanism of bird species dwelling in the croplands, and hence it has destructive biological effect on the birds (Lundholm, 1987; Fairbrother et al., 2004). Pesticide residues have been reported in eggs of many bird species in different parts of the world (Tannock et al., 1983; Medvedev, 1995). It is apparent that the habitat destruction and pollution have caused serious threats to this splendid array of fauna in almost all ecosystems.

A bird has been described as a 'feathered biped'. Birds are arboreal and flying creatures with forelimbs adapted for flight and hind limbs for perching. Birds belong to the subphylum Vertebrata and Phylum Chordata. They are

generally thought to have evolved from small Theropod Dinosaurs in the mid-late Jurassic, over 150 million years ago. The first known fossil bird is *Archaeopteryx*, from the late Jurassic of Bavaria, Germany. It was represented by seven skeletons and a feather and it's a missing link between reptiles and birds. Birds form a class of animals that includes over 10,000 species worldwide. The class Aves is mainly divided into two subclasses Archaeornithes and Neorinthes. Ancient birds belong to Archaeornithes and present day ones to Neorinthes. There are two subdivisions of the Neornithes, the Palaeognathae and the Neognathae. The Palaeognathae includes two subgroups: the Ratitae, which includes the Ostrich, Rhea, Emu, and other large, cursorial, flightless birds as well as the kiwi, which isn't so large; and the Tinamiformes, which includes the South American Tinamous. All other living birds, from hawks to humming birds and from plovers to penguins, are classified in the Neognathae. These species were traditionally divided into 30 orders but more recent lists (in part based on molecular studies) group birds into 23 to 40 orders. Passeriformes, commonly called perching birds or songbirds, is the most diverse order.

In the matter of number, the birds far outnumber all other vertebrates except fishes. The world population of birds is nearly 100 billion. This numerical superiority of birds can be ascribed to the comparative absence of barriers to their distribution. The total number of bird species inhabiting the earth today has been estimated as about 8600. If subspecies or geographical races are taken into account, the figure would rise to nearly 30,000. Of these some 2,500 species and sub species are inhabitants of the Indian sub-region, with roughly 500 winter visitor from the north (Ali, 2012 and Kotpal, 1985).

The birds are cosmopolitan in distribution. They occupy almost all places of highest altitudes, high peaks, deserts, jungles, seas, polar ice caps, caves etc.

Birds have several adaptations for their diversity. The most outstanding way that birds have adapted is the evolution of their upper limbs into wings, the growth of feathers and the ability to fly. Various types and colour of Plumage for various habitats and courtship behaviours, colouration for camouflage, less weight of bones for buoyancy in air, absence of teeth but a beak of various size and shape, presence of a gizzard for grinding are some of the adaptations. Birds have developed specialized bills and feet for feeding. The most generalized bill perhaps belongs to the omnivorous crow. It is a straight, pointed and roughly triangular in section. Birds like herons and kingfishers have more dagger-like bills, suitable for catching fish and frogs; some have 'tooth-edged' bills with which they can grip fish. Dabbling ducks have widened bills with lamination on edges of the upper and lower mandibles. Shore birds have thin, elongated bills for probing the mud in search for small animals. Birds of prey have developed deeper, shorter and down curved bills for tearing and piercing flesh. Strong, dagger-shaped bills for chiseling wood and probing insets from cervices and beneath bark for wood peckers. Birds which feed on flower nectars also have well adapted long pointed thin beak. A much large number of bird species feeds on the fruit and seeds of plants and trees (Grewal et al, 1995).

Bird migration is one of the fascinating aspects of behaviour. Many species migrate locally or over long distances to avoid adverse climatic conditions and in search of food. There are few birds which are seen only during a definite period of the year and they disappear for the rest of years. The periodical movement called migration is seen mostly in harsher winter conditions or during the scarcity of food because they cannot reproduce successfully in the conditions of intense cold or inadequate food.

Many birds are of great economic importance to man because of their food value. Certain kinds are hunted as game, while the domesticated species contribute to man's food supply as meet and eggs. Vulture and Adjutant Storks play an important role in scavenging the dead bodies of animals. They render valuable service by eating large quantities of carcasses and refuse, which, if allowed to decompose under the influence of hot sun, would give rise to pestilence. Some birds render great service by consuming weeds and pests. Tree pies feed on grubs of the palm weevil (Krishnakumar and Sudha, 2002) and cattle egrets consumes ticks on cattles. Hawks and owls help control vermin that might otherwise overrun agricultural crops. Many birds act as pollinators and some help in seed dispersal.

Birds cause hazards to humans by harboring parasitic pathogens either externally or internally. Birds drop their excreta from air when they are in flight and thus contaminate the products for human consumption. Many insects act as pests too but with defined ecological roles. Diseases transmitted by birds are known as ornithosis. Psittacosis, Avian pox and Avian flu are some of them.

One of the saddest features of civilization has been the disappearance (extinction) of so many birds which had rendered valuable services in ecosystem. Granting of lands for lease for various activities, Land, air and water pollution, oil spill and uncontrolled growth of weeds in water bodies, extensive loss of wetland etc. can be detrimental to the diversity and number of birds. This warrants the need of protection of birds from the great tide of destruction. The existing diversity of birds and the major threats faced by them have to be studied globally and necessary measures should be taken for its conservation.

An exploration of the avian diversity in the wetlands of Kollam has been a major concern for years, but no many attempts have been made so far in this regard. This study is a small attempt for the record of the avian diversity in the wetlands of Kollam district. Kerala is one of the green states of India and is well known for its wetlands. There are about 217 wetland areas in Kerala and it accounts for one fifth of land area of the state. The unique wetland ecosystem of Kerala includes marshy and water logged areas, vast polders (paddy cultivation areas) associated with back waters and myristica swamps in the Ghats forests.

Wetlands are defined as lands transitional between terrestrial and aquatic eco-system where the water table is usually at or near the surface or the land is covered by shallow water (Mitch and Gosselink, 1986). Wetlands are among the most productive ecosystems in the world and play vital role in flood control, aquifer (a body of permeable rock which can contain or transmit groundwater) recharge, nutrient absorption and erosion control. Wetlands provide home for a huge diversity of wildlife such as birds, mammals, fish, frogs, insects and plants (Buckton, 2007). Thus wetland helps in maintaining biodiversity of flora and fauna.

310 species of birds in India are known to depend on wetlands (Kumar et al., 2005). Wetlands in India, as elsewhere, are facing tremendous anthropogenic pressures (Prasad et al., 2002) which can greatly influence the structure of bird community (Kler, 2002; Verma et al., 2004; Reginald et al., 2007). Water birds have long attracted the attention of the public and scientists because of their beauty, abundance, visibility and social behavior as well as for their recreational and economic importance.

One of the best known functions of wetland is to provide a habitat for birds. Wetlands are important bird habitats and birds use them for breeding, nesting and rearing young ones. Birds also use wetlands as a source of drinking water and for feeding, resting, shelter and social interactions. Some water fowl such as grebes, have adapted to wetlands to such an extent that their survival as individual species depends on the availability of certain types of wetlands within their geographic ranges. The relation between wetlands and birds is shaped by many factors. These include the availability, depth and quality of water, the availability of food and shelter, and presence or absence of predators. The value of a wetland to a specific bird species is affected by the presence of surface water or moist soils and the duration and timing of flooding.

Many migratory birds are wetland dependent, using wetlands during their migration and breeding season. Some wetlands are on the migration path of water fowls and other migratory birds and provide stopover locations for travelling birds. These birds might feed in agricultural fields during the day and return to the shelter of wetlands during the night.

Nowadays most of the wetlands are under degradation (Bellrose and Trudeu, 1988). This can be attributed to extensive sand-mining and new construction activities across rivers and mangrove afforestation without any environmental impact assessment (EIA). Wetlands are also harmfully affected by nutrient run-off from agricultural lands resulting in increased algal blooms, decreased invertebrate production and lowered oxygen level. Since the suitable wetlands for breeding of many birds are altered, birds have to switch over to less suitable habitats. It causes reproduction to be lower and mortality higher. These birds fail to contribute a sustainable population through the years (Pulliam and Danielson, 1991).

OBJECTIVES

OBJECTIVES

- To enlist the existing species of birds in the wetlands of Kollam district
- To observe and describe the biology, ethology and ecological importance of recorded birds
- To create an awareness on the importance of avian diversity and its conservation

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Kerala has a long history of ornithological surveys. Many works have been conducted across Kerala for exploring the diversity of birds and implementing conservation strategies. Given the ongoing declines in avian functional groups, there is a pressing need to compare avian ecological functions to those of other taxa, to understand how these functions translate to ecosystem services and to estimate the ecological implications of bird declines (Sekercioglu, 2006). 215 species of birds were recorded in Kuluthupuzha reserve of Kollam (Anonymous). Among them more than 20% of the total species were migrant, while the rest were local migrants and residents. A total of 165 birds belonging to 43 families were recorded in the Kottiyoor reserve forest (Sasikumar, 2002). In Nelliyampathy reserve 109 species were recorded (Anonymous). Veeramani and Krishnan (2002) conducted a bird survey in periyar and 187 species were recored. The bird survey conducted in Thatekkad wildlife sanctuary recorded 167 species (Ali, 1964). The habitat preference of birds in Periyar tiger reserve (Yahya, 1981) reveals many of bird species turn to insectivore due to the destruction of defoliator, *Hyblaea puera,* the teak defoliator. Neyyar wildlife sanctuary was recorded with 172 species (Nair, 1993). A total of 249 species were recorded in periyar tiger reserve in which 16 species were new recorded and three were new record to Kerala. (Srivastava *et al.* 1993). Prambikulam wildlife sanctuary recorded with 214 species (Nameer, 1994) including globally threatened species. Even though many surveys have been conducted for birds in various ecosystems across Kerala, many ecosystems in remote suburbs still deserve the exploration and record of avian diversity. Of the 1230 bird species found in India, around 23% are totally wetland dependent (Lekshmy, 2014). Lekshmy (2014) has

recorded 14 species of birds from 5 families from the wetlands at Nilamel and Chadayamangalam, Kollam, Kerala. Guptha (2011) recorded 47 species of wetland birds from Coimbatore, Trichy, Perambalore and Thiruvarur Districts in Tamil Nadu. Habitat disturbance through multi utilization of wetlands, poaching of birds, biomagnifications, regular flow of agricultural activities, eutrophication are reasons from decline in bird diversity in Gidhwa and Parsada wetlands in Chhattisgarh (Sharma *et al*., 2014). A total of 167 species of birds, belonging to 16 orders and 39 families were recorded from Kole Wetlands of Thrissur (Sivaperuman and Jayson, 2000).

STUDY AREA

STUDY AREA

The study area, Kollam District (Plate 1) is well-known for its old sea port town, Quilon or Kollam, on the Arabian Sea coast. This district is located on the southwest part of Kerala State and extends from Lakshadweep Sea to the Western Ghats and is bordered by Trivandrum district on the South and Alapuzha and Pathanamthitta districts in the North and Thirunelveli district of Tamilnadu State in the East and Lakshadweep sea in the west. It lies between North latitudes 8° 45′ and 9° 07′ and East longitudes 76° 29′ and 77° 17′. It has a geographical area of 2491 sq. km which is about 6.48% of the total geographical area of the State. This district has been gifted with sea, lakes, plains, mountains, rivers, streams, backwaters, forest, vast green fields and tropical crop of every variety, both food and cash crop, hence called God's own Capital. The district is drained by three west flowing rivers, Achenkovil, Kallada and Ithikara, originating in the eastern hilly region. These rivers together with their tributaries exhibit dendritic pattern of drainage. Achankovil, Ayirur, Ithikkara, Kallada, Pallikkathodu and Vamanapuram are the major water sheds of Kollam. The main wetlands in Kollam are Kandachira, Pallikkodi, Thodiyur, Vattakkayal, Vellanathuruthu, Chittumala-Kairali marshes, Polachira etc. Coastal areas also are in the list of wetlands in Kollam district.

The whole district of the study area has a tropical humid climate, with an oppressive summer, plentiful seasonal rainfall and cool winters. Temperature is almost steady throughout the year. The average temperature is around 25° C to 32° C. Summers usually begin from March and extend till May. The rest of the year is generally dry. The monsoons begin by June and end by September. The district receives an average of about 2555 mm rainfall annually. The major source

of rainfall is South West monsoon from June to September which contributes nearly 55% of the total rainfall of the year. The North East monsoon season from October to December contributes about 24% and the balance 21% is received during the month of January to May as pre-monsoon showers. Winter is from November to February during which temperature is moderately cool and hovers from 18° C to 25° C. The Relative humidity is higher during the monsoon period and all through the year it is higher during the morning hours. Ecologically Kollam district belongs to Agasthyamalai Biosphere Reserve. The vegetation consists of typical southern subtropical flora.

Plate 1. The study area

MATERIALS AND METHODS

MATERIALS AND METHODS

A study on the avian diversity of the wetlands in Kollam district was conducted from January to March 2017. Opportunistic observation was adopted for studying the avian diversity. Casual observations were made whenever possible especially in early mornings and evenings and photographs were taken with a DSLR camera (Canon PowerShot SX60 HS).

Identification of birds was done by using field guide (Ali, 2002) and with the help of an expert. The identity, habitat, status, ecology and behavior of birds were recorded. Call notes of the birds and seasonal variation in plumage were also carefully observed for the identification of birds. The collected data were analyzed and tabulated.

RESULTS AND DISCUSSION

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A total of 24 species (Table 1) belonging to 11 families were observed. Ardeidae, Threskiornithidae, Recurvirostridae, Scolopacidae, Charadriidae, Sternidae, Rallidae, Halcyonidae, Alcedinidae, Phalacrocoracidae, Ciconiidae, were the families observed in the study area. Ardeidae recorded more number of species. Other families were represented by only a few species. (Figure 1).

It seemed that the wetlands in Kollam district host a variety of Resident bird species. Kandachira and nearby paddy fields recorded many species. Many are migrants during different seasons. Local migrants were also found in the area. Migrations are mainly seasonal movement in response to changes in food availability, habitat, or weather. Non-migratory birds are said to be resident or sedentary. Local migrants are the species which migrate from one locality to another. Out of 24 species, 13 species were residents, 8 were migrants and 3 were local migrants (Figure 2). Night Heron, Black-winged stilt, Common greenshank, Wood Sandpiper, Green Sandpiper, Red wattled lapwing, Gull Billed Tern and White necked stork were the migrant birds sighted in the area. The Local migrants observed were Large Egret, Cattle egret and Oriental white ibis.

Many studies, for e.g., Sivaperuman and Jayson (2000); Guptha (2011) indicated rich diversity of wetland birds in many areas. This study reveals the decline of birds in wetlands of Kollam district. This implies large scale degradation of wetlands, environmental pollution and other anthropogenic threats. Studies have to be conducted on this aspect and strict regulations and laws have to implemented in order to protect our wetlands and thereby the faunal diversity associated with them.

Table 1. Checklist of birds observed

Sl. No	COMMON NAME	SCIENTIFIC NAME	LOCAL NAME	ORDER	FAMILY	STATUS IN INDIA*	RED LIST CATEGORY#
1	Large Egret	*Ardea alba*	പെരുമുണ്ടി	Pelecaniformes	Ardeidae	LM	LC
2	Median Egret	*Ardea intermedia*	ചെറുമുണ്ടി	Pelecaniformes	Ardeidae	R	LC
3	Little Egret	*Egretta garzetta*	ചിന്നമുണ്ടി	Pelecaniformes	Ardeidae	R	LC
4	Cattle Egret	*Bubulcus ibis*	കാലിമുണ്ടി	Pelecaniformes	Ardeidae	LM	LC
5	Indian Pond Heron	*Ardeola grayii*	കുളക്കൊക്ക്	Pelecaniformes	Ardeidae	R	LC
6	Striated Heron	*Butorides striata*	ചിന്നക്കൊക്ക്	Pelecaniformes	Ardeidae	R	LC
7	Night Heron	*Nycticorax nycticorax*	പാതിരാക്കൊക്ക്	Pelecaniformes	Ardeidae	M	LC
8	Purple Heron	*Ardea purpurea*	ചായമുണ്ടി	Pelecaniformes	Ardeidae	R	LC
9	Grey Heron	*Ardea cinerea*	ചാരമുണ്ടി	Pelecaniformes	Ardeidae	R	LC
10	Oriental White Ibis	*Threskiornis melanocephalus*	അരിവാൾ കൊക്കൻ	Pelecaniformes	Threskiornithidae	LM	NT
11	Black-winged Stilt/Common Stilt/ Pied Stilt	*Himantopus himantopus*	പവിഴക്കാലി	Charadriiformes	Recurvirostridae	M	LC
12	Common Greenshank	*Tringa nebularia*	പച്ചക്കാലി	Charadriiformes	Scolopacidae	M	LC
13	Wood Sandpiper	*Tringa glareola*	പുള്ളിക്കാടക്കൊക്ക്	Charadriiformes	Scolopacidae	M	LC
14	Green Sandpiper	*Tringa ochropus*	കരിമ്പൻ കാടക്കൊക്ക്	Charadriiformes	Scolopacidae	M	LC

15	Red wattled Lapwing	*Vanellus indicus*	ചെങ്കണ്ണി തിത്തിരി	Charadriiformes	Charadriidae	M	LC
16	Gull Billed Tern	*Gelochelidon nilotica*	പാത്തക്കൊക്കൻ ആള	Charadriiformes	Sternidae	M	LC
17	White-breasted Waterhen	*Amaurornis phoenicurus*	കുളക്കോഴി	Gruiformes	Rallidae	R	LC
18	White-throated Kingfisher	*Halcyon smyrnensis*	മീൻകൊത്തി ചാത്തൻ	Coraciiformes	Halcyonidae	R	LC
19	Stork-billed Kingfisher	*Pelargopsis capensis*	കാക്ക മീൻകൊത്തി	Coraciiformes	Alcedinidae	R	LC
20	Common Kingfisher	*Alcedo atthis*	ചെറിയ മീൻകൊത്തി	Coraciiformes	Alcedinidae	R	LC
21	Indian Cormorant/ Indian Shag	*Phalacrocorax fuscicollis*	കിന്നരി നീർകാക്ക	Suliformes	Phalacrocoracidae	R	LC
22	Little Cormorant	*Phalacrocorax niger*	നീർകാക്ക	Suliformes	Phalacrocoracidae	R	LC
23	Asian Openbill/Asian Openbill	*Anastomus oscitans*	ചേരക്കൊക്കൻ	Ciconiiformes	Ciconiidae	R	LC
24	White necked Stork/ Asian Woollyneck	*Ciconia episcopus*	കരുവാരക്കൊക്ക്	Ciconiiformes	Ciconiidae	M	VU

*R: Resident, M: Migrant, LM: Local migrant

VU: Vulnerable, NT: Near Threatened, LC: Least Concern

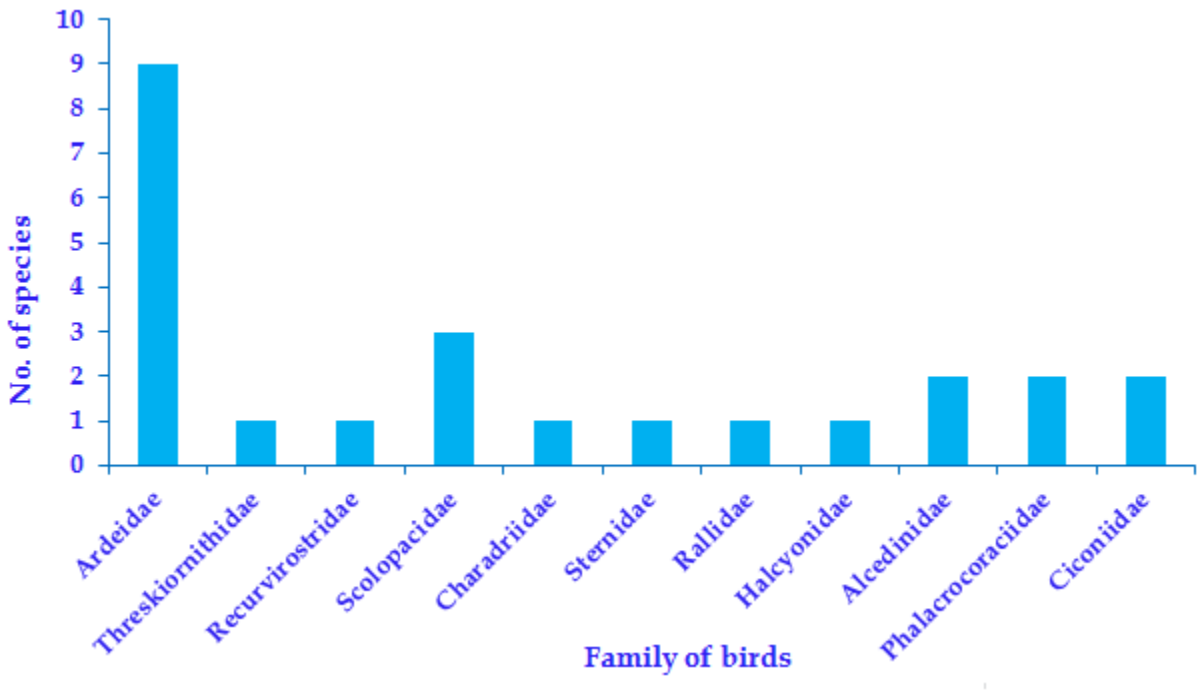


Fig. 1: Relative abundance of the family of birds observed in the study area

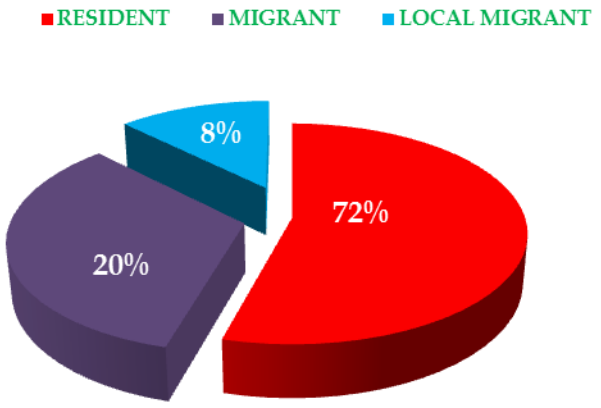


Fig. 2: Status of birds observed in the study area

1. *Ardea alba* Linnaeus, 1758

Common name: Great Egret (പെരുമുണ്ടി)

Order: Pelecaniformes

Family: Ardeidae

The great egret is a large heron with all-white plumage. Standing up to 1 m (3.3 ft) tall, this species can measure 80 to 104 cm (31 to 41 in) in length and have a wingspan of 131 to 170 cm (52 to 67 in). Body mass can range from 700 to 1,500 g (1.5 to 3.3 lb), with an average of around 1,000 g (2.2 lb). It is thus only slightly smaller than the great blue or grey heron (*A. cinerea*). Apart from size, the great egret can be distinguished from other white egrets by its yellow bill and black legs and feet, though the bill may become darker and the lower legs lighter in the breeding season. In breeding plumage, delicate ornamental feathers are borne on the back. Males and females are identical in appearance; juveniles look like non-breeding adults. Differentiated from the intermediate egret (*Mesophoyx intermedius*) by the gape, this extends well beyond the back of the eye in case of the great egret, but ends just behind the eye in case of the intermediate egret. It has a slow flight, with its neck retracted. This is characteristic of herons and bitterns, and distinguishes them from storks, cranes, ibises, and spoonbills, which extend their necks in flight. The great egret walks with its neck extended and wings held close. The great egret is not normally a vocal bird; it gives a low hoarse croak when disturbed, and at breeding colonies, it often gives a loud croaking *cuk cuk cuk* and higher-pitched squawks. The species breeds in colonies in trees close to large lakes with reed beds or other extensive wetlands, preferably at height of 10–40 feet (3.0–12.2 m). It begins to breed at 2–3 years of age by forming monogamous pairs each season. It is unknown if the pairing carries over to the next season. The male selects the nest area, starts a nest and then attracts a female. The nest, made of sticks and lined with plant material, could be up to 3 feet across. Up to six bluish green eggs are laid at one time. Both sexes incubate the eggs and the incubation period is 23–26 days. The young are fed by regurgitation by both parents and they are able to fly within 6–7 weeks.

2. *Ardea intermedia* Wagler, 1827

Common name: Median Egret/Intermediate Egret (ചെറുമുണ്ടി)

Order: Pelecaniformes

Family: Ardeidae

The non-breeding colours are similar to great egrets, but the intermediate is smaller, with neck length a little less than body length, a slightly domed head, and a shorter, thicker bill. The great egret has a noticeable kink near the middle of its neck, and the top of its longer bill nearly aligns with the flat top of its head. Close up, the bare skin of the great egret's gape line extends in a dagger shape behind the eye, while the Intermediate's is less pointed and ends below the eye. The intermediate tends to stalk upright with neck extended forward. The great is more patient, often adopting a sideways-leaning "one-eyed" stance. This species inhabit lowlands, flood plains, seasonal wetlands, shallow mudflats with emergent grasses and reeds, shallow waters with aquatic vegetables etc. It is intermediate in size between great egret and little egret. They have dark legs and thick yellow bills. They have filamentous plumes in breast and their back. It feeds on small fishes, frogs, crustaceans, aquatic insects, small reptiles, small birds and mammals. They are mainly sedentary; post breeding dispersals take place. During winter southward movement may take place Northern groups.

3. *Egretta garzetta* Linnaeus, 1766

Common name: Little Egret (ചിന്നമുണ്ടി)

Order: Pelecaniformes

Family: Ardeidae

Little egrets have yellow-soled feet and black bills. They often run after fish in shallow water. Breeding birds have long nuptial plumes on the back of their heads. Little egrets are sociable birds and are often seen in small flocks. It is a white bird with a slender black beak, long black legs, and in the western race, yellow feet. As an aquatic bird it feeds in shallow water as on land, consuming a variety of small creatures. It breeds colonially with other aquatic birds, making a platform of nests of sticks in tree, bush or reed bed. A clutch of bluish-green eggs is laid and incubated by both parents. The young

fledge at about six weeks of age. Its breeding distribution is in wetlands in warm temperate to tropical parts of Europe, Africa, Asia etc. The adult little egret is 55-5 cm long and 88-106 cm. Little egrets are silent but a various croaking and bubbling calls at their breeding colonies.

4. *Bubulcus ibis* Linnaeus, 1758

Common name: Cattle egret (കാലിമുണ്ടി)

Order: Pelecaniformes

Family: Ardeidae

Cattle egret is a cosmopolitan species of heron found in the tropics, subtropics and warm temperate zones. It is a white bird adorned with buff plumes in the breeding season. It nests in colonies, usually near bodies of water and often with other wading birds. The nest is a platform of sticks in trees or shrubs. Cattle egrets exploit drier and open habitats more than other heron species. Their feeding habitats include seasonally inundated grasslands, pastures, farmlands, wetlands and rice paddies. They often accompany cattle or other large mammals, catching insect and small vertebrate prey disturbed by these animals. Some populations of the cattle egret are migratory and others show post-breeding dispersal.

5. *Ardeola grayii* Sykes, 1832

Common name: Indian Pond Heron (കുളക്കൊക്ക്)

Order: Pelecaniformes

Family: Ardeidae

Indian pond herons inhabit ponds, pools, marshes, rivers, streams, flooded grasslands, paddy fields, canals and ditches and feed on fish, frog, crustaceans, insects and small reptiles. They usually feed from edge of the pond. They may use floating plants to perch themselves for catching prey. They are stocky species with a short neck and coloured or streaked fore neck and breast. It is mainly seen in Pakistan, Bhutan, Nepal, Bangladesh and India. They are sedentary and disperse locally in search of feeding grounds.

6. *Butorides striata* Linnaeus, 1758

Common name: Striated heron (ചിന്നക്കൊക്ക്)

Order: Pelecaniformes

Family: Ardeidae

The striated heron (*Butorides striata*) also known as mangrove heron, little heron or green-backed heron, is a small heron. Adults have a blue-grey back and wings, white underparts, a black cap, a dark line extends from the bill to under the eye and short yellow legs. Juveniles are browner above and streaked below. These birds stand still at the water's edge and wait to ambush prey, but are easier to see than many small heron species. They mainly eat small fish, frogs and aquatic insects. They sometimes use bait, dropping a feather or leaf carefully on the water surface and picking fish that come to investigate. They nest in a platform of sticks measuring between 20–40 cm long and 0.5–5 mm thick. The entire nest measures some 40–50 cm wide and 8–10 cm high outside, with an inner depression 20 cm wide and 4–5 cm deep. It is usually built in not too high off the ground in shrubs or trees but sometimes in sheltered locations on the ground, and often near water. The clutch is 2–5 eggs, which are pale blue and measure around 36 by 28 mm.

7. *Nycticorax nycticorax* Linnaeus, 1758

Common name: Night Heron (പാതിരാക്കൊക്ക്)

Order: Pelecaniformes

Family: Ardeidae

Adult Night Herons are approximately 64 cm (25 in) long and weigh 800 g. They have a black crown and back with the remainder of the body white or grey, red eyes, and short yellow legs. They have pale grey wings and white under parts. Two or three long white plumes, erected in greeting and courtship displays, extend from the back of the head. The sexes are similar in appearance although the males are slightly larger. Black-crowned night herons do not fit the typical body form of the heron family. They are relatively stocky with shorter bills, legs, and necks than their more familiar cousins, the egrets and "day" herons. Their resting posture is normally somewhat hunched but when

hunting they extend their necks and look more like other wading birds. Immature birds have dull grey-brown plumage on their heads, wings, and backs, with numerous pale spots. Their underparts are paler and streaked with brown. The young birds have orange eyes and duller yellowish-green legs. They are very noisy birds in their nesting colonies, with calls that are commonly transcribed as *quok* or *woc*. The breeding habitat is fresh and salt-water wetlands throughout much of the world.

8. *Ardea purpurea* Linnaeus, 1766

Common name: Purple Heron (ചായമുണ്ടി)

Order: Pelecaniformes

Family: Ardeidae

It is similar in appearance to the more common grey heron but is slightly smaller, more slender and has darker plumage. It is also a more evasive bird, favouring densely vegetated habitats near water, particularly reed beds. It hunts for a range of prey including fish, rodents, frogs and insects, either stalking them or standing waiting in ambush. Purple herons are colonial breeders and build a bulky nest out of dead reeds or sticks close to the water edge among reeds or in dense vegetation. About five bluish-green eggs are laid and are incubated by both birds. The young hatch about four weeks later and fledge six weeks after that. The purple heron is a large bird, 78–97 cm (31–38 in) in length with a standing height from 70 to 94 cm (28 to 37 in) and a 120–152 cm (47–60 in) wingspan. However, it is slender for its size, weighing only 0.5 to 1.35 kg (1.1 to 3.0 lb). It is somewhat smaller than the grey heron, from which it can be distinguished by its darker reddish-brown plumage, and, in adults, its darker grey back. Adults have the forehead and the crown of the head black, with a dark stripe down the back of the neck that terminates in a slender, dangling crest. This is shorter than the crest of the grey heron and does not exceed 140 mm (5.5 in). The sides of the head and the neck are buffish chestnut, with dark streaks and lines down either side of the whole the neck. The mantle is oily brown and the upper scapular feathers are elongated but not the lower ones. The rest of the upper parts and the tail are brownish grey. The front of the neck is paler than the sides and there are some elongated feathers at the base of the neck which are streaked

with white, chestnut and black. The breast is chestnut brown, with some blackening at the side, and the belly and under-tail coverts are black. The brownish-yellow beak is long, straight and powerful, and is brighter in colour in breeding adults. The iris is yellow and the legs are brown at the front and yellowish behind. The call is a harsh "frarnk", but is quieter and more high-pitched than that of the grey heron. It is generally a less noisy bird, though similar guttural sounds are heard emanating from the heronry. It is also less robust, and appears somewhat hollow-chested.

9. *Ardea cinerea* Linnaeus, 1758

Common name: Grey heron (ചാരമുണ്ടി)

Order: Pelecaniformes

Family: Ardeidae

Grey heron is a long legged predatory wading bird of the heron family. It is native throughout temperate Europe, Asia. The grey heron has an extensive range throughout most of the Palearctic Eco zone. It is seen in lakes, reservoirs, large and small rivers, marshes, ponds, ditches etc. Fish, amphibians, small mammals and insects are taken in shallow water with the heron's long bill. The species breeds in colonies known as heronries. It is usually in high trees close to lakes, seashores or other wetlands. The grey heron is a large bird, standing up to 100 cm (39 in) tall and measuring 84–102 cm (33–40 in) long with a 155–195 cm (61–77 in) wingspan. The body weight can range from 1.02–2.08 kg (2.2–4.6 lb). The plumage is largely ashy-grey above, and greyish-white below with some black on the flanks. Adults have the head and neck white with a broad black supercilium that terminates in the slender, dangling crest, and bluish-black streaks on the front of the neck. The scapular feathers are elongated and the feathers at the base of the neck are also somewhat elongated. Immature birds lack the dark stripe on the head and are generally duller in appearance than adults, with a grey head and neck, and a small, dark grey crest. The pinkish-yellow beak is long, straight and powerful, and is brighter in colour in breeding adults. The iris is yellow and the legs are brown and very long. The main call is a loud croaking "fraaank", but a variety of guttural

and raucous noises are heard at the breeding colony. The male uses an advertisement call to encourage a female to join him at the nest, and both sexes use various greeting calls after a pair bond has been established. A loud, harsh "schaah" is used by the male in driving other birds from the vicinity of the nest and a soft "gogogo" expresses anxiety, as when a predator is nearby or a human walks past the colony. The chicks utter loud chattering or ticking noises.

10. *Threskiornis melanocephalus* Latham, 1790

Common name: Oriental white ibis/Black headed ibis (അരിവാൾ കൊക്കൻ)

Order: Pelecaniformes

Family: Threskiornithidae

It is a species of wadding bird. It breeds in the Indian subcontinent and south Asia from northern India, Bangladesh, Nepal, and Sri Lanka, east up to Japan. It builds a stick nest in a tree and lays 2 to 4 eggs. It occurs in marshy wetland islands and on the coast. It feeds on various fish, frogs and other water creatures. It walks about actively on marshy land probing with its bill into soft mud and often feeds in shallow water with its head momentarily submerged. Like storks and spoonbills, it lacks a true voice producing mechanism and is silent except for peculiar ventriloquial grunts uttered when nesting. Adults are typically 75 cm long and white-plumaged, with some greyer areas on the wings. The bald head, the neck and legs are black. The thick down curved bill is dusky yellow. In breeding, plumage some slaty grey on scapulars and in wings and ornamental plumes at base of the neck. Sexes are similar, but juveniles have whiter necks and a black bill.

11. *Himantopus himantopus* Linnaeus, 1758

Common name: Black-winged stilt/common stilt/pied stilt (പവിഴക്കാലി)

Order: Charadriiformes

Family: Recurvirostridae

Black-winged stilt is a widely distributed very long-legged wader. Adults are 33–36 cm (13–14 in) long. They have long pink legs, a long thin black bill and

are blackish above and white below, with a white head and neck with a varying amount of black. Males have a black back, often with greenish gloss. Females' backs have a brown hue, contrasting with the black remiges. In the populations that have the top of the head normally white at least in winter, females tend to have less black on head and neck all year round, while males often have much black, particularly in summer. This difference is not clear-cut, however, and males usually get all-white heads in winter. Immature birds are grey instead of black and have a markedly sandy hue on the wings, with light feather fringes appearing as a whitish line in flight.

12. *Tringa nebularia* Gunnerus, 1767

Common name: Common greenshank (പച്ചക്കാലി)

Order: Charadriiformes

Family: Scolopacidae

This is a subarctic bird breeding from Northern Scotland eastwards across Northern Europe and Asia. It is a migratory species wintering in Africa, Indian subcontinent and Australia usually on freshwater. They are the largest shanks apart from willets. They are brown in breeding plumage and grey brown in winter and have long greenish legs and a long bill with a grey base. It is a migratory species wintering in Africa and Indian continent. It breeds on dry ground near marshy areas, laying about four eggs in a ground scrape. They feed on small invertebrates, but will also take small fishes and amphibians

13. *Tringa glareola* Linnaeus, 1758

Common name: Wood Sandpiper (പുള്ളിക്കാടക്കൊക്ക്)

Order: Charadriiformes

Family: Scolopacidae

This bird is usually found on freshwater during migration and wintering. They forage by probing in shallow water or on wet mud, and mainly eat insects and similar

small prey. *T. glareola* nests on the ground or uses an abandoned old tree nest of another bird, such as the fieldfare (*Turdus pilaris*). Four pale green eggs are laid between March and May. Adult wood sandpipers moult all their primary feathers between August and December, whilst immature birds moult varying number of outer primaries between December and April, much closer to their departure from Africa. Immatures are also much more flexible than adults in the timing and rate of their moult and refueling. Adults and immatures which accumulate fuel loads of c.50% of their lean body mass can potentially cross distances of 2397-4490 km in one non-stop flight

14. *Tringa ochropus* Linnaeus, 1758

Common name: Green Sandpiper (കരിമ്പൻ കാടക്കൊക്ക്)

Order: Charadriiformes

Family: Scolopacidae

Green Sandpiper breeds across subarctic Europe and Asia and is a migratory bird, wintering in southern Europe, the Indian Subcontinent, Southeast Asia, and tropical Africa. Food is small invertebrate items picked off the mud as this species works steadily around the edges of its chosen pond. This is not a gregarious species, although sometimes small numbers congregate in suitable feeding areas. Green sandpiper is very much a bird of freshwater, and is often found in sites too restricted for other waders, which tend to like a clear all-round view. It lays 2–4 eggs in an old tree nest of another species, such as a fieldfare (*Turdus pilaris*). The clutch takes about three weeks to hatch.

15. *Vanellus indicus* Boddaert, 1783

Common name: Red Wattled Lapwing (ചെങ്കണ്ണി തിത്തിരി)

Order: Charadriiformes

Family: Charadriidae

The red wattled lapwing (V*anellus indicus*) is a lapwing or large plover of about 35 cm long. The bird is usually seen in pairs or small groups not far from

water. The wings are black and light brown with a purple sheen but head and chest and front part of the neck are black. Short tail is tipped black. Males and females are similar in plumage but males have a 5% longer wing. It usually keeps in pairs or trios in well-watered open country, ploughed fields, grazing lands etc. The eggs are laid in a ground scrape or depression.

16. *Gelochelidon nilotica* Gmelin, 1789

Common name: Gull-billed tern (പാത്തക്കൊക്കൻ ആള)

Order: Charadriiformes

Family: Sternidae

This is a fairly large and powerful tern, similar in size and general appearance to a Sandwich tern, but the short thick gull-like bill, broad wings, long legs and robust body are distinctive. The summer adult has grey upperparts, white underparts, a black cap, strong black bill and black legs. The call is a characteristic *ker-wik*. It is 33–42 cm (13–17 in) in length and 76–91 cm (30–36 in) in wingspan.[4][5] Body mass ranges from 150–292 g (5.3–10.3 oz). In winter, the cap is lost, and there is a dark patch through the eye like a Forster's tern or a Mediterranean gull. Juvenile gull-billed terns have a fainter mask, but otherwise look much like winter adults. Juvenile Sandwich terns have a short bill, and are frequently mistaken for gull-billed tern where the latter species is uncommon, such as North Sea coasts.

17. *Amaurornis phoenicurus* Pennant, 1769

Common name: White-breasted Waterhen (കുളക്കോഴി)

Order: Gruiformes

Family: Rallidae

Widely distributed across South-east Asia and the Indian sub-continent. Dark slaty birds with a clean white face, breast and belly. Adults are white-breasted waterhens. They have mainly dark grey upperparts and flanks and a white face neck and breast. The lower belly and under tail are cinnamon coloured.

These birds are usually seen singly or in pairs as they forage slowly along the edge of a waterbody mainly on the ground. They mainly eat insects, small fishes, aquatic invertebrates and seeds such as those of *Pithecolombumdulse.* The nesting season is mainly June to October but varies locally. They nest in a dry location on the ground in marsh vegetation, laying 6-7 eggs. The eggs hatch in about 19 days

18. *Halcyon smyrnensis* Linnaeus, 1758

Common name: White-throated kingfisher (മീൻകൊത്തി ചാത്തൻ)

Order: Coraciiformes

Family: Halcyonidae

The white-throated kingfisher is also known as white-breasted kingfisher or Smyrna kingfisher. They are widely distributed in Asia from Turkey east through the Indian subcontinent to the Philippines. The king fisher is resident over much of its range, although some populations make short of its distance movements. They feed on wide range of prey that includes small reptiles, amphibians, crabs, small rodents and even birds. The adult has bright blue back, wings and tail. Its head, shoulders, flanks and lower belly are chestnut and the throat and breast are white. The large bill and legs are bright red. The species mainly hunts large crustaceans, insects, earthworms, rodents, snakes, fish and frogs. The eggs take 20-22 days to hatch while the chicks fledge in 19 days.

19. *Pelargopsis capensis* Linnaeus, 1766

Common name: Stork-billed Kingfisher (കാക്ക മീൻകൊത്തി)

Order: Coraciiformes

Family: Alcedinidae

Stork-billed Kingfisher is a very large kingfisher, measuring 35 to 38 cm (14 to 15 in) in length. The adult has a green back, blue wings and tail, and grey head. Its underparts and neck are buff. The very large bill and legs are bright red. The flight of the stork-billed kingfisher is laboured and flapping, but direct. Sexes are similar. There are 15

races or subspecies, differing mostly in plumage detail, but *P. c. gigantea* of the Sulu Islands has a white head, neck and underparts. The call of this noisy kingfisher is a low and far reaching *peer-por-por* repeated about every 5 seconds, as well cackling *ke-ke-ke-ke-ke-ke*. The stork-billed kingfisher lives in a variety of well-wooded habitats near lakes, rivers, or coasts. It perches quietly whilst seeking food, and is often inconspicuous despite its size. It is territorial and will chase away eagles and other large predators. This species hunts fish, frogs, crabs, rodents and young birds. Adults dig their nests in river banks, decaying trees, or tree termite nests. A clutch of two to five round white eggs is typical.

20. *Alcedo atthis* Linnaeus, 1758

Common name: Common Kingfisher (ചെറിയ മീൻകൊത്തി)

Order: Coraciiformes

Family: Alcedinidae

The common kingfisher (*Alcedo atthis*) also known as the Eurasian kingfisher, and river kingfisher, is a small kingfisher with seven subspecies recognized within its wide distribution across Eurasia and North Africa. It is resident in much of its range, but migrates from areas where rivers freeze in winter. This sparrow-sized bird has the typical short-tailed, large-headed kingfisher profile; it has blue upperparts, orange underparts and a long bill. It feeds mainly on fish, caught by diving, and has special visual adaptations to enable it to see prey under water. The glossy white eggs are laid in a nest at the end of a burrow in a riverbank. It has a green-blue neck stripe, white neck blaze and throat, rufous underparts, and a black bill with some red at the base. The legs and feet are bright red. It is about 16 centimetres (6.3 in) long with a wingspan of 25 cm (9.8 in), and weighs 34–46 grams. The female is identical in appearance to the male except that her lower mandible is orange-red with a black tip. The juvenile is similar to the adult, but with duller and greener upperparts and paler underparts. Its bill is black, and the legs are also initially black. Feathers are moulted gradually between July and November with the main flight feathers taking 90–100 days to moult and regrow. Some

that moult late may suspend their moult during cold winter weather. Unlike in North Africa, Europe and Asia north of the Himalayas, in south and Southeast Asia it can be confused with six other small blue-and-rufous kingfishers, but the rufous ear patches distinguish it from all but juvenile blue-eared kingfisher; details of the head pattern may be necessary to differentiate the two species where both occur. The common kingfisher has no song. The flight call is a short sharp whistle, *chee*, repeated two or three times. Anxious birds emit a harsh, *shrit-it-it* and nestlings call for food with a churring noise.

21. *Phalacrocorax fuscicollis* Stephens, 1826

Common name: Indian cormorant/Indian shag (കിന്നരി നീർകാക്ക)

Order: Suliformes

Family: Phalacrocoracidae

It is found mainly along the inland waters of the Indian Subcontinent but extending west to Sind and east to Thailand and Cambodia. Black on the upper plumage, lacks a crest and has a small and slightly peaked head with a long narrow bill that ends in a hooked tip. The eye is blue and bare yellow facial skin during the non-breeding season. Breeding birds have a short white ear tuft. In some plumages it has a white throat but the white is restricted below the gape unlike in the much larger great cormorant. Sexes are similar, but non-breeding adults and juveniles are browner. This cormorant fishes gregariously in inland rivers or large wetlands of peninsular India and northern part of Sri Lanka. It also occurs in estuaries and mangroves but not on the open coast. They breed very locally in mixed species breeding colonies from July to February.

22. *Phalacrocorax niger* Vieillot 1817

Common name: Little cormorant (നീർകാക്ക)

Order: Suliformes

Family: Phalacrocoracidae

The little cormorant is about 50 centimetres (20 in) long and only slightly smaller than the Indian cormorant (*Phalacrocorax fuscicollis*). The Indian cormorant has a narrower and longer bill which ends in a prominent hook tip, blue iris and a more pointed head profile. The breeding adult bird has a glistening all black plumage with some white spots

and filoplumes on the face. There is also a short crest on the back of the head. The eyes, gular skin and face are dark. In the non-breeding bird or juvenile, the plumage is brownish and the bill and gular skin can appear fleshier. The crest becomes inconspicuous and a small and well-marked white patch on the throat is sometimes visible. Towards the west of the Indus River valley, its range can overlap with vagrant pygmy cormorants (*Microcarbo pygmaeus*), which can be difficult to differentiate in the field and are sometimes even considered conspecific. The sexes are indistinguishable in the field, but males tend to be larger. Some abnormal silvery-grey plumages have been described. The species was described by Vieillot in 1817 as *Hydrocorax niger*. The genus *Hydrocorax* literally means water crow. It was later included with the other cormorants in the genus *Phalacrocorax* but some studies place the smaller "microcormorants" under the genus *Microcarbo*. They may nest beside Indian pond herons and little egrets in colonies. The nest is built in about two weeks. The whitish eggs turn muddy with age and incubation begins when the first egg is laid. This leads to asynchronous hatching and the chicks in a nest can vary considerably in age. The clutch size can vary from two to six eggs laid at intervals of about two days. The eggs hatch after 15 to 21 days. The downy chicks have a bare red head. The young birds are able to leave the nest after about a month. Little cormorants are vocal near their nest and roosts where they produce low roaring sounds. They also produce grunts and groans, a low pitched *ah-ah-ah* and *kok-kok-kok* calls. They roost communally often in the company of other waterbirds.

23.*Anastomus oscitans* Boddaert, 1783

Common name: Asian openbill/ Asian openbill stork (ചേരക്കൊക്കൻ)

Order: Ciconiiformes

Family: Ciconiidae

Asian openbill is a large wading bird mainly in the Indian subcontinent and Southeast Asia. It is greyish or white with glossy black wings and tail and the adults have a gap between the arched upper mandible and recurved lower mandible. Young birds are born without this gap which is thought to be an adaptation that aids in the handling of

snails, their main prey. Although resident within their range, they make long distance movements in response to weather and food availability. The usual foraging habitats are inland wetlands and are only rarely seen along river banks and tidal flats. The breeding season is after the rains, during July to September in northern India and November to March in southern India and Sri Lanka. They may skip breeding in drought years.

24. *Ciconia episcopus* Boddaert, 1783

Common name: White Necked Stork/Woolly Necked Stork (കരുവാരക്കാക്ക്)

Order: Ciconiiformes

Family: Ciconiidae

The woolly-necked stork is a medium-sized stork at 75–92 cm tall. The iris is deep crimson or wine-red. The stork is glistening black overall with a black "skull cap", a downy white neck which gives it its name. The lower belly and under-tail coverts are white, standing out from the rest of the dark coloured plumage. Feathers on the fore-neck are iridescent with a coppery-purple tinge. These feathers are elongated and can be erected during displays. The tail is deeply forked and is white, usually covered by the black long under tail coverts. It has long red legs and a heavy, blackish bill, though some specimens have largely dark-red bills with only the basal one-third being black. Sexes are alike. Juvenile birds are duller versions of the adult with a feathered forehead that is sometimes streaked black-and-white. At fledging age, the immature bird is identical to the adult except for a feathered forehead, much lesser iridescence on feathers, and much longer and fluffier feathers on the neck. It is a widespread tropical species which breeds in Asia, from India to Indonesia, and in tropical Africa. It is a resident breeder in wetlands with trees. They use a variety of freshwater wetlands including seasonal and perennial reservoirs and marshes, crop lands, irrigation canals and rivers. This species is largely solitary or seen in pairs or small family groups of 4-5, and flocks are rare. In agricultural landscapes, the species occurs mostly as very small flocks (< 5 birds), though flocks of over 10 birds occur commonly. The woolly-necked stork walks slowly and steadily on the ground seeking its prey, which like that of most of its relatives, consists of amphibians, reptiles and insects. The large stick nest is built on a tree, and two to

five eggs form the typical clutch, with five eggs being very rare. Birds commonly use both forest trees and solitary trees in agricultural areas to build nests. In India, nests are sometimes built on cell phone towers. Riverside cliffs are also increasingly being used as nest sites.

CONCLUSION

CONCLUSION

The survey conducted on the avian diversity of the wetlands of Kollam district from January to March 2017 revealed the presence of many resident, migrant and local migrant birds. Opportunistic observation was made using a DSLR camera. A total of 24 species belonging to 11 families were observed. Out of 24 species, 13 species were residents, 8 were migrants and 3 were local migrants. Ardeidae, Threskiornithidae, Recurvirostridae, Scolopacidae, Charadriidae, Sternidae, Rallidae, Halcyonidae, Alcedinidae, Phalacrocoracidae, Ciconiidae, were the families observed in the study area. The study revealed that the wetlands offer rich habitats for many birds. Many birds visit wetlands as migratory for breeding and overwintering. The ecological niches assumed by these birds are highly associated with the health and wealth of wetlands. The role of many birds in pollination, seed dispersal, biocontrol etc. makes them important in natural balance. But the developmental invasions, anthropogenic pollutions, habitat destructions etc. cause serious threats to the biodiversity in wetlands. It is highly recommended that strict laws have to be enacted and actions taken in order to conserve these ecosystems and associated organisms and that the developmental and agricultural activities in the nearby areas should be sustainable and in compliance with the legal and scientific norms. This study generated a basic data on the avian fauna associated with the wetlands in Kollam district. Highly systematic and long term survey is needed to record the avian fauna of these areas in detail and strict conservatory measures have to be implemented.

PLATES

1. Great Egret	*Ardea alba*	പെരുമുണ്ടി

2. Median Egret	*Ardea intermedia*	ചെറുമുണ്ടി

3. Little Egret	*Egretta garzetta*	ചിന്നമുണ്ടി

4. Cattle Egret	*Bubulcus ibis*	കാലിമുണ്ടി

5. Indian Pond Heron	*Ardeola grayii*	കുളക്കൊക്ക്

6. Striated Heron	*Butorides striata*	ചിന്നക്കൊക്ക്

7. Night Heron	*Nycticorax nycticorax*	പാതിരാക്കൊക്ക്

8. Purple Heron	*Ardea purpurea*	ചായമുണ്ടി

9. Grey Heron	*Ardea cinerea*	ചാരമുണ്ടി

10. Oriental White Ibis	*Threskiornis melanocephalus*	അരിവാൾ കൊക്കൻ

11. Black-winged Stilt/Common Stilt/ Pied Stilt	*Himantopus himantopus*	പവിഴക്കാലി

12. Common Greenshank	*Tringa nebularia*	പച്ചക്കാലി

13. Wood Sandpiper	*Tringa glareola*	പുള്ളിക്കാടക്കൊക്ക്

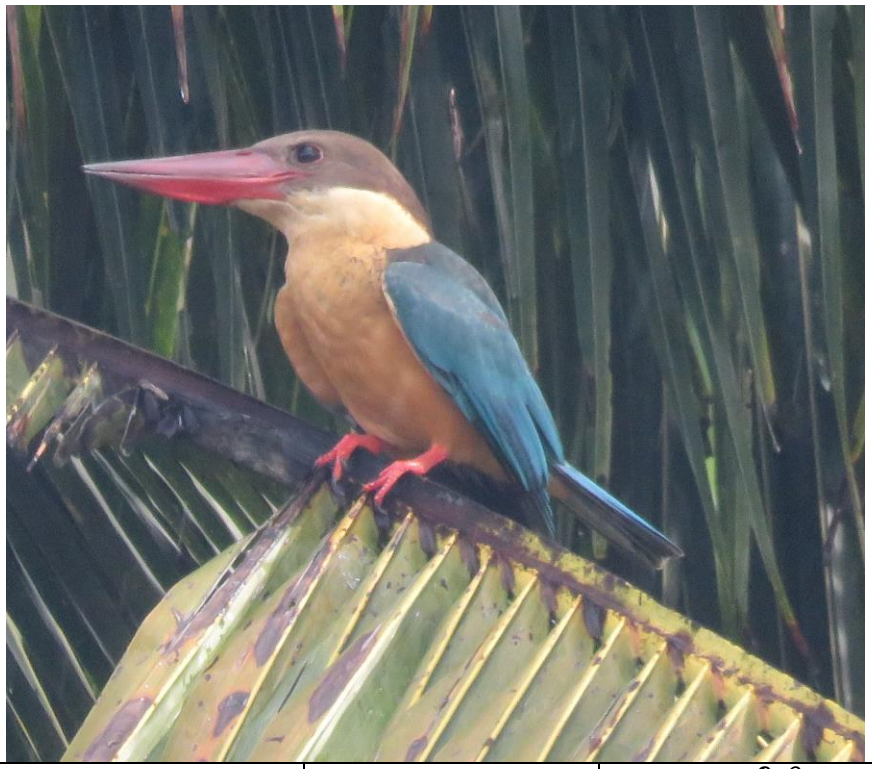
14. Green Sandpiper	*Tringa ochropus*	കരിമ്പൻ കാടക്കൊക്ക്

15. Red wattled Lapwing	*Vanellus indicus*	ചെങ്കണ്ണി തിത്തിരി

16. Gull Billed Tern	*Gelochelidon nilotica*	പാത്തക്കൊക്കൻ ആള

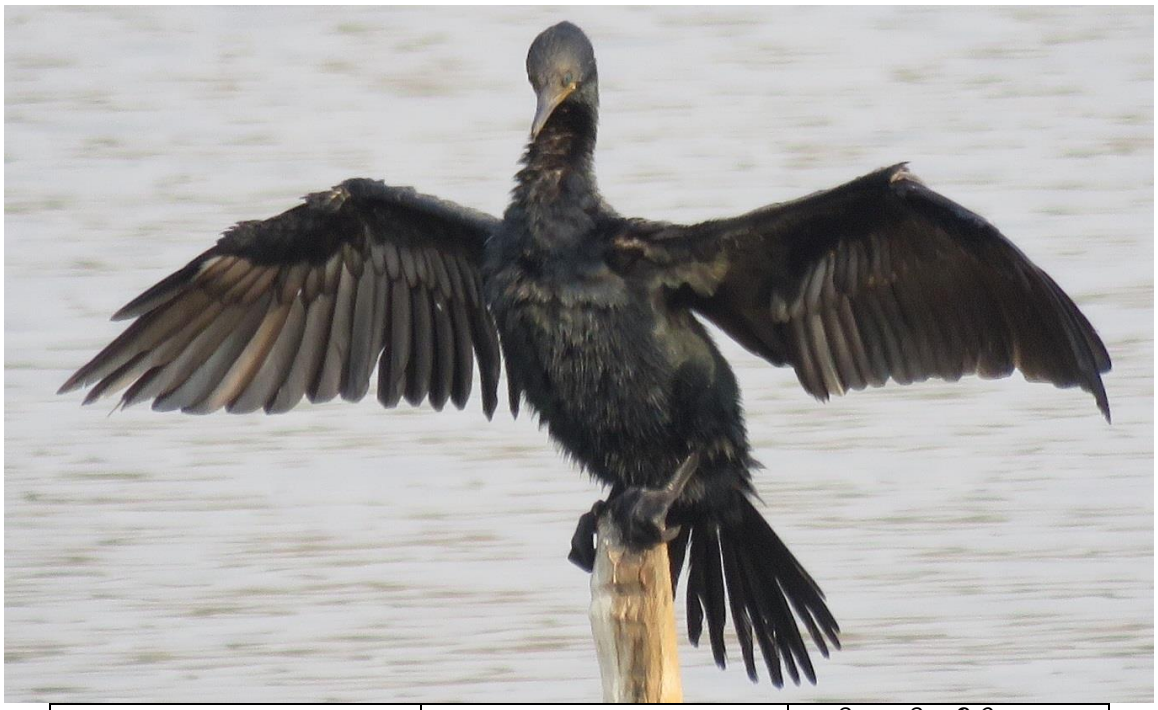
17. White-breasted Waterhen	*Amaurornis phoenicurus*	കുളക്കോഴി

18. White-throated Kingfisher	*Halcyon smyrnensis*	മീൻകൊത്തി ചാത്തൻ



19. Stork-billed Kingfisher	*Pelargopsis capensis*	കാക്ക മീൻകൊത്തി


20. Common Kingfisher	*Alcedo atthis*	ചെറിയ മീൻകൊത്തി



21. Indian Cormorant/ Indian Shag	*Phalacrocorax fuscicollis*	കിന്നരി നീർകാക്ക

22. Little Cormorant	*Phalacrocorax niger*	നീർകാക്ക

23. Asian Openbill/ Asian Openbill	*Anastomus oscitans*	ചേരക്കൊക്കൻ

24. White necked Stork/ <u>Asian Woollyneck</u>	*Ciconia episcopus*	കരുവാരക്കൊക്ക്

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