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Diversity and abundance of avifauna in Kondakarla Ava Lake, Andhra Pradesh, India.

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Abstract:

Bird migration is an amazing natural phenomenon that fascinates scientists, bird lovers, and environmentalists alike. A significant migratory hotspot, Kondakarla Ava Lake near Visakhapatnam, a coastal city in the Indian state of Andhra Pradesh, draws a variety of bird species from all over the world.

Each year, Kondakarla Ava Lake witnesses the arrival of migratory birds during the winter months, creating a unique spectacle of biodiversity. These birds traverse long distances, crossing geographical boundaries and ecological barriers, to seek favorable breeding and feeding grounds.

The ecological ramifications of migrating bird populations in Kondakarla Ava Lake are extensive. These avian guests are essential to preserving the delicate ecosystems' equilibrium in the area. They contribute to the reduction of pest populations and the improvement of nutrient cycling in wetlands and water bodies by eating fish, aquatic plants, insects, and other animals. Additionally, their excretions act as organic fertilizers, improving the soil and encouraging the growth of plants. As a result, migrating birds greatly contribute to the general stability and health of the environment in the area.

The survival of migrating birds in Kondakarla Ava Lake is threatened by a number of factors notwithstanding their significance. Significant threats to their wellbeing include deforestation, habitat degradation, pollution, climate change, and illegal hunting. Additionally, as urbanization and human activities spread, migratory species have less secure places to stop and feed because of the disruption to their natural habitats. Given these difficulties, conservation initiatives are essential to protect the migratory bird populations in Kondakarla Ava Lake.

Keywords: Coastal city, Geographical boundaries, Ecological barriers, Conservation, Illegal hunting.

Introduction:

The Kondakarla Awa Lake, being a unique ecosystem, upon which several thousands of families are dependent for their livelihood, needs urgent conservation measures Chourey, (2001) for protecting it from the threats of pollution, siltation, eutrophication and encroachments. As per my study has indicated that the major wetlands harbor substantial biodiversity, provide habitats at times for several species of conservation importance and are ecologically sensitive and valuable. So these wetlands should b protected as per the stipulations of Wetlands (Conservation & Management) Rules-2010. A strategy for sustainably and wisely using them whilst ensuring their entire ecosystem structure, functions and services should be identified and executed. Many fishermen indulge in poaching of birds and other wild life wherever available. They are unaware of the importance of such species. Awareness programmes have to be initiated to address this issue. Programmes with stakeholder participation should be formulated to protect such wetlands.

Study Area:

Kondakarla Ava wetland, a natural freshwater lake (stretches between latitudes 17°35‟30” and 17° 36‟02″ N longitudes; 82° 59‟27” and 83° 01‟02” E) of Visakhapatnam district, Andhra Pradesh, India. The Kondakarla Awa Lake is a part of the Sarada riverine system and is classified as a perennial, warm, a euphotic, shallow, polymitic, eutropic fresh water lentic body. The wetland is named after a village, “Kondakarla”, abutting thelake. For the natives, the wetland is a livelihood source, while for the nearby towns and city people it is a getaway famous for avian diversity. During the British period oneof the famous tourist place in Andhra Pradesh.

Methodology:

Bird survey was conducted, when the birds are most active during day from 06:00 to 9.30 hrs and from 16:00 to 19:00 hrs. Field visits have been conducted weekly once in all three seasons and habitat wise (Xu Hanqiu, 2006). Opportunistic observations were made during other timings and species recorded during these observations included in the checklist. The birdlife in the study area were documented by direct observations, random walks and opportunistic encounters following Agardi, T.,*et al* 2005. Identification manuals and field guides by Balasubramanian, P., *et al* 2004 and Rahmani, A.R., *et al* 2009 were used during survey. Common and scientific names of the birds following Buckton, S., 2007 and COP 11, 2012 were adopted. The birds were categorized as Resident (R), Migratory (M), Aquatic (A) and Terrestrial (T) as per Balachandran, S., 2006 and Xu Hanqiu, 2006. All the birds species recorded during the present study were tabulated giving their scientific name, family, IUCN (2022) status & legal status if any. Abundance of the recorded species are documented based on the total sightings during the study period as common (more than 10 sightings), uncommon (3-5 sightings), and rare (1-2 sightings). The checklist of species with their status was given. The numbers of migratory birds are maximum during December, January and starts reducing from February onwards.

Results:

Towards improvement of birds habitat, mounds and bunds are planted with tree species such as *Acacia nilotica* (Babul), *Azadirachta indica* (Neem), *Tamarindus indicus* (Tamarind/Imli) *Prosophus* sps, *Ficus glomerata*, *Ficus benghalensis*,*Phoenix sylvestris* (Wild date palm), *Sygium cumini, Pongamia pinnata, Samania saman,, Calophyllum* sps. *Mimusops elegi* etc., for roosting and nesting of the wetland birds like *Pelicans, Painted storks, Herons, Egrets*, *Cormorants*, etc. Artificial perches with logs of wood, bamboo have been provided as vantage points for diving birds like Kingfisher, Darters, and Raptors etc.

Table.-1. Overall season wise variations of small wading bird density (No./ha) recordedfrom January 2021 to December 2022. (Values are Mean ± SE).

S.No	Small Wading birds	Seasons (January 2021 - December 2022)			
		Pre-Monsoon	Monsoon	Post-Monsoon	Summer
1	*Pelecanus onocrotalus*	0.2±0.12	14.02±7.42	19.7±11.20	0
2	*Halcyon smyrnensis*	37.2±6.98	27.5±7.68	59.7±27.15	13.5±2.68
3	*Fulica atra*	5.1±3.48	12.3±8.51	7.1±5.28	0.04±0.03
4	*Bubulcus ibis*	3.5±0.75	0.2±0.18	15.2±12.86	0
5	*Microcarbo niger*	0	2.4±0.82	0	0.5±0.67
6	*Marsh sandpiper*	35.0±0.58	26.1±0.52	58.2±20.9	0
7	*Columba livia*	4.2±2.52	0.4±0.73	10.2±6.84	0
8	*Vanellus indicus*	5.8±5.01	3.1±1.14	1.9±0.8	1.02±1.05
9	*Ardeola grayii*	18.7±4.56	19.7±6.42	12.9±3.8	24.4±3.72
10	*Alcedo atthis*	1.4±0.48	0.3±0.13	3.5±2.78	0.1±0.20

Table.-2. Overall season wise variations of small wading birds density, diversity and richness recorded from January 2021 to December 2022. (Values are Mean ± SE).

S. No	Small wading birds	Pre-monsoon	Monsoon	Post-monsoon	Summer
1	Density (No./ha)	77.3±08.23	63.5±22.54	152.4±59.58	44.2±9.64
2	Diversity (H)	0.08±0.007	0.06±0.002	0.04±0.008	0.04±0.003
3	Richness(No. of species)	5.1±0.56	3.8±0.47	3.2±0.78	2.5±0.45

Table- 3. Analysis of variance showed the impact of season in relation to density, diversity and richness of small wading birds studied from January 2021 to December -2022.

S. No	Small wading birds	Sum of Squares	df	Mean Square	F	p
1	Density (No./ha)	281.458	4	78721.875	3.597	0.028
2	Diversity (H′)	0.007	4	0.005	2.23	0.089
3	Richness (No. of species)	48.578	4	20.505	2.781	0.01

January, 2021 to December, 2022 a total of ten species were reported for plover and sandpiper. The monsoon period (27.5±7.68/ha.) and pre monsoon period (37.2±6.98/ha.) *Halcyon smyrnensis* to have highest density *Pelecanus onocrotalus* and *Vanellus indicus* presence was found in all the seasons for both years. From the 10 species, the *Marsh sandpiper* was recorded only during the January, 2021 to December, 2022 period the value of 58.2±20.9 /ha of post- monsoon period. *Microcarbo niger* was not spotted during this period. All the ten species were the birds sighted in the period of January, 2021 to December, 2022.

During the monsoon period the overall bird density was noted maximum during period January, 2021 to December, 2022 (112.3±48.52and 196 .12±54.247/ha.). Highest diversity was at monsoon period of two years. Bird species richness was maximum during the monsoon period of first year and pre-monsoon period of the second year. The diversity, species, and density, varied significantly between the years and among the seasons ($P<0.05$).

DISCUSSION:

This study records ten species of coastal birds i.e. plover and sandpipers in the Kondakarla Ava wetland during 2021-2022. This is a remarkable finding among inland wetlands of India. Insufficient invertebrate prey in the coastal wetlands compels the shorebirds to shift their habitat and forage on inland wetland habitats. Inland wetlands provide the energetic demands of coastal birds; enable them to build up nutrient reserves for their breeding activities (Almeida *et al.* (2021). Loss of invertebrate prey species in the coastal wetlands maybe due to degradation of coastal wetlands by increase in

anthropogenic pressure, such as conversion of mudflats for aquaculture practices, agricultural purposes, and other human activities (Bharatha Lakshmi, B., 2006 & 2008). This progressive loss, lead to the use of new habitats (Rio Conference, 2012). Hence, shifting of water birds, from one habitat to another habitat, could be due to the decline in preferred resources (Wilen, B.O., *et al.,* 2004).

Density dependent factor also drivesthe birds to shift their habitat (Xu Hanqiu, 2006.). Species when unable to respond to fluctuating intertidal food supplies, supplement their diet with prey, from non-intertidal habitats i.e., inland wetlands. Prey populations might be lower in quality, availability or abundant nature in these habitats than on intertidal habitats, and hence, their use might indicate, changes in the intertidal system, such as, declining or varying prey populations (WHO (2022).

The monsoon season reports highest bird density, diversity, and species richness. Birds use the wetlands frequently, during winter season (Van Eeden *et al.* (2020). The prey, is the main resource, for utilization of wetland habitats (Holmes *et al.* (2019), which is abundant during winter season in inland wetlands. The quality of habitat through enriching of prey, and other environmental factors determines the shifting of foraging grounds by water birds and shorebirds during winter season (NASA FIRMS (2022).

Conservation implications

The present study shows that, the shorebirds shift their feeding ground, from coastal mud flats to inland wetlands. Balachandran (2006) reported, the shorebirds population has declined in east-coast and they shift to nearby wetlands, agricultural and inland wetlands. In conservation planning, it is important to understand, habitat switches, its causes, and implications, for species of birds.

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