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RESEARCH ARTICLE

Diversity and status of avian species in the Rann of Hadda, Jaisalmer (Rajasthan)

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Abstract

The aim of this research was to study the avian species at wetlands in the warm climatic conditions of the Thar Desert. The research was conducted on the diversity, composition, and status of bird species at Hadda Rann in Jaisalmer district, Rajasthan, India. Direct observation, point count, and flock count methods were used. Total 143 bird species were recorded. These species belong to 41 families in 16 orders. Among 143 species, 74 were winter visitors, 61 were residents, 5 were passage migrants and 3 were summer migrants. The maximum number of bird species (49 species) belongs to 16 families of the Passeriformes order. A minimum number of species (one species) was recorded in the orders of Psittaciformes, Bucerotiformes, and Falconiformes. The maximum diversity was observed during the winter season, while the minimum diversity was noted during the summer season. A critically endangered species, the White-rumped Vulture (*Gyps bengalensis),* was also pointed out at this place. Out of the total avian species, 130 bird species were of the least concern category, two endangered, one critically endangered, five near threatened, and five species were belonged to the vulnerable category. This study can play a crucial part in raising public awareness of the wetland's importance for conservation.

Keywords: Avian species, Diversity, Status, Rann, Jaisalmer.

Introduction

Wetlands play a vital role for both residential and migratory birds species because these sites provide a suitable habitat for feeding, roosting, nesting, and breeding for various bird species (Kumar et al. 2016; Erwin and Beck 2007), They also give protection to different types of living beings in the habitat (Dai et al. 2019). The changes in the chemical, physical, and biological components of wetlands directly or indirectly affect the abundance and variety of avifauna (Ramsar Convention 2013). The distribution and accessibility of biological resources in the area are the primary causes of the abundance of the region's biodiversity (Kumar and Sahu, 2020). Unprotected wetlands are typically ignored, but these types of areas provide the necessary shelter to birds (Ulman and Singh, 2022). Unprotected wetlands are accessible to the general public and do not have an official status of protection or conservation (Blanckenberg et al. 2020). In every place subject to significant anthropogenic pressure, the assessment of the bird community has become a critical tool for preserving biodiversity (Koshelev et al., 2019; Rahman and Ismail, 2018). Wetland bird monitoring gives extensive information about the condition and biological health of the wetland (Kumar and Gupta, 2009). The availability of food and water at Rann was an important factor in the richness and dispersion of migratory and local species. There is a lack of sufficient and systematic records of wetlands found in Jaisalmer. Therefore, it was decided to study the biodiversity and status of the avian fauna in the Rann of Hadda of Jaisalmer district of Rajasthan.

Materials And Methods

The analysis work was conducted at the Rann (wetland) of Hadda Panchayat in Jaisalmer district. (fig.1) This Rann is situated between the Hadda village and Pohra village of Jaisalmer district (27.077° N and 70.957° E). This Rann had an area of nearly 13 Km^2. Rainwater is the sole source of nourishment for this wetland and its biodiversity. When rain was sufficient, water remained for almost the throughout year. Because of sufficient water and food availability, this place is favourable for many resident and migratory birds. The line transect method, the flock count method, and the

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Figure 1: Hadda Rann

point count method were applied to determine the diversity and the status of birds present at the study site. Data were gathered over about one year, from January 2024 to February 2025. Mostly, the data were collected from 06:00 AM to 9 AM and from 5:00 PM to 07:00 PM during the summer season. During the winter and monsoon season, field visits and data were collected from 8:00 a.m. to 11:00 a.m. and from 3:00 p.m. to 6:00 p.m. Photographs of birds were taken during the fieldwork by Nikon 5600 camera with a 70mm–300mm lens and a Canon camera with a Tamron 150mm–600mm lens. For bird species identification, the Grimmett field guide (Grimmett et al. 2016) and the available scientific sources were also used. The direct observation method was utilised for the identification for birds. The statistical analysis of the gathered data was done by a software called "PAST version 4.04". (Hammer et al., 2001).

Results And Discussion

During the study period, we noticed 143 avian species from 42 families and 16 orders. A total of 44793 individuals of birds were associated with the Rann. During the winter season, we recorded 30403 individuals of 142 species. 6099 individuals from 73 species were counted in the summer season and 8291 individuals from 84 species in the monsoon season (Table 1). Rain was the sole source of water in the Rann, and this rainwater was stored there for a long period. Because of an adequate amount of water, food availability attracts the different bird species and the invasion of migratory birds during the winter season, due to this, the numbers of birds and diversity of species were highest at the Rann. During the summer season, despite no or least amount of water available at the Rann, Resident birds were seen at Rann throughout the year. During the monsoon season, water again comes into the Rann. Due to water availability, there was rise in bird population and bird variety in the monsoon season.

Out of 143 species, a maximum of 49 species belong to the Passeriformes order across 16 families. It was followed by Charadriiformes with 20 species from 6 families, 20 species from one family of the Accipitriformes order, Pelecaniformes order with 12 species across three families, Anseriformes with 14 species from one family, Coraciiformes with eight species across three families, Gruiformes order has four species from two families, Columbiformes and Ciconiiformes with three species belonged to one family, Galliformes, Suliformes and Cuculiformes each with two species from one family, single species from the single family of Psittaciformes, from Bucerotiformes, from Phoenicopteriformes and Falconiformes orders (Fig: 3, Table 2,).

The populations and variety of birds present at Hadda Rann were composed of migratory birds and resident birds. Out of a total of 143 species, 74 were winter visitors or winter migrants, three species were summer visitors (summer migrants), 61species were residents, and five bird species were passage migrants. The Indian thick-knee bird (*Burhinus oedicnemus)* was seen only in the summer season. The highest number of winter visitor birds was from the Anatidae family. Winter visitor birds came to this site at the start of the winter season, and they stayed here during the whole winter season and went back to their native places at the close of the winter season (March), but we also noticed some winter visitor species stayed at this place until the end of the April month of the summer season. Those were the Northern Shoveler, Northern Pintail, Common Pochard, Greater Flamingo, Pied Avocet, Kentish Plover, Common Teal, and Mallard. Jaipal et al. (2023) also reported Common Shelduck *Tadorna tadorna* from Kumhar Kotha and Hadda Rann for the first time. Jaipal and Khati (2023) recorded a total of 96 bird species from the Barmer and 110 bird species from the Jalore at the Narmada canal region. We also noticed that Greater Flamingos were regularly visiting this place every year in the winter, and their numbers were increasing year by year. There was a sufficient amount of food available for the Greater Flamingos. There were no competitors or predators in the wetland study site. Due to

these reasons, Greater flamingos were attracted to this site. We measured the diversity indices for the Rann of Hadda during three different seasons. The greatest value of the Shannon-Weiner index (H = 3.74) was documented during the winter season, and the lowest Shannon-Weiner index value was measured in the summer season (H = 3.099). In the monsoon season, the Shannon-Weiner index (H) was 3.474. Jaipal and Khati (2023) estimated the H' index (4.3105) and species evenness (0.944) at the Barmer region, and a slightly higher H' index value (4.40) and species evenness (0.936) were recorded from the Jalore region. It is almost equal to our findings because both are wetlands. We obtained the highest Simpson's diversity index (Simpson_1-D) value during the period of winter (0.9595) and the minimal value during the season of summer (0.9304). Maximum diversity was noted during the winter season because of sufficient food and water availability at the Rann and the invasion of migratory birds (Table 1).

The Margelaf richness index was used to determine the species richness. The summer season yielded the lowest value of this richness (8.261), while the winter season yielded the peak value (13.66) (Table 1). Results of all indices show that the diversity was highest in the season of winter and lowest diversity in the summer season. Evenness was very high in the monsoon season (0.3841) and lowest (0.2979) in the winter season.

Table 1: Diversity indices are found in different seasons

Diversity indices	*Summer season*	*Monsoon season*	*Winter season*
Species	73	84	142
Simpson_1-D	0.9304	0.954	0.9595
Shannon_H	3.099	3.474	3.745
Evenness_e^H/S	0.3039	0.3841	0.2979
Margalef	8.261	9.199	13.66

We recorded the residential and IUCN status of the avian species in the Rann. A total of 143 species were identified, including 130 species of Least Concern, one critically endangered species, two endangered species, five species that were near threatened, and five species that were vulnerable (Fig. 2). The White-rumped vulture *Gyps bengalensis,* was critically endangered. Endangered species were the Egyptian vulture *Neophron percnopterus* and the Steppe eagle *Aquila nipalensis*. Near threatened status were Cinereous vulture *Aegypius monachus,* Himalayan vulture *Gyps himalayensis,* Painted Stork *Mycteria leucocephala*, Woolly-necked Stork *Ciconia episcopus*, Black-headed Ibis *Threskiornis melanocephalus*, Ferruginous Duck *Aythya nyroca*. However, vulnerable species were Tawny Eagle *Aquila rapax*, Eastern Imperial Eagle Aquila *heliacal,* Greater Spotted Eagle *Aquila clanga,* Common Pochard *Aya farina,* and River Tern *Sterna aurantia* (Table 2).

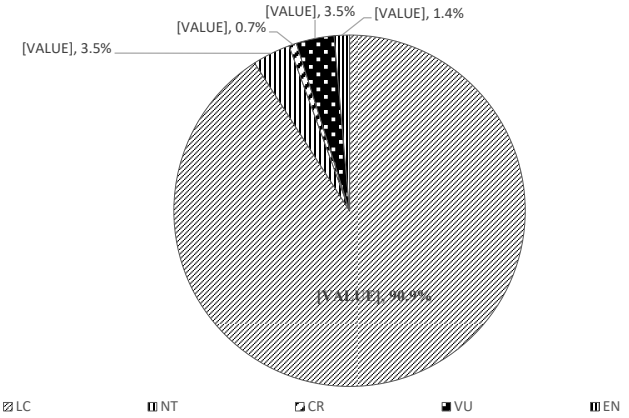

Fig. 2: IUCN status of avian species

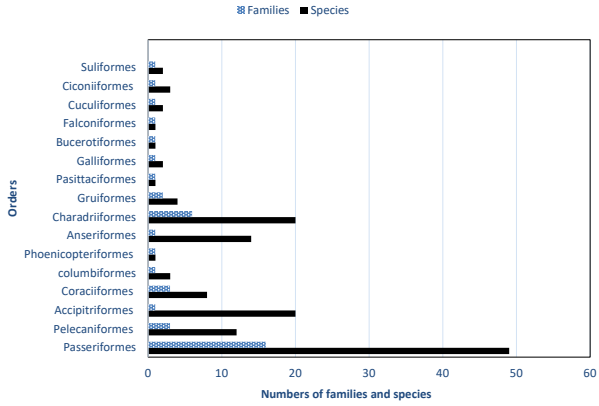

Figure 3: Bird community composition in the Hadda Rann

Table 2: List of the bird species observed in the Hadda Rann.

Order/Family	*Common name*	*Scientific Name*	*IUCN Status*	*Reside-ntial status*
Accipitriformes Accipitridae	Cinereous Vulture	*Aegypius monachus*	NT	WM
	Himalayan Vulture	*Gyps himalayensis*	NT	WM
	Egyptian Vulture	*Neophron percnopterus*	EN	R
	Griffon Vulture	*Gypus fulvus*	LC	WM
	Eurasian Sparrowhawk	*Accipiter nisus*	LC	WM

Cont...

	Shikra	*Accipiter badius*	LC	R
	Western Marsh Harrier	*Circus aeruginosus*	LC	WM
	White-rumped Vulture	*Gyps bengalensis*	CR	R
	Tawny Eagle	*Aquila rapax*	VU	R
	Steppe Eagle	*Aquila nipalensis*	EN	WM
	Eastern Imperial Eagle	*Aquila heliacal*	VU	WM
	White-eyed Buzzard	*Butastur teesa*	LC	R
	Long-legged Buzzard	*Buteo rufinus*	LC	WM
	Crested Serpent Eagle	*Spilornis cheela*	LC	WM
	Black Kite	*Milvus migrans*	LC	R
	Montagu's Harrier	*Circus pygargus*	LC	WM
	Oriental Honey-buzzard	*Pernis ptilorhynchus*	LC	WM
	Black-winged Kite	*Elanus caeruleus*	LC	R
	Short-toad Snake Eagle	*Circaetus gallicus*	LC	WM
	Greater Spotted Eagle	*Aquila clanga*	VU	WM
Ciconiiformes Ciconiidae	Painted stork	*Mycteria leucocephala*	NT	WM
	Woolly-necked Stork	*Ciconia episcopus*	NT	WM
	Black Stork	*Ciconia nigra*	LC	WM
Pelecaniformes Ardeidae	Cattle Egret	*Bubulcus ibis*	LC	R
	Great Egret	*Ardea alba*	LC	R
	Intermediate Egret	*Ardea intermedia*	LC	WM
	Little Egret	*Egretta garzetta*	LC	R
	Grey Heron	*Ardea cinerea*	LC	WM
	Black-crowned night hereon	*Nycticorax nycticorex*	LC	R
	Indian Pond Heron	*Ardeola grayii*	LC	R
Pelecanidae	Great White Pelican	*Pelecanus onocrotalus*	LC	WM
Threskiornithidae	Eurasian spoonbill	*Platalea leucorodia*	LC	WM
	Glossy Ibis	*Plegadis falcinellus*	LC	WM
	Black-headed Ibis	*Threskiornis melanocephalus*	NT	WM
	Red-naped Ibis	*Pseudibis papillosa*	LC	R
Columbiformes Columbidae	Common Pigeon	*Columba livia*	LC	R
	Eurasian collared Dove	*Streptopelia decaocto*	LC	R
	Laughing Dove	*Spilopelia senegalensis*	LC	R
Phoenicopterifor-mes Phoenicopteridae	Greater Flamingo	Phoenicopterus roseus	LC	WM
Suliformes Phalacrocoracidae	Great Cormorant	*Phalacrocorax carbo*	LC	WM
	Indian Cormorant	*Phalacrocorax fuscicollis*	LC	WM
Anseriformes Anatidae	Red crested Pochard	*Netta rufina*	LC	WM
	Greylag Goose	*Anser anser*	LC	WM
	Knob-billed Duck	*Sarkidiornis melanotos*	LC	R
	Northern Shoveler	*Anas clypeata*	LC	WM
	Ruddy shelduck	*Tadorna ferruginea*	LC	WM
	Common Pochard	*Aythya farina*	VU	WM

Cont...

	Eurasian Wigeon	*Anas penelope*	LC	WM
	Indian Spot-billed Duck	*Anas poecilorhyncha*	LC	WM
	Northern Pintail	*Anas acuta*	LC	WM
	Gadwall	*Anas strepera*	LC	WM
	Common Teal	*Anas crecca*	LC	WM
	Mallard	*Anas platyrhynchos*	LC	WM
	Ferruginous Duck	*Aythya nyroca*	NT	WM
	Common Shelduck	*Tadorna tadorna*	LC	WM
Charadriiformes Charadriidae	Kentish Plover	*Charadrius alexandrines*	LC	WM
	Red-wattled Lapwing	*Vanellus indicus*	LC	R
	Little Ringed Plover	*Charadrius dubius*	LC	R
	White-tailed Lapwing	*Vanellus leucurus*	LC	WM
Burhinidae	Indian Thick-knee	*Burhinus indicus*	LC	R
Recurvirostridae	Black-winged Stilt	*Himantopus himantopus*	LC	R
	Pied Avocet	*Recurvirostra avosetta*	LC	WM
Scolopacidae	Common Sandpiper	*Actitis hypoleucos*	LC	WM
	Dunlin	*Calidris alpina*	LC	WM
	Little stint	*Calidris minuta*	LC	WM
	Common Redshank	*Tringa totanus*	LC	WM
	Spotted Redshank	*Tringa erythropus*	LC	WM
	Green Sandpiper	*Tringa ochropus*	LC	WM
Laridae	Black-headed Gull	*Chroicocephalus ridibundus*	LC	WM
	Pallas's Gull	*Ichthyaetus ichthyaetus*	LC	WM
	River Tern	*Sterna aurantia*	VU	WM
	Gull-billed Tern	*Gelochelidon nilotica*	LC	WM
Glareolidae	Cream-coloured Courser	*Cursorius cursor*	LC	WM
	Oriental Pratincole	*Glareola maldivarum*	LC	WM
	Indian Courser	*Cursorius coromandelicus*	LC	WM
Gruiformes Rallidae	Common Coot	*Fulica atra*	LC	R
	Common Moorhen	*Gallinula chloropus*	LC	R
Gruidae	Demoiselle Crane	*Grus virgo*	LC	WM
	Common Crane	*Grus grus*	LC	WM
Pasittaciformes Psittacilidae	Rose-ringed Parakeet	*Pisttacula krameri*	LC	R
Passeriformes Corvidae	Common Raven	*Corvus corax*	LC	R
	House Crow	Corvus splendens	LC	R
	Indian Jungle crow	*Corvus culminatus*	LC	WM
Ploceidae	Baya Weaver	*Ploceus philippinus*	LC	R
Pycnonotidae	Red-vented Bulbul	*Pycnonotus cafer*	LC	R
	White-eared Bulbul	Pycnonotus leucotis	LC	R
Passeridae	House Sparrow	*Passer domesticus*	LC	R
	Yellow-throated Sparrow	*Gymnoris xanthocollis*	LC	R
	Sind Sparrow	*Passer pyrrhonotus*	LC	WM
Sylviidae	Asian Desert Warbler	*Sylvia nana*	LC	R

Cont...

Phylloscopidae	Common Chiffchaff	*Phylloscopus collybita*	LC	WM
Nectariniidae	Purple Sunbird	*Cinnyris asiaticus*	LC	R
Dicruridae	Black Drongo	*Dicrurus macrocercus*	LC	R
Cisticolidae	Rufous-fronted Prinia	Prinia buchanani	LC	R
	Plain Prinia	*Prinia inornate*	LC	R
	Ashy Prinia	*Prinia socialis*	LC	WM
Sturnidae	Common Myna	*Acridotheres tristis*	LC	R
	Brahminy Starling	Sturnia pagodarum	LC	R
	Rosy Starling	*Pastor roseus*	LC	PM
Motacillidae	Citrine Wagtail	*Motacilla citreola*	LC	WM
	White Wagtail	*Motacilla alba*	LC	WM
	Long-billed Pipit	Anthus similis	LC	WM
	Water Pipit	*Anthus spinoletta*	LC	WM
	Tree Pipit	*Anthus trivialis*	LC	WM
	Paddyfield Pipit	*Anthus rufulus*	LC	WM
	Tawny Pipit	Anthus campestris	LC	WM
Muscicapidae	Desert Wheatear	*Oenanthe deserti*	LC	R
	Variable Wheatear	*Oenanthe picata*	LC	WM
	Indian Robin	*Saxicoloides fulicatus*	LC	R
	Oriental Magpie Robin	Copsychus saularis	LC	R
	Rufous-tailed Scrub Robin	*Cercotrichas galactotes*	LC	PM
	Brown Rock Chat	*Oenanthe fusca*	LC	R
	Isabelline Wheatear	*Oenanthe isabellina*	LC	WM
	Pied Bushchat	Saxicola caprata	LC	R
Alaudidae	Rufous-tailed Lark	*Ammomanes phoenicura*	LC	SM
	Crested Lark	*Galerida cristata*	LC	R
	Desert Lark	*Ammomanes deserti*	LC	R
	Ashy-crowned Sparrow Lark	Eremopterix griseus	LC	R
	Greater Hoopoe Lark	*Alaemon alaudipes*	LC	R
	Greater Short-toad Lark	*Calandrella brachydactyla*	LC	WM
Hirundinidae	Barn Swallow	*Hirundo rustica*	LC	WM
Laniidae	Isabelline Shrike	Lanius isabellinus	LC	WM
	Red-tailed Shrike	*Lanius phoenicuroides*	LC	PM
	Great Grey Shrike	*Lanius excubitor*	LC	R
	Bay-backed Shrike	*Lanius vittatus*	LC	R
	Red-backed Shrike	Lanius collurio	LC	PM
	Long-tailed Shrike	*Lanius schach*	LC	R
	Brown Shrike	*Lanius cristatus*	LC	WM
Estrildidae	Indian Silverbill	*Euodice malabarica*	LC	R
Galliformes Phasianidae	Grey Francolin	*Francolinus pondicerianus*	LC	R
	Indian Peafowl	*Pavo cristatus*	LC	R
Coraciiformes Coraciidae	Indian Roller	*Corcacias benghalensis*	LC	R
	European Roller	*Coracias garrulous*	LC	PM
Meropidae	Blue-cheeked Bee-eater	*Merops persicus*	LC	SM

Cont...

	Green Bee-eater	*Merops orientalis*	LC	R
	Blue-tailed Bee-eater	*Merops philippinus*	LC	SM
Alcedinidae	White-throated Kingfisher	*Halcyon smyrnensis*	LC	R
	Pied Kingfisher	*Ceryle rudis*	LC	R
	Common Kingfisher	*Alcedo atthis*	LC	R
Bucerotiformes Upupidae	Eurasian Hoopoe	*Upupa epops*	LC	R
Falconiformes Falconidae	Common Kestrel	*Falco tinnunculus*	LC	WM
Cuculiformes Cuculidae	Asian Koel	*Eudynamys scolopaceus*	LC	R
	Greater Coucal	*Centropus sinensis*	LC	R

NT: Near Threatened, EN: Endangered species, LC: Least concern, CR: Critically Endangered, VU: Vulnerable, WM: Winter migratory, SM: Summer migratory, PM: Passage migrant

Conclusion

Rann is a water body that provides food and habitat to a variety of birds in the harsh climatic conditions of the Thar desert. In winter, several kinds of migratory birds come here from different places and stay here for the whole winter. This work suggests that Rann is preferred by many migratory birds for shelter and food. Rann had a maximum diversity of birds during the winter season and a minimum diversity during the summer season.

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