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Occurrence and documentation of stork species in selected water bodies of Kota region, Rajasthan, India

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Abstract
Storks are huge wading birds found throughout the Indian subcontinent. They are members of the order Ciconiiformes and have lengthy bills, necks, and legs. The Ciconiidae family is intimately related to wetlands, marshes, and swamps. The study was carried out for four years (January 2020 to December 2023) to determine the occurrence and distribution of stork species in India's drought-prone Kota region. The line transect and point count methods were used for road surveys and field visits. Despite its harsh climate, the Kota region is fortunate to host six species of storks (three resident and three winter migratory). The six species were sighted alone, in flocks, and in mixed flocks. They were seen foraging and resting in reservoirs, rivers, seasonal ponds, and agricultural fields with water. Seasonally, the type of bird flocks was changed. Sand mining in rivers, the disappearance of seasonal ponds, and severe changes in agricultural practices pose a serious threat to storks and other wetland birds. It is critical to include local communities in the conservation of the stork species.

Keywords: Storks, Kota, winter migratory, resident

Introduction
Rajasthan is located in the north western section of India, encompassing the entire dry Great Indian Desert as well as parts of the semi-arid climatic zone. Because to its location on the western edge of the Indian landmass, the state is subject to hot western winds in the summer and Mediterranean cyclones in the winter. The topographical features of Kota are related with Vindhyan scrap land, Aravali land and Deccan lava Plateau appear in the south eastern parts of the region. The Kota uplands are huge and stony with black soil deposits visible in the valleys here and there. The soils of Kota region are a natural gift as a result of the interaction of live species and environment on bare rocks. Chambal and its tributaries, such as Kali-Sindh and Parbati, have created a triangle alluvial basin in Kota. Temperatures range from 7° to 45° degrees Celsius throughout the year. On extremely scorching summer days, the mercury might reach 47° degrees Celsius, causing extreme dryness and heat. Storks are members of order Ciconiiformes and have large bills, necks, and legs. The Ciconiidae family is strongly related to wetlands, marshes, and swamps. There are 19 species of storks recorded worldwide (Kahl, 1968) [7]. Eight stork species are reported in India (Ali and Ripley, 1987) [10]. Two of these species are migratory (Black stork and European white stork), while the remaining 6 are resident in India (Asian Open-Bill, Painted stork, Woolly-Necked stork, Black-Necked stork, Lesser Adjutant, and Greater Adjutant). So far, no investigations on the family Ciconiidae have been highlighted in the Kota Region. It is critical to know their state and understand their biology in order to conserve them. The lack of baseline data impedes the conservation of already threatened species. So the study was undertaken for the reason to fill these knowledge gaps particularly in the unprotected areas. As a result, the study was conducted in order to fill these information gaps, particularly in exposed areas.

Study area
Kota district is located at the south eastern most part of Rajasthan. Kota is situated on the bank of Chambal River. The cartographic coordinates are 25.2138° N 75.8648° E. A good number of wetlands are found in this city and they provide a habitat platform to aquatic bio-communities. During the present study, 8 areas of Kota region were selected. Stork species have been reported from Kota's protected areas and important bird sites, including

Ummedganj Conservation reserve, Abhera Pond, Udpuriya Pond, Dharampura Pond, Rajpura pond, Alania dam, Borabas Pond and Jamuniya Island (Fig. 1). The study was carried out for over four years (January 2020 to December 2023) to determine the occurrence and documentation of stork species in selected areas of Kota region.

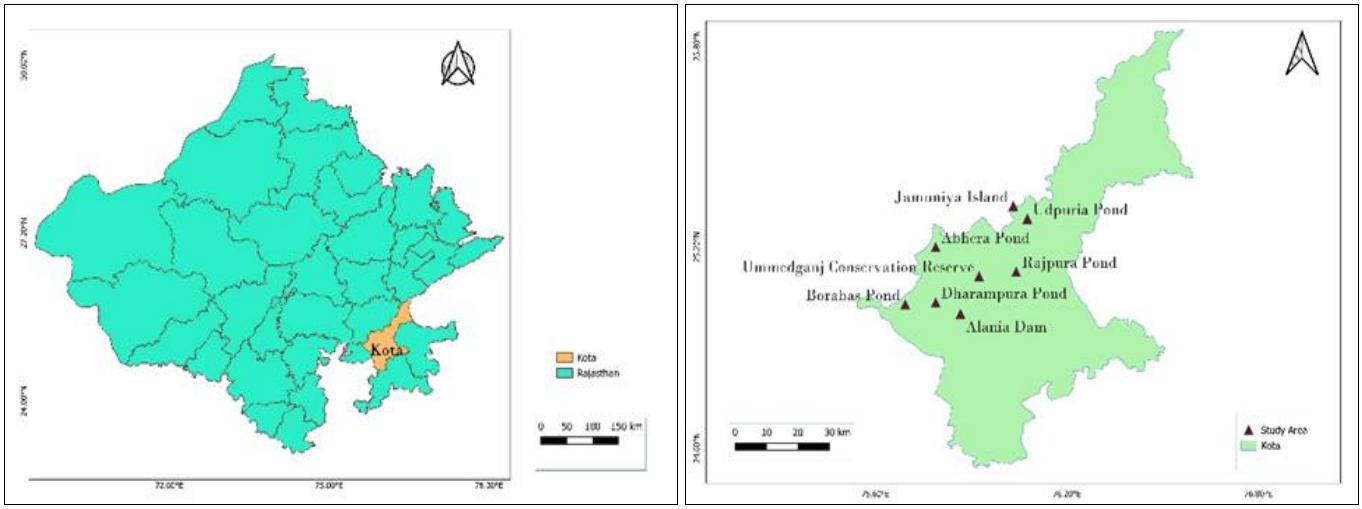

Fig 1: Kota Region showing the 8 selected areas

Methodology

All the three seasons (Summer, Monsoon and Winter) were covered. The line transect and point count methods were used for road surveys and field visits. The reservoirs, as well as the interior ponds and river locations, were all covered. The agricultural fields were largely seen from the side of the road. The observations were supported by photographs taken with a Nikon D7500 DSLR camera. Binoculars were also brought. The poll was largely conducted in the morning (06-10 AM and 03- 07 PM during summers, 06-10 AM and 03- 07 PM in the monsoon and 07-11 AM and 02- 05 PM during winters).

Result and Discussion

Despite its harsh climatic conditions, the Kota region is fortunate to be home to six species (3 resident and 3 migratory) of storks (Table 1). According to the IUCN Status, Woolly-necked Stork and Black-necked stork are Near threatened species. The Asian Open-bill stork, Painted stork, Black stork and White stork are Least concerned.

Table 1: Species of Ciconiidae family reported from the study areas

S. No.	Common Name	Scientific Name	Residential/ Migratory	IUCN Status
1.	Painted stork	*Mycteria leucocephala*	Resident	Least concern
2.	Woolly-necked stork	*Ciconia episcopus*	Resident	Near threatened
3.	Asian Openbill	*Anastomus oscitans*	Resident	Least concern
4.	Black-necked stork	*Ephippiorhynchus asiaticus*	Winter Migratory	Near threatened
5.	Black Stork	*Ciconia nigra*	Winter Migratory	Least concern
6.	European white stork	*Ciconia ciconia*	Winter Migratory	Least concern

Fig 2: Painted stork (*Mycteria leucocephala*)

Fig 3: Woolly-necked stork (*Ciconia episcopus*)

Fig 4: Asian openbill (*Anastomus oscitans*)

Fig 5: European white stork (*Ciconia Ciconia*)

Fig 6: Black Stork (*Ciconia nigra*)

Fig 7: Black-necked stork (*Ephippiorhynchus asiaticus*)

Three species of storks (Asian open bill, Woolly necked stork & Painted stork) regularly occurred in all the study sites (Table 2). The storks were sighted in single, pairs, flocks, and mixed flocks. Black stork, the winter migratory species was recorded from Alania dam only. The Painted stork and Asian Open-bill were mostly observed in flocks. On certain occasions they were seen in flocks ranging from 4-500 in number. This was mostly during the summers and monsoon when water sources are limited. Woolly-necked Stork was mostly seen in pairs or in small flocks of 2-8 storks. The black-necked storks were always seen singly or in pair. This species is depicted as non-social, found mostly as single birds, pairs or small family groups and introverted in the presence of humans (Luthin, 1987) [1]. The Black storks were sighted in pair or in small flocks of maximum 10 individuals. It chose to avoid human disturbances. They were also seen in mixed flocks with Painted storks. The White storks were sighted in single or in small flocks of maximum 7 individuals.

Table 2: Occurrence of Stork species in the study area

S. No.	Study Area	Painted stork	Woolly-necked stork	Asian openbill	Black-necked stork	Black stork	European white stork
1.	Alania dam	✓	✓	✓	✓	✓	✓
2.	Abhera pond	✓	✓	✓	×	×	×
3.	Ummedganj conservation reserve	✓	✓	✓	×	×	✓
4.	Rajpura pond	✓	✓	✓	×	×	×
5.	Udpuriya pond	✓	✓	✓	×	×	×
6.	Jamuniya island	✓	✓	✓	×	×	×
7.	Dharmpura pond	✓	✓	✓	×	×	×
8.	Borabas pond	✓	✓	✓	×	×	×

Fig 8: Mixed Flock of Painted stork and Woolly-necked stork at Alania dam

Fig 9: Flock of Painted stork with Black storks

Storks were spotted foraging and resting in dams, rivers, ponds, water canals and agricultural fields with water (Table 3). The six species were observed individually, in flocks and in mixed flocks. Painted storks, Woolly-necked storks and Asian open-bill storks were sighted in mixed groups at selected study areas. During the field investigations, flocks of Painted Storks and Black storks were also seen foraging in the same habitat. The mixed bird flocks are reported to change seasonally. The availability of food supplies is reported to determine the dispersal of stork species. Food availability is one of the critical factors that determines bird dispersion to a significant extent. The Painted Stork and Woolly-necked Stork were reported in all the six habitat categories, including dams, ponds, rivers, agricultural fields, water canal and open fields filled with rain water.

Table 3: Distribution of species of Ciconiidae family in different Habitats

S. No.	Species	Dam	River	Pond	Water Canal	Agriculture Field	Open Field (Water filled
1.	Painted stork	✓	✓	✓	✓	✓	✓
2.	Woolly-necked stork	✓	✓	✓	✓	✓	✓
3.	Asian Openbill	✓	✓	✓	✓	×	✓
4.	Black-necked stork	✓	×	×	×	×	×
5.	Black Stork	✓	×	×	×	×	×
6.	European white stork	✓	×	×	✓	×	✓

Fig 10: Flock of Painted stork along a pond Udpuriya

Fig 11: Flock of White stork at Ummedganj Conservation reserve

Fig 12: Flock of Asian-Open bill at Ummedganj Conservation Reserve

Fig 13: Flock of Black stork at Alania dam

Woolly-necked storks preferred fallow fields during the summer and monsoon seasons, and natural freshwater wetlands during the winter on a north Indian agricultural tract (Sundar, 2006) [5]. This was consistent with the observations made during the current investigation, in which Woolly-necked storks foraged in all six types of habitats. Black-necked stork was only spotted at Alania dam November 2023. They were not seen along rivers, in agricultural fields, water canal in open fields. Black-necked Storks are known to use a wide range of wetland environments, both freshwater and saltwater, but they prefer wide-ranging, undisturbed freshwater natural wetlands for foraging (LUTHIN, 1987 & Rahmnai *et al*., 1992) [1, 14]. In the present study also, these storks were using diverse range of wetlands.

The white stork prefers to forage in grassy meadows, farmland, shallow water and marshes. In general, they prefer water bodies that are outside and far away from villages to water bodies that are present within the villages (Pande *et al.*, 2007) [8]. White Storks were not reported regularly from the study areas.

Painted storks were observed foraging in all six habitat types studied. They also shared their foraging sites with Sarus cranes, Egrets, Ibises, Spoonbills and Herons.

Some notable threats were discovered when researching the existence and documentation of the Ciconiidae family. The disappearance of natural ponds in rural areas was the most significant impact. This contributes to water body encroachment and sprawl. The lack of natural water bodies in the Kota region as well as hunting are major threats to bird populations. The Kota region is also known for illegal stone and sand mining. The contractors violate the laws and standards for sand mining, leaving the river banks unfit for fauna. As a result, sand mining in rivers, the disappearance of small seasonal ponds, and severe changes in agricultural practices pose a serious threat to Stork species and other wetland birds in the Kota region. Various anthropogenic activities in the feeding grounds of different stork habitats were observed during the study period. All of these activities are directly or indirectly responsible for storks temporarily leaving the area and changing their food preferences, which primarily include overfishing in the shallow water of rivers and water bodies. Certain species numbers have recently dropped dramatically in Europe due to the elimination of their feeding grounds (Sande *et al*., 2005) [15]. Many water birds, including storks, ibises, egrets, herons and spoonbills spend a lot of time in both aquatic and terrestrial environments. These birds provide two functions: firstly, they release guano, which promotes nutrient cycling and secondly they operate as significant pest control managers, reducing crop loss (Thiollay, 1995 & Greenberg *et al*., 1997) [4, 9].

Conclusion

The purpose of this study was to document the occurrence and distribution of Stork species in Kota region. Documenting them is important not only for demonstrating the diverse richness of a drought-prone and economically backward region, but also for further exploring research prospects on Stork population status, ecology and behaviour. Unprecedented and unrestricted mining of rocks and sand has resulted in large-scale soil erosion and destruction of forest areas, hill slopes, and other natural resources. There is an urgent need to develop some policies in this area. The habitats can be historically conserved and cherished by the locals, in addition to the use of essential government protection measures.

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References

1. Luthin CS. Status of and conservation priorities for the world's stork species. Cool Water Birds. 1987;10:181-202.
2. Norris DR, Marra PP, Kyser TK, Sherry TW, Ratcliffe LM. Tropical winter habitat limits reproductive success on the temperate breeding grounds in a migratory bird. Proc. R Soc. Lond. 2003;271:59-64.
3. Hoyo JD, Elliott A, Sargatal J. Handbook of the Birds of the World. Ostrich to Ducks. Family: Ciconiidae (Storks). Barcelona, Spain: Lynx Edicions. 1992;1:696.
4. Thiollay JM. The role of traditional agro-forests in the conservation of rain-forest bird diversity in Sumatra. Conservation Biology. 1995;9:335-353.
5. Sundar KSG. Flock Size, Density and Habitat Selection of Four Large Water bird Species in an Agricultural Landscape in Uttar Pradesh, India: Implications for Management. Waterbirds: The International Journal of Waterbird Biology. 2006;29(3):365-374.
6. Poudyal LP. Population status and habitat preference of Lesser Adjutant Leptoptilos javanicus in Nepal. Nagao Natural Environment Foundation Newsletter.

2009;18:30-32.
7. Kahl MP. Recent breeding records of storks in East Africa. J East Afr. Nat His Soc. Natl. Mus. 1968;27:67-72.
8. Pande S, Sant N, Bhate R, Ponkshe A, Pandit P, Pawashe A, *et al*. Recent records of wintering White stork *Ciconia ciconia* and Black stork *C. nigra* and flocking behaviour of White-necked Storks *C. episcopus* in Maharashtra and Karnataka states, India. Indian Birds. 2007;3(1):28-32.
9. Greenberg R, Bichier P, Sterling J. Bird populations in rustic and planted shade coffee plantations of eastern Chiapas, Mexico. Biotropica. 1997;29:501-514.
10. Ali S, Ripley SD. Birds of India and Pakistan. New Delhi: Oxford University Press; c1987.
11. Sharma A, Sharma H, Shrivastava S, Neha. An investigation of biodiversity of avian fauna of Ummedganj Pakshi Vihar, Kota, Rajasthan, India. Accent Journal of Economics Ecology & Engineering. 2019;4(4):1-6.
12. Sharma H, Sharma A, Shrivastava S, Sharma S. Study of nesting behaviour of Painted Stork (*Mycteria leucocephala*) in Rajpura village, Kota, Rajasthan, India. International Journal of Innovation in Engineering Research & Management. 2019;6(2):1-3.
13. Sharma H, Sharma A, Shrivastava S, Sharma S. Documentation of a European White Stork with flock of Egyptian Vultures in Kota district, Rajasthan. International Journal of Advanced Research in Science, Communication and Technology. 2023;3(14):251-254.
14. Zhou XJ, Rahmani R. Preclinical and clinical pharmacology of vinca alkaloids. Drugs. 1992 Nov;44:1-6.
15. Garbusinski JM, van der Sande MA, Bartholome EJ, Dramaix M, Gaye A, Coleman R, *et al*. Stroke presentation and outcome in developing countries: A prospective study in the Gambia. Stroke. 2005 Jul 1;36(7):1388-1393.