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Three Globally Threatened Waterbird Species in Pokkali Farming, Central Kerala

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Abstract

The documentation of Waterbird communities in Pokali wetland was carried out during the winter season 2021-2022. A total of 48 species of birds were recorded from the pokali wetland. During present study, 31 species of waterbirds were recorded. Waterbirds belong to 8 orders and 14 families. In addition, we can count the terrestrial bird species (17 species). All bird species are included in Least Concern except three species of the IUCN Category. Three bird species are Near Threatened birds and these are recorded from Pokali wetland. They are: Oriental Darter (*Anhinga melanogaster*), Spot-billed Pelican (*Pelecanus philippensis*) and Black headed Ibis (*Threskiornis melanocephalus*). Many factors, which threaten the birds in pokali wetland and it affects the decreasing level of bird population. These factors are: Habitat loss, High water level like flood, Climate change, poaching or hunting of birds, Electric lines, Nets used for fishing activities, loss of employees, Predators, Plastics and other types of pollution, etc. Most threats to birds are the cause of human actions.

Keywords: Pokali Wetland; Threatened Birds; Conservation Problems

Introduction

Wetlands are highly productive ecosystems and it provides the home of many threatened bird species [1]. It is intermediate between terrestrial and aquatic environments [2]. Birds are one of the indicators for concentrating ecological issues [3]. Wetlands support different activities of birds like foraging and feeding, moving, resting, calling, preening, chasing etc [4]. Pokkali farming is a unique system of rice cultivation in coastal regions of Alappuzha, Ernakulam and Thrissur districts in Kerala [5]. Pokali system utilizes the relationship between Rice farming and Shrimp or fish farming [6]. Rice cultivation is not profitable but the pokkali farming includes both rice and prawn cultivation and it is highly profitable [7]. The economic importance of pokali is high. Pokali requires no pesticides or fertilizers through their farming time. Pokali is an organic salt resistant rice variety [8]. Rice cultivation can start in May or June and end in September or first week of October. In April and May, the farm can be prepared for Rice cultivation. October time can be ready for prawn or fish farming. Prawn or fish farming starts in November to March. The present study was aimed to document the Waterbird diversity, globally threatened bird species in winter season and their current Threats in pokkali farming, Central Kerala.

Materials and Methods

Study Area

The Pokali field (*Kochuvavakkad padashekharam*) was located near Pallithode Bridge (9°46'35.99"N, 76°17'9.71"E), Thuravoor. Pallithode is a village in the Alappuzha district in the state of Kerala, India, on the shores of the Arabian Sea.

Pallithode is within the Gram Panchayat of Kuthiathode, Pattanakkad Block of Cherthala Taluk. Pallithode is a green, palm-fringed, scenic village in the coastal region of Kerala, on a narrow strip of land, with white, sandy beaches bordering the Arabian Sea to the west, and a lake (kayal)-the Pallithode Pozhi, a part of the Cochin estuary-to the east, as well as extensive, interconnected paddy fields and backwaters to the east of the Pozhi. Chappakadavu beach, in South Pallithode, provides local fishing boats access to the sea. Chellanam is to the north; Valiathode, Parayakad, Chavadi, and Thuravoor are to the east; Andhakaranazhy (4 kilometres (2.5 mi) west of National Highway 66 at Pattanakad), Manokkam Harbor, Azheekal, and Ottamassery are to the south.

Methodology

The study sites were observed four times in a month during 6:00h-12:00 h. Observations were made using binoculars (10 × 50 Nikon) and 4k series DSLR Video Camera (Nikon Coolpix p1000). Data were collected following methods - Direct Observation method Hoves JG, et al. [9], Point Count Ralph CJ, et al. and Hamel PB, et al. [10,11] and Line Transect Method [12]. Bird species can be identified with the help of Field Guide [13,14]. The present study was conducted during the winter season 2021-2022. The wetland birds can be recorded using binoculars (10×50) at a fixed scanning point across the habitat by using direct observation method. Different activities of birds were recorded as foraging and feeding, moving, resting, calling, preening, chasing etc [4]. Using the Point count method the observer reaches at the Centre of the point count plots and records all birds seen or heard for a period of 10 or 15 minutes [15]. Point counts were performed in the morning, beginning with high bird activity. To avoid performing point counts in days with heavy rain and stronger wind [16]. Line transect method, walk through a transact will be used to record the total number of water birds from one scanning point to adjoin one (approximately 500m) along a designated transect line [12]. When standing at each transacted sample point for a ten minute period, birds seen or heard were recorded [17].

Results

The present study documented the diversity of waterbirds and globally threatened birds. The study site was observed four times in a month during 6:00h–12:00 h. Observations were made using binoculars (10 × 50 Nikon) and 4k series DSLR Video Camera (Nikon Coolpix p1000). Data were collected following methods - Direct Observation method Hoves JG, et al. [9], Point Count Ralph, et al. and Hamel, et al. [10,11] and Line Transect Method [12]. A total of 31 species of waterbirds identified from the study area were recorded with greater abundance in January - March, June and Oct-Nov. Waterbirds were identified using "The Book of Indian Birds" by Salim Ali and "Birds of the Indian Subcontinent" by Richard Grimmet, et al. [18,19].

A total of 48 species of waterbirds were recorded from the field area. During present study, 31 species of waterbirds were recorded (Table 1). Waterbirds belong to 8 orders and 14 families. The different water birds are Cotton Pygmy Goose (*Nettapus coromandelianus*), Lesser Whistling Duck (*Dendrocygna javanica*), Garganey (*Spatula querquedula*), White – throated kingfisher (*Halcyon smyrnensis*), Stork-billed kingfisher (*Pelargopsis capensis*),Common kingfisher (*Alcedo atthis*), White breasted waterhen (*Amaurornis phoenicurus*), Purple swamphen (*Porphyrio porphyrio*), Oriental darter (*Anhinga melanogaster*), Little cormorant (*Microcarbo niger*) Great cormorant (*Phalacrocorax carbo*), Indian cormorant (*Phalacrocorax fuscicollis*), Little egret (*Egretta garzetta*), Great egret (*Ardea alba*), Median egret (*Ardea intermedia*), Indian pond heron (*Ardeola grayii*), Grey heron (*Ardea cinerea*), Purple heron (*Ardea purpurea*), Western reef heron (*Egretta gularis*), Cattle Egret (*Bubulcus ibis*), Spot – Billed Pelican (*Pelecanus philippensis*), Black-headed ibis (*Threskiornis melanocephalus*), Painted stork (*Mycteria leucocephala*), Little greb (*Tachybaptus ruficollis*), Green sandpiper (*Tringa ochropus*), Wood sandpiper (Tringa glareola), Whiskered tern (*Chlidonias hybrid*), Little ringed plover (*Charadrius dubius*), Red wattled lapwing Vanellus indicus, Yellow wattled lapwing (*Vanellus malabaricus*), Black-winged stilt (*Himantopus himantopus*).

Sl.No.	Order & Family	Scientific Name	Common Name	IUCN status
1	**Anseriformes**			
	Anatidae	*Nettapus coromandelianus*	Cotton Pygmy Goose	LC
		Dendrocygna javanica	Lesser Whistling Duck	LC
		Spatula querquedula	Garganey	LC
2	**Coraciiformes**			
	Alcedinidae	*Halcyon smyrnensis*	White – throated kingfisher	LC
		Pelargopsis capensis	Stork – billed kingfisher	LC
		Alcedo atthis	Common kingfisher	LC

3	**Gruiformes**			
	Rallidae	*Amaurornis phoenicurus*	White breasted waterhen	LC
		Porphyrio porphyrio	Purple swamphen	LC
4	**Suliformes**			
	Anhingidae	*Anhinga melanogaster*	Oriental darter	NT
	Phalacrocoracidae	*Microcarbo niger*	Little cormorant	LC
		Phalacrocorax carbo	Great cormorant	LC
		Phalacrocorax fuscicollis	Indian cormorant	LC
5	**Pelecaniformes**			
	Ardeidae	*Egretta garzetta*	Little egret	LC
		Ardea alba	Great egret	LC
		Ardea intermedia	Median egret	LC
		Ardeola grayii	Indian pond heron	LC
		Ardea cinerea	Grey heron	LC
		Ardea purpurea	Purple heron	LC
		Egretta gularis	Western reef heron	LC
		Bubulcus ibis	Cattle egret	LC
	Pelecanidae	*Pelecanus philippensis*	Spot-billed pelican	NT
	Threskiornithidae	*Threskiornis melanocephalus*	Black-headed ibis	NT
6	**Ciconiiformes**			
	Ciconiidae	*Mycteria leucocephala*	Painted Stork	LC
7	**Podicipediformes**			
	Podicipedidae	*Tachybaptus ruficollis*	Little greb	LC
8	**Charadriiformes**			
	Scolopacidae	*Tringa ochropus*	Green sandpiper	LC
		Tringa glareola	Wood sandpiper	LC
	Laridae	*Chlidonias hybrid*	Whiskered tern	LC
	Charadriidae	*Charadrius dubius*	Little ringed plover	LC
		Vanellus indicus	Red wattled lapwing	LC
		Vanellus malabaricus	Yellow wattled lapwing	LC
	Recurvirostridae	*Himantopus himantopus*	Black-winged stilt	LC

Table 1: Checklist of Waterbirds recorded in the Pallithodu area.

In addition, we can count the terrestrial bird species (17 species). Terrestrial birds belong to 5 orders and 11 families. The different terrestrial birds are: Brahminy kite (*Haliastur indus*), Black kite (*Milvus migrans*), Greater coucal (*Centropus sinensis*), Asian koel (*Eudynamys scolopaceus*), Rock pigeon (*Columba livia*), Rufous treepie (*Dendrocitta vagabunda*), House crow (*Corvus splendens*), Large – billed crow (*Corvus macrorhynchos*), Oriental magpie (*Pica serica*), Black-hooded oriole (*Oriolus xanthornus*), Indian golden oriole (*Oriolus kundoo*), Black drongo (*Dicrurus macrocercus*), Common myna (*Acridotheres tristis*), Red vented bulbul (*Pycnonotus cafer*), Jungle Babbler (*Argya striata*), Purple-rumped sunbird (*Leptocoma zeylonica*) and White – cheeked Barbet (*Psilopogon viridis*).

All bird species are included in Least Concern of the IUCN Category. In India, 153 bird species are Globally Threatened Deepa KM, et al. [22]. Three species are Near Threatened birds and these are recorded from Pokali wetland (Table 2, Figures 1 & 2). They are: Oriental Darter (*Anhinga melanogaster)*, Spot-billed Pelican (*Pelecanus philippensis)* and Black headed Ibis (*Threskiornis melanocephalus).*

Sl. No.	Species (Common Name)	Scientific Name
1	Oriental Darter	*Anhinga melanogaster*
2	Spot-billed Pelican	*Pelecanus philippensis*
3	Black headed Ibis	*Threskiornis melanocephalus*

Table 2: Globally Threatened Birds from Pokali wetland.

Figure 1: Oriental Darter.

Figure 2: Spot billed pelican.

All these wetlands also support the globally threatened waterbirds. Most of the bird species are included in Least Concern of the IUCN Category. In India, 153 bird species are Globally Threatened. Three species of waterbirds are Near Threatened birds and these are observed from our sampling sites. They are: Oriental Darter (*Anhinga melanogaster*), Spot-billed Pelican (*Pelecanus philippensis)* and Black headed Ibis (*Threskiornis melanocephalus).*

During the winter season (Jan to March 2021 and Jan. 22), we had observed few nests of Spot-billed Pelicans (Figures 3 & 4). The nesting and parental care of Spot-billed Pelicans are very interesting. Using their large beaks they damage the top of coconut trees and construct their nest. Interesting behaviour about that, all the time they care for their family members and young ones.

Figure 3: Black headed Ibis.

Figure 4: Nest of Spot-billed Pelican.

In addition to water birds we had counted the shorebirds also. They are Green Sandpiper, Wood Sandpiper, Whiskered tern, Little ringed plover, Red wattled lapwing, Yellow wattled lapwing and Black-winged stilt. Shorebirds are small wading birds and these birds are under the Avian Order Charadriiformes. They are migratory and resident birds

inhabiting different ecological conditions, mainly shorelines, inland and coastal wetlands, agricultural fields Gutierrez S, et al. [20] and interior grasslands [21].

Many factors, which threaten the bird population, were identified during the study. Most threats are the cause of human actions. The leading threats observed in our sampling sites include Electric lines, Fishing net, Predators, Communication tower, Pesticides and Habitat destruction ,flood, climate change, hunting, loss of employees, plastics, water and soil pollution.

Discussion

The present study documented the waterbird diversity of different sampling sites from the winter season. Along with that, we had observed different types of waterbirds including shore birds and globally threatened ones. Sampling sites are the major feeding grounds of many Egrets, Herons, Cormorants and other waterbirds. The abundance of waterbirds is high in the Saline agroecosystem. Saline Agroecosystem consists of two farming practices (Pokkali farming)-Rice farming and Prawn farming. Most of the time the farm contains water sources. All water birds prefer their habitat in Open water and Water edges. This is the reason where the most waterbirds are observed in saline Agroecosystem.

All these wetlands also support the globally threatened waterbirds. Most of the bird species are included in Least Concern of the IUCN Category. In India, 153 bird species are Globally Threatened [22]. Of these, Common pochard (*Aythya farina*), Marbled duck (*Marmaronetta angustirostris*), White-headed duck (*Oxyura leucocephala*) are three globally threatened waterbirds collected from Morocco at winter time [23]. Three species of waterbirds are Near Threatened birds and these are observed from our sampling sites. They are: Oriental Darter (*Anhinga melanogaster*), Spot-billed Pelican (*Pelecanus philippensis*) and Black headed Ibis (Threskiornis melanocephalus). 13 species of globally threatened shorebirds had been observed at Nijhum Dwip National Park [24]. The Blue winged Goose (*Cyanochen cyanoptera*) observed from Lake Arekit, Southern Ethiopia. The abundance of globally threatened waterbirds has been reduced by the effect of invasive plant species, water hyacinth in Nepal [25]. Globally threatened waterbirds are mainly threatened from anthropogenic factors [23].

The different shorebirds had been observed in rice paddies, *ie*, black-tailed godwits (*Limosa limosa*), common greenshanks (*Tringa nebularia*), and wood sandpipers (*T. glareola*) [26]. Lesser Yellowlegs (*Tringa flaviped*) is a medium sized shorebird and it can be identified from interior Alaska [27]. 12 Plovers including Piping Plover (*Charadrius melodus*) from Michigan's Lake Superior Shoreline [28]. In our sampling sites, we counted the shorebirds. They are Green Sandpiper, Wood Sandpiper, Whiskered tern, Little ringed plover, Red wattled lapwing, Yellow wattled lapwing and Black-winged stilt. They are migratory and resident birds inhabiting different ecological conditions, mainly shorelines, inland and coastal wetlands, agricultural fields Gutierrez S, et al. [20] and interior grasslands [21].

Habitat protection is important to conserve bird communities. Major threats being faced by the wetlands are Habitat loss Yasue M, et al. and Wang C, et al. [29,30], Climate change Gutiérrez, et al. [31], Solid waste dumping Aarif, et al. [32], Reclamation Nameer PO, et al. [33], Pollution Veeramani, et al. and Aarif, et al. [18,19], waterfowls hunting at wetlands Stewart, et al. [34], Use of chemical pesticides Anoop, et al. [35], Flood or sea level rise Marchesiello P et al. [36] waste disposals, siltation, and intensive agricultural expansion Tilahun, et al. [37], building dams Hasan, et al. [38], Disturbance by livestock (feral Water Buffalo Bubalus bubalis and domestic cows) grazing has been listed as key threat to the high-tide roosts of waterbirds Mohsanin [39], accidental by catch shore fishing nets . Chowdhury, et al. [24] results in the decline in bird population. Migrant birds were disturbed by the action of tourists and local fishermen Aarif, et al. [19], Poaching Aarif, et al. [32], Illegal killing (deliberate hunting, poisoning and trapping) [40]. Threats identified for the shorebirds are trapping, lime shell mining and pesticide contamination Kannan, et al. [41], shorebirds in fishing gear [24].

Conclusion

Wetlands are the most productive ecosystems and it is the home of many waterbirds and shorebirds. It helps in maintaining the biodiversity of flora and fauna. Waterbirds use the wetland habitat for feeding, roosting, preening and parental caring, etc. Wetland ecosystems are important for feeding and roosting the area of many egrets, herons, cormorants, Shorebirds and other migratory birds and also support important populations of Globally Threatened waterbirds - Oriental Darter, Spot-billed Pelican and Black headed Ibis.

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