

Three Globally Threatened Waterbirds from Pokkali Wetland, Central Kerala

Neena Narayanan

Sree Narayana College, Cherthala, Alappuzha, Kerala, India

Email: neenanarayanan84[at]gmail.com

Abstract: The documentation of Waterbird communities in Pokkali wetland was carried out during the winter season, end of January to February 2021 - November to February 2022. A total of 31 species of waterbirds belonging to 8 orders and 14 families were recorded during the study. Of these, three are globally threatened ones. They are Oriental Darter (*Anhinga melanogaster*), Spot-billed Pelican (*Pelecanus philippensis*) and Black headed Ibis (*Threskiornis melanocephalus*). The conservation problems affecting the waterbirds in pokkali wetland are Habitat loss, High water level and flood, Climate change affects migration of birds, poaching or hunting of waterbirds, water hyacinth, Electric lines, Fishing nets dipped inside the water affects the cormorants and darter, Feral dogs and other Predators, Solid wastes, Plastics, Water contamination, Soil pollution.

Keywords: Pokkali wetland, Threatened waterbirds, Conservation Problems

1. Introduction

Wetlands are highly productive ecosystems and it provides the home of many threatened bird species (Kaur *et al* 2021). It is intermediate between terrestrial and aquatic environments (Babu *et al* 2022). Birds are one of the indicators for concentrating ecological issues (Ali *et al* 2022). Wetlands support different activities of birds like foraging and feeding, moving, resting, calling, preening, chasing etc. (Akhtar *et al* 2009). Pokkali farming is a unique system of rice cultivation in coastal regions of Alappuzha, Ernakulam and Thrissur districts in Kerala (Ranjith *et al* 2019). Pokkali system utilizes the relationship between Rice farming and Shrimp or fish farming (Vijayan 2016). Rice cultivation is not profitable but the pokkali farming includes both rice and prawn cultivation and it is highly profitable (Jayan *et al* 2010). The economic importance of pokkali is high. Pokkali requires no pesticides or fertilizers through their farming time. Pokkali is an organic salt resistant rice variety (Tomy *et al* 1984). Rice cultivation can start in June and end in September or the 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 and ends in March. The present study was aimed to document the globally threatened waterbird species in winter season and their current Threats in pokkali farming, Central Kerala.

2. Materials and Methods

2.1 Study Area

The Pokkali field (Kochuvavakkadpadashekaram) 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, Pattanakad 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.

2.2 Methodology

Waterbirds were studied based on the Direct Observation method (Hoves and Bakewell 1989), Point Count (Ralph *et al* 1995, Hamel *et al* 1996) and Line Transect Method (Burnham *et al* 1980). Bird species can be identified with the help of Field Guide (Grimmet *et al* 2000, Ali *et al* 2002). Observations were made using binoculars (10 × 50 Nikon) and 4k series DSLR Video Camera (Nikon Coolpix p1000). 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 (Mogaka *et al* 2019). To avoid performing point count in days with heavy rain and stronger wind (Volpato *et al* 2009). Line Transect method walk through a transect 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 (Burnham *et al* 1980). When standing at each transected sample point for a ten minute period, birds seen or heard were recorded (Buckland *et al* 1993). All bird species and individuals seen from a fixed point were recorded to a radius of approximately 300 m, depending on visibility (Lorenzón *et al* 2017). Each count was recorded for a duration of fifteen minutes during the early morning when bird activity was high. Fifteen minutes count enabled recording all the individuals with minimal efforts and disturbances (Yardi *et al* 2019).

3. Results

A total of 31 species of waterbirds belonging to 8 orders and 14 families were recorded during the study. 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 swampphen (*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 grebe (*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*).

All bird species are included in Least Concern of the IUCN Category. In India, 153 bird species are Globally Threatened (Deepa *et al* 2017). Three species are Near Threatened birds and these are recorded from Pokali wetland (Table 1). They are: Oriental Darter (*Anhinga melanogaster*), Spot - billed

Pelican (*Pelecanus philippensis*) and Black headed Ibis (*Threskiornis melanocephalus*).

Oriental ibis (Fig 3) is common in freshwater agroecosystems but it is uncommon in pokkali farms. The reason is that, Most of the Pokkali wetland contains water sources. Ibis is a Water Edged bird, they choose the edges of wetlands for their food preferences. Only a few numbers come to the winter season (January to March), after that they can't be seen. It faces many threats, drainage, disturbance, pollution, agricultural conversion, destruction of roosting and nesting sites, hunting and collection of eggs and nestlings from colonies. A combination of these factors has probably caused the decline.

Spot billed pelicans (Fig 2) are common in the central part of Kerala. In our field area, few are visible in January. Pelicans and Darters are Open Water species. Because they feed on fishes and others on the open water (OW). During the winter season (End of January to February 2021 and November to Jan. 2022), we have observed few nests of Spot - billed Pelicans (Fig 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 behavior about that, all the time they care for their family members and young ones. Spot-billed Pelican birds are threatened by habitat loss due to deforestation, hunting, and pollution by organochlorine pesticides. The population of Oriental Darter (Fig 1) was declining. It is primarily threatened by habitat loss (both degradation of foraging areas and felling of trees used for breeding), pollution, disturbance (at feeding grounds and colonies), hunting, Electric lines (Fig 5), Water hyacinth (Fig 6), and pollution.

Table 1: Globally Threatened waterbirds from Pokkali wetland

Sl No	COMMON NAME	SCIENTIFIC NAME	HABITAT PREFERENCE	IUCN
1.	Black headed Ibis	<i>Threskiornis melanocephalus</i>	WE	NT
2.	Oriental Darter	<i>Anhinga melanogaster</i>	OW	NT
3.	Spot-billed Pelican	<i>Pelecanus philippensis</i>	OW	NT

WE – WATER EDGES

OW – OPEN WATER



Figure 1: Oriental Darter



Figure 4: Nest of Spot - billed Pelican



Figure 2: Spot billed pelican

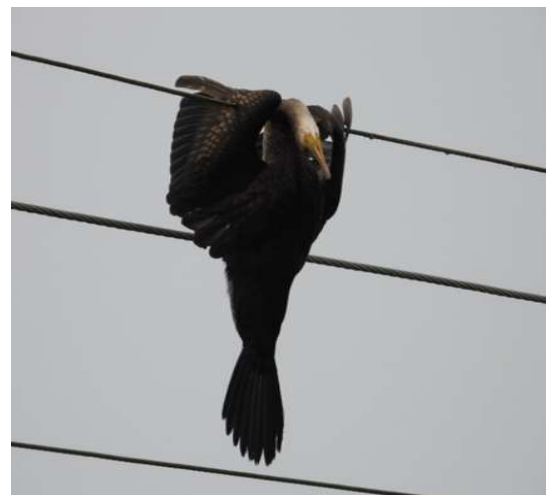


Figure 5: Threats in Oriental Darter by Electric lines



Figure 3: Black headed Ibis



Figure 6: Water hyacinth

Many factors, which threaten the bird population, were identified during the study. The conservation problems affecting the pokkali farming are Habitat loss, High water level and flood, Climate change affects migration of birds, poaching or hunting of waterbirds, Electric lines (Fig 5), Fishing nets dipped inside the water affects the cormorants and darters, Feral dogs and other Predators, water hyacinth (Fig 6), Solid wastes, Plastics, Water contamination, Soil pollution.

4. Discussion

The abundance of waterbirds is high in the Saline agro-ecosystem. Saline Agro-ecosystem 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 Agro-ecosystem.

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 (Deepa *et al* 2017). Of these, Common pochard (*Aythya Ferina*), Marbled duck (*Marmaronetta angustirostris*), White - headed duck (*Oxyura leucocephala*) are three globally threatened waterbirds collected from Morocco at winter time (Ouassou *et al* 2021). Three species of waterbirds are Near Threatened birds and these are observed from our field area. 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 Dvip National Park (Chowdhury *et al* 2021). 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 (Basaula *et al* 2021). Globally threatened waterbirds are mainly threatened from anthropogenic factors (Ouassou *et al* 2021).

Habitat protection is important to conserve bird communities. Major threats being faced by the wetlands are Habitat loss (Yasue *et al* 2009), (Wang *et al* 2022), Climate change (Gutiérrez *et al* 2022), Solid waste dumping (Aarif *et al* 2014), Reclamation (Nameer *et al* 2015), Pollution (Aarif *et al* 2012) (Veeramani *et al* 2018), waterfowls hunting at wetlands (Stewart *et al* 2021), Use of chemical pesticides (Anoop *et al* 2015), Flood or sea level rise (Marcheciello *et al* 2019), waste disposals, siltation, and intensive agricultural expansion (Tilahun *et al* 2022), building dams (Hasan *et al* 2020), Disturbance by livestock (Mohsanin 2014), accidental by catch shore fishing nets (Chowdhury *et al* 2021) results in the decline in bird population. Migrant birds were disturbed by the action of tourists and local fishermen (Aarif *et al* 2014), Poaching (Aarif *et al* 2012), Illegal killing (deliberate hunting, poisoning and trapping) (Gallo – Cajiao *et al*.2020). Threats identified for the shorebirds are trapping, lime shell mining, pesticide contamination (Kannan 2012) and shorebirds in fishing gear. (Chowdhury *et al* 2021).

5. Conclusion

The pokkali wetland supports the globally threatened waterbird species like Oriental Darter, Spot - billed Pelican and Black headed Ibis. These Wetlands are important for feeding and roosting the area of many egrets, herons, cormorants, Shorebirds and other migratory birds.

Acknowledgement

The research was supported by the University Junior Research Fellowship from Kerala University.

References

- [1] Aarif, Basheer (2012). "The Waterbirds of Mavoor wetland, Kerala, South India". *World. J. Zoo.* IDOSI Publications.7 (2): 98 - 101.
- [2] Aarif K. M, Prasad P. K (2014). "Conservation issues of KVCR, the wintering ground and stop - over site of migrant shorebirds in south west coast of India". *Biosystematica*.8.51 - 57.
- [3] Akhtar S, Kabir M. M, Hasan M. K and Begum S (2009). "Activity pattern of Bronze - winged Jacana (*Metopidius Indicus*) at Jahangirnagar University Campus, Bangladesh". *J. Life Sci.*21 (2): 111 - 120.
- [4] Ali S, Daniel (2002). "The Book of Indian Birds".13th ed. Oxford University Press.326p.
- [5] Ali R, Shrivastava P, Gautham V (2022). "Study on the Avifaunal diversity and Species Richness in and around UPPER Lake, Bhopal, India ". *I. J. A. R;* 8 (2): 121 - 126.
- [6] Anoop N, Mathews T. J, Vinayan P. A, Jayakumar S, Sujin N. S, Sabita C and Anoop Raj P. N (2015). "Status and conservation of water birds in Panamaram heronry, Kerala and implication for management". *Asi. J. of Con. Bio.* Vol.4 No.1, pp.76 - 80.
- [7] Babu S, Thomas R (2022). "The comparative study on the wetland Avifauna in the Pokkali fields of Ernakulam District, Kerala ". Book: Impact of climate change on Hydrological cycle, Ecosystem, Fisheries and Food Security.1st Edition. CRC Press. P - 6, Ebook ISBN - 9781003299769.
- [8] Basaula R, Sharma H P, Belant J, Sapkota K. (2021). "Invasive Water Hyacinth Limits Globally Threatened Waterbird Abundance and Diversity at Lake Cluster of Pokhara Valley, Nepal". *Sustainability*. <https://doi.org/10.3390/su132413700>.
- [9] Buckland S. T, Anderson, D. R, Burnham K. P and Laake, J. L (1993). "Distance Sampling: Estimating

- Abundance of Biological Populations. Chapman and Hall, London".446pp.
- [10] Burnham P. K, David R A and Jeffrey L (1980). "Estimation of Density from Line Transect Sampling of Biological Populations". *Wildlife Society*. Wildlife Monograph Number 72.
- [11] Chowdhury S, Foysal M, Shahadat O, Prince N U, Mohsanin S, Islam T (2021). "Globally threatened shorebirds of Nijhum Dwip National Park and management implications' ". *Wader Study*.127 (3): 244-251. doi: 10.18194/ws.00202.
- [12] Deepa K M and Geoge J (2017). "Globally Threatened species of birds recorded from Pokali wetland, Kerala, South India. *J. G. Bio Sci*. Vol.6 (9), Pp.5222 - 5226.
- [13] Gallo - Cajiao E, Morrison T. H, Woodworth B. K, Lees A C, Naves L C, Yong D. L, Choi C Y, Mundkur T, Bird, Jain A, Klovov K, Syroechkovskiy E, Chowdhury S U, Watson J E M, Fuller R A (2020). "Extent and potential impact of hunting on migratory shorebirds in the Asia - Pacific". *Biological Conservation*.246: 108582.
- [14] Grimmett R, Inskipp C, Inskipp T (2000). "Birds of the Indian Subcontinent". London: Oxford University Press pp: 384.
- [15] Gutiérrez J, Moore J, Donnelly P J, Dorador C, Navedo J G, Senner N R (2022). "Climate change and lithium mining influence flamingo abundance in the Lithium Triangle". <https://doi.org/10.1098/rspb.2021.2388>.
- [16] Hamel P. B, Smith W. P, Twedt D. J, Woehr J. R, Morris E, Hamilton R. B and Cooper, R. J (1996). "A land manager's guide to point counts of birds in the Southeast". *Gen. Tech*. DOI: 10.2737/SO - GTR - 120.39.
- [17] Hasan S, Evers J & Zwartveen M (2020). "The transfer of Dutch Delta Planning expertise to Bangladesh: A process of policy translation". *Environmental Science & Policy* 104: 161- 173.
- [18] Hoves J. G. & Bakewell D (1989). "*Shorebird Studies Manual*". AWB Publication No 55, Kuala Lumpur.362.
- [19] Jayan P R, Nithya S (2010). "Overview of farming practices in the Water - logged areas of Kerala, India". *I. J. A. &B. E. Eng*. Vol.3, No.4.
- [20] Kannan V (2012). "178 Shorebirds (Charadriidae) of Pulicat Lake, India". *W. J. Z.* © IDOSI Publications. DOI: 10.5829/idosi. wjz.2012.7.3.6382.7 (3): 178 - 191.
- [21] Kaur R, Brraich O S (2021). "Abundance and Diversity of threatened birds in Nangal wetland, Punjab, India ". *J. Threatened Taxa*.13, 12, 19733 - 19742.
- [22] Lorenzón, R.E., Beltzer, A.H., Peltzer, P.M., Olguin, P.F., León, E.J., Sovrano, L. and Ronchi-Virgolini, A.L. (2017) Habitat-Mediated Influence of Water-Level Fluctuations on Waterbird Occurrence in Floodplain Wetlands of the Parana River, Argentina. *River Research and Applications*, 33, 1494-1505. <https://doi.org/10.1002/rra.3199>.
- [23] Marchesiello P, Nguyen N. M, Gratiot, Loisel H, Anthony E. J, San D. C (2019) "Erosion of the coastal Mekong delta: assessing nature against man - induced processes". *Conti. Shel. Res*.181, 72-89. <https://doi.org/10.1016/j. csr.2019.05.004>.
- [24] Mogaka, Muya, Ndwigah (2019). "Diversity, Abundance, Richness and Birds of Conservation Interest in Nyando Sugar Belt, Muhoroni Sub - county, Lake Victoria Basin, Western Kenya". *Open. J. Animal Sci*.9, 268 - 285.
- [25] Mohsanin S (2014). "Survey of wintering Indian Skimmer *Rynchopsalbicollis* in Bangladesh ". *Birding ASIA*.21: 105-106.
- [26] Nameer G, Tom P, Jayadevan S. C (2015). "Long term population Trends of Waterbirds in Kerala over three decades". *Waterbirds of India, Wildlife & Protected Areas*.16; 368, 1: 4.
- [27] Ouassou A, Dakki M, Agbani DM, Qninba A, Hamoumi (2021). "Distribution and Numbers of Three Globally Threatened Waterbird Species Wintering in Morocco: The Common Pochard, Marbled Teal, and White - Headed Duck ". *I. J. of Zoo*. <https://doi.org/10.1155/2021/8846203>.

- [28] Ralph C. J, Droege S and Sauer J. R (1995a). "Managing and Monitoring Birds Using Point Counts: Standards and Applications". 161 - 168. Science, 38, 332-341. <https://doi.org/10.1086/703440>.
- [29] Ranjith P, Karunakaran K R, Avudainayagam, Daniel (2019). "Pokkali Rice Cultivation system of Kerala: An Economic Analysis". I. J. Multi. Res. ICRD Publication. Journal - ISSN 2424 - 7073, P.14 - 19.
- [30] Stewart C, Garrick E, McDougall M, Moss Z (2021). "Waterfowl hunting wetlands as habitat for two New Zealand eel species". *New Zealand J. of Z.* <https://doi.org/10.1080/03014223.2021.1885454>.
- [31] Tilahun B, Hailu A, Abie K, Kidane T, & Alemkere A (2022). "Avifauna diversity and conservation challenges in Lake Arekit, Southern Ethiopia". *IsJoEE*. doi: <https://doi.org/10.1163/22244662-bja10032>
- [32] Tomy, Geoge, Jose S (1984). "Pokkali cultivation in kerala". Technical bulletin - 10, Kerala Agricultural University. Trichur. Kerala 1 - 20.
- [33] Veeramani, Vinoth B, Ramakrishnan B, Mohanakrishnan H and Samson A (2018). "Diversity and Habitat Selection of Wetland Birds in Nilgiris, South India". *I. J. of Z and AB*. Volume 1, Issue 3, Medwin Publishers.
- [34] Vijayan R (2016). "Pokkali Rice Cultivation in Kerala". Agriculture Update. Hind. Agri - Horticultural Society. Vol.11, No.3, Pp.329 - 333.
- [35] Volpato, Lopes, Mendonca, Boncon, Bisheimer, Serafini, Anjos (2009). "The use of the Point count Method for Bird survey in the Atlantic Forest". *ZOOLOGIA* 26 (1): 74 - 78.
- [36] Wang C, Yu X, Xia S, Liu Y, Huang J, Zhao W (2022). "Potential Habitats and Their Conservation Status for Swan Geese (*Ansercygnoides*) along the East Asian Flyway". *RS.14* (8), 1899; <https://doi.org/10.3390/rs14081899>.
- [37] Yardi, K.D., Bharucha, E. and Girade, S. (2019) Post-Restoration Monitoring of Water Quality and Avifaunal Diversity of Pashan Lake, Pune, India Using a Citizen Science Approach. *Freshwater*
- [38] Yasue M, Dearden P (2009) "The Importance of Supratidal Habitats for Wintering Shorebirds and the Potential Impacts of Shrimp Aquaculture". *EM* 43, 1108 (2009). <https://doi.org/10.1007/s00267-008-9255-7>.