



Avian Diversity and Conservation at Tal Chhapar Sanctuary: An Ecological Assessment

¹Hari Lal Jangir, ²Balram Sain and ³Prof. Partap Singh

¹ Assistant Professor, Department of Zoology, G.H.S. Govt. College, Sujangarh, Rajasthan, India

² Assistant Professor, Department of Zoology, Govt. Dungar College, Bikaner, Rajasthan, India

³ Professor and H.O.D., Department of Zoology, Govt. Dungar College, Bikaner, Rajasthan, India

Email: harrijangir@gmail.com

Abstract: *Tal Chhapar Sanctuary, situated in the heart of the Thar Desert in Rajasthan, India, represents a remarkable ecological transformation from historical hunting grounds to a protected haven for avian species. This research paper provides a comprehensive assessment of the sanctuary's avian biodiversity, with particular emphasis on its significance as a raptor conservation zone and wintering ground for migratory species. The study documents the presence of 106 avian species, including several critically endangered and endemic birds that find refuge in this unique ecosystem. Through systematic analysis of the sanctuary's ecological characteristics and conservation challenges, this paper highlights the sanctuary's importance in global bird conservation efforts and recommends strategies for enhanced protection measures. The research underscores the delicate balance between desert ecology and avian habitat requirements, offering insights into the conservation of bird species in arid landscapes.*

Key Words: *Avian biodiversity, conservation strategies, ecological transformation, endemic birds, habitat management, Tal Chhapar Sanctuary, threatened species*

1. INTRODUCTION:

Tal Chhapar Sanctuary stands as a remarkable ecological oasis in the otherwise arid landscape of the Thar Desert in Rajasthan, India. This unique sanctuary, characterized by its flat saline grasslands and scattered acacia trees, has undergone a dramatic transformation from its historical role as a hunting ground for Maharajas to a protected bird conservation reserve. The sanctuary's significance in avian conservation stems from its ability to support a surprisingly diverse array of bird species despite its desert location, particularly serving as a crucial habitat for raptors and winter migratory birds. The global importance of Tal Chhapar is underscored by its inclusion in the network of Important Bird Areas (IBAs) recognized by Bird Life International. This designation reflects the sanctuary's critical role in supporting populations of threatened bird species, including several vultures on the brink of extinction. The presence of small water bodies in this desert landscape creates a rare resource that attracts both resident and migratory species, forming a complex ecological web that merits detailed scientific examination. The sanctuary is home to a diverse range of bird species, making it a popular destination for birdwatchers and wildlife enthusiasts. This research paper aims to provide a comprehensive assessment of the avian diversity at Tal Chhapar, analyzing the ecological factors that contribute to its significance as a bird habitat and addressing the conservation challenges that threaten this unique ecosystem.

2. STUDY AREA:

2.1 GEOGRAPHICAL AND ECOLOGICAL CONTEXT:

Tal Chhapar Sanctuary is nestled in the Churu district of Rajasthan, India, covering an area of approximately 7.19 square kilometers in the heart of the Thar Desert. The sanctuary's landscape is characterized by flat saline grasslands known as "Chhapar", which provide a unique vegetative structure unlike typical desert environments. The word "Tal" means pond or 'Talab' in Hindi. The rain water flows through shallow low-lying areas and collect in the small seasonal water ponds. This grassland ecosystem is interspersed with acacia trees and low shrubs that offer crucial perching and nesting sites for avian species. The sanctuary is located between 27°47'53" and 74°26'06" north and east, at a height of 302 metres above sea level, contributing to its specific microclimatic conditions. The entire sanctuary is relatively flat and primarily covered in Mothiya (*Cyperus rotundus*), a kind of grass, which is a preferred meal for bird species and other animals of

the sanctuary. The transformation of Tal Chhapar from a hunting ground to a protected sanctuary represents a significant conservation achievement. Initially maintained as a hunting reserve for blackbucks, the area was declared a sanctuary in 1966, primarily to protect the population of blackbucks (*Antelope cervicapra*). However, the protection of this habitat inadvertently created a safe haven for avian species, particularly raptors that thrive in the open grassland ecosystem. This historical context underscores the interconnectedness of habitat conservation for multiple species and the unintended benefits that protection can provide for entire ecosystems.

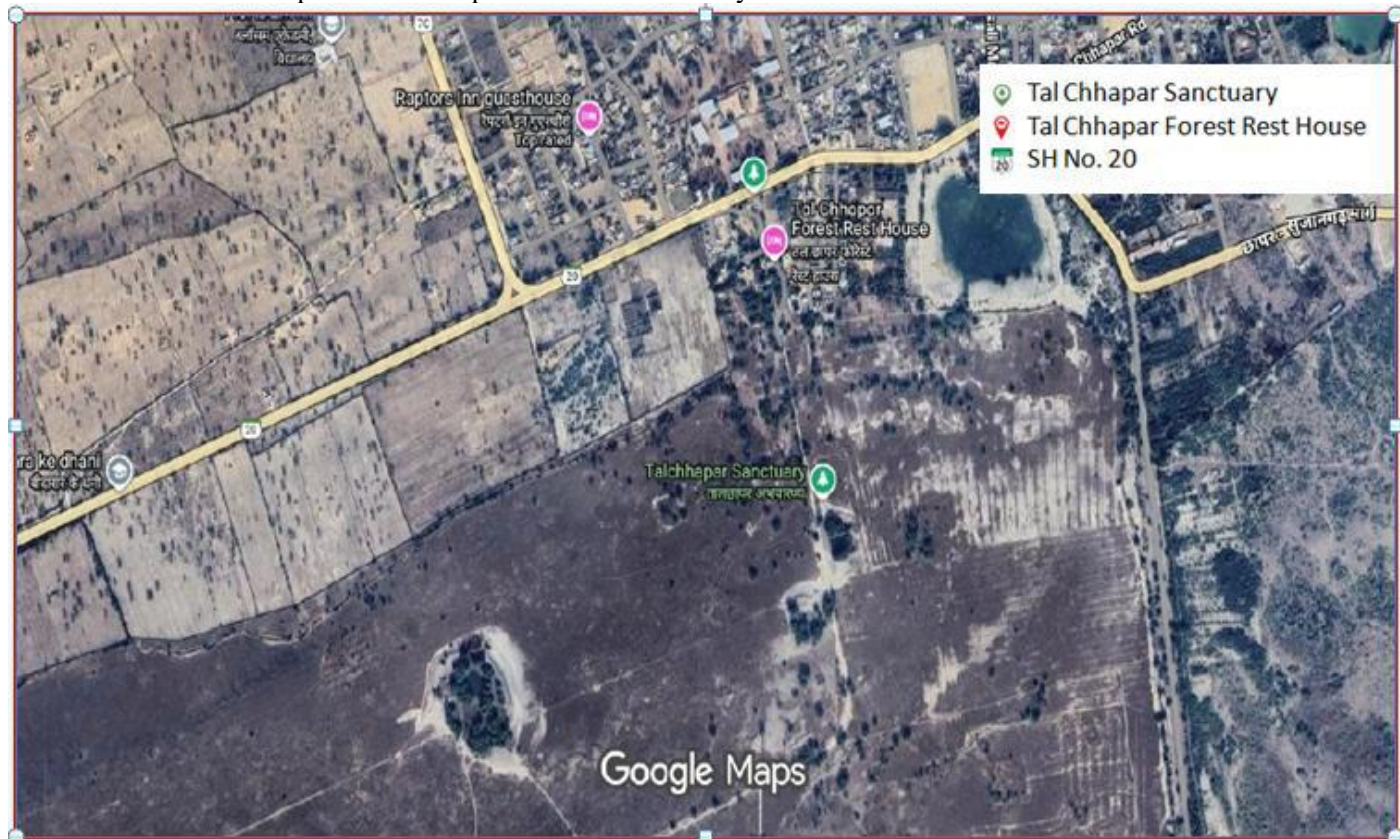


Figure 1: Location Map of Study Area, Tal Chhapar Sanctuary

2.2 CLIMATE AND HYDROLOGY:

Tal Chhapar experiences a semi-arid climate with distinct seasonal variations that profoundly influence avian populations. Summers (April-June) are extremely hot with temperatures reaching 48°C, while winters (November-February) are comparatively mild with temperatures ranging from 5°C to 22°C. The monsoon season (July-September) brings limited rainfall, averaging 300-400mm annually, which rejuvenates the grasslands and creates temporary water bodies that attract both resident and migratory birds. The presence of small water bodies represents a critical hydrological feature in this otherwise arid landscape. These water sources, though limited in size and distribution, provide essential drinking and bathing opportunities for birds, particularly during the dry summer months. The availability of water, combined with the grassland ecosystem, creates an ecological magnet that supports higher avian densities than would typically be sustainable in desert environments. This combination of factors makes Tal Chhapar a critical refuge for bird species in the Thar Desert.

3. METHODOLOGY:

This research employs a multifaceted approach to assess the avian diversity and conservation status of Tal Chhapar Sanctuary. Data collection involved systematic field observations conducted during multiple visits across different seasons between January, 2024 to December, 2024 to account for seasonal variations in avian populations. The methodology incorporated both direct observation points and transects surveys to ensure comprehensive coverage of the sanctuary's diverse habitats.



3.1 DATA COLLECTION TECHNIQUES:

Standardized bird survey techniques were employed, including point counts and line transects, following established ornithological research protocols. Observations were conducted during peak activity hours (in the morning from 06.00 to 10.00 hours and in the evening from 16.00 to 19.00 hours) using 10x42 binoculars, Cannon SX50 HS camera and spotting scopes for accurate identification. Photographic documentation aided in the verification of species identification, particularly for similar-looking species. Additionally, scientific literature and conservation reports were reviewed to contextualize findings within broader conservation frameworks. Data on habitat characteristics, including vegetation structure, water availability, and human disturbance levels, were recorded simultaneously with bird observations to establish habitat associations. For threatened species, particular attention was paid to nesting sites, foraging behavior, and potential threats. The conservation status of each species was classified according to the International Union for Conservation of Nature (IUCN) Red List categories, while endemism status was determined using standardized classifications of avian biogeography.

4. RESULTS:

4.1 OVERVIEW OF AVIAN POPULATIONS:

The current research paper has recorded a total of 106 bird species at Tal Chhappar Sanctuary representing 17 orders and 43 families, thus making the sanctuary a major attraction for both native and migratory birds (Table-1, Fig. 2). Such diversity is the result of many different ecological niches being present, ranging from raptors, waterfowl, shorebirds, and passerines. The occurrence of migratory species highlights the importance of Tal Chhappar as a stopover site for birds migrating along major routes in northwest India, providing them with the necessary resting and feeding places during the migration seasons. The winter months (October-March) represent the period of peak diversity when migratory species join resident populations, creating a dynamic avian community that utilizes the sanctuary's resources. In the study, the Accipitridae family was most prominent having 18 species, while family Anatidae with 9 species, Columbidae, Alaudidae and Muscicapidae each with 5 species were other noticeable families. One of the main priorities of this paper is the ecological importance of these bird populations, The Tal Chhappar bird's play an important part in the ecosystem processes with their seed dispersal, pollination, and biological pest control functions being essential to the ecosystem. Raptors are playing a role of apex predators and bio indicators of health and stability of the environment. The abundance of raptor families, such as Accipitridae, is often correlated with good habitat quality and minimal human disturbance. The presence of scavengers like vultures is indispensable for ecology, as their decline, seen elsewhere, has led to increases in mammal scavengers (e.g., rats and feral dogs), resulting in severe human health issues and immense economic costs. The sanctuary's significance is further enhanced by the presence of species with special conservation status. According to the data, Tal Chhappar hosts 3 near threatened species, 4 vulnerable, 1 critically endangered and 2 endangered species according to IUCN classification. (Fig. 3). This concentration of threatened species underscores the sanctuary's importance in global bird conservation efforts. Of the 106 species of birds reported from the sanctuary 69 were resident, 32 migratory and 5 passage migrants.

The results are conclusive that the Tal Chhappar Wildlife Sanctuary is an ecological haven that cannot be substituted and can support a wide range of avifauna, including resident, migratory, and globally threatened species. The sanctuary is a critical habitat in the arid region since it harbors a unique ecosystem comprising of saline wetlands and grasslands. Thus, it is clear that there is a need to carry out urgent conservation efforts in concert with other parties to reduce the current threats and guarantee the survival and sustainability of its avian populations in the long run. Preservation is a multi-pronged process that should not only focus on the protection of the habitats but also human involvement.

Table 1: Checklist of birds of Tal Chhappar Wildlife Sanctuary

S. No.	Common Name	Scientific name	Family	Status	IUCN Status
1	Common koel	<i>Eudynamys scolopacea</i>	Cuculidae	Resident	LC
2	Greater coucal	<i>Centropus sinensis</i>	Cuculidae	Resident	LC
3	Common cuckoo	<i>Cuculus canorus</i>	Cuculidae	Passage migrant	LC
4	Baya weaver	<i>Ploceus philippinus</i>	Ploceidae	Resident	LC
5	Black drongo	<i>Dicrurus macrocercus</i>	Dicruridae	Resident	LC



6	Indian peafowl	<i>Pavo cristatus</i>	Phasianidae	Resident	LC
7	Gray francolin	<i>Francolinus pondicerianus</i>	Phasianidae	Resident	LC
8	Black francolin	<i>Francolinus francolinus</i>	Phasianidae	Resident	LC
9	Black winged stilt	<i>Himantopus himantopus</i>	Recurvirostridae	Resident	LC
10	Knob billed duck	<i>Sarkidiornis melanotos</i>	Anatidae	Resident	LC
11	Common teal	<i>Anas crecca</i>	Anatidae	Resident	LC
12	Common pochard	<i>Aythya ferina</i>	Anatidae	Resident	VN
13	Bar-headed goose	<i>Anser indicus</i>	Anatidae	Migratory	LC
14	Indian spot-billed duck	<i>Anas poecilorhyncha</i>	Anatidae	Resident	LC
15	Lesser whistling duck	<i>Dendrocygna javanica</i>	Anatidae	Resident	LC
16	Northern pintail	<i>Anas acuta</i>	Anatidae	Migratory	LC
17	Eurasian wigeon	<i>Mareca penelope</i>	Anatidae	Migratory	LC
18	Northern shoveler	<i>Spatula clypeata</i>	Anatidae	Migratory	LC
19	Common coot	<i>Fulica atra</i>	Rallidae	Migratory	LC
20	Common myna	<i>Acridotheres tristis</i>	Sturnidae	Resident	LC
21	Brahminy myna	<i>Sturnia pagodarum</i>	Sturnidae	Resident	LC
22	Common crane	<i>Grus grus</i>	Gruidae	Migratory	LC
23	Demoiselle crane	<i>Grus virgo</i>	Gruidae	Migratory	LC
24	Indian roller	<i>Coracias benghalensis</i>	Coraciidae	Resident	LC
25	European roller	<i>Coracias garrulus</i>	Coraciidae	Migratory	LC
26	Common hoopoe	<i>Upupa epops</i>	Upupidae	Resident	LC
27	Indian pond heron	<i>Ardeola grayii</i>	Ardeidae	Resident	LC
28	Cattle egret	<i>Bubulcus ibis</i>	Ardeidae	Resident	LC
29	Grey heron	<i>Ardea cinerea</i>	Ardeidae	Migratory	LC
30	Little egret	<i>Egretta garzetta</i>	Ardeidae	Resident	LC
31	Jungle babbler	<i>Turdoides striata</i>	Leiothrichidae	Resident	LC
32	Large grey babbler	<i>Argya malcolmi</i>	Leiothrichidae	Resident	LC
33	Lesser white throat	<i>Sylvia curruca</i>	Sylviidae	Migratory	LC
34	Purple sunbird	<i>Cinnyrus asiaticus</i>	Nectariniidae	Resident	LC
35	Red-vented bulbul	<i>Pycnonotus cafer</i>	Pycnonotidae	Resident	LC
36	White-eared bulbul	<i>Pycnonotus leucotis</i>	Pycnonotidae	Resident	LC
37	Red-naped ibis	<i>Pseudibis papillosa</i>	Threskiornithidae	Resident	LC
38	Glossy ibis	<i>Plegadis falcinellus</i>	Threskiornithidae	Resident	LC
39	Red-wattled lapwing	<i>Vanellus indicus</i>	Charadriidae	Resident	LC
40	White-tailed lapwing	<i>Vanellus leucurus</i>	Charadriidae	Migratory	LC
41	Little ringed plover	<i>Charadrius dubius</i>	Charadriidae	Migratory	LC
42	Red collared dove	<i>Streptopelia tranquebarica</i>	Columbidae	Resident	LC
43	Laughing dove	<i>Spilopelia senegalensis</i>	Columbidae	Resident	LC
44	Eurasian collared-dove	<i>Streptopelia decaocto</i>	Columbidae	Resident	LC
45	Rock pigeon	<i>Columba livia</i>	Columbidae	Resident	LC
46	Yellow-footed green-pigeon	<i>Treron phoenicopterus</i>	Columbidae	Resident	LC
47	Painted sandgrouse	<i>Pterocles indicus</i>	Pteroclididae	Resident	LC
48	Chestnut-bellied sandgrouse	<i>Pterocles exustus</i>	Pteroclididae	Resident	LC
49	Ashy crowned sparrow lark	<i>Eremopterix griseus</i>	Alaudidae	Resident	LC
50	Crested lark	<i>Galerida cristata</i>	Alaudidae	Resident	LC



51	Oriental sky lark	<i>Alauda gulgula</i>	Alaudidae	Resident	LC
52	Rufous tailed lark	<i>Ammomanes phoenicurus</i>	Alaudidae	Migratory	LC
53	Indian bush lark	<i>Mirafra erythroptera</i>	Alaudidae	Resident	LC
54	Little green bee-eater	<i>Merops orientalis</i>	Meropidae	Resident	LC
55	Blue-cheeked bee-eater	<i>Merops persicus</i>	Meropidae	Passage migrant	LC
56	Great grey shrike	<i>Lanius excubitor</i>	Laniidae	Resident	LC
57	Wagtail	<i>Motacilla alba</i>	Motacillidae	Resident	LC
58	White throated kingfisher	<i>Halcyon smyrnensis</i>	Alcedinidae	Resident	LC
59	Spotted owl	<i>Athene brama</i>	Strigidae	Resident	LC
60	Indian eagle owl	<i>Bubo bengalensis</i>	Strigidae	Resident	LC
61	Short eared owl	<i>Asio flammeus</i>	Strigidae	Migratory	LC
62	Shikra	<i>Accipiter badius</i>	Accipitridae	Resident	LC
63	Indian spotted eagle	<i>Clanga hastata</i>	Accipitridae	Passage migrant	VN
64	Short toed snake eagle	<i>Circaetus gallicus</i>	Accipitridae	Resident	LC
65	Imperial eagle	<i>Aquila heliaca</i>	Accipitridae	Resident	VN
66	Steppe eagle	<i>Aquila nipalensis</i>	Accipitridae	Migratory	EN
67	Black kite	<i>Milvus migrans</i>	Accipitridae	Resident	LC
68	Tawny Eagle	<i>Aquila rapax</i>	Accipitridae	Resident	VN
69	Black-winged kite	<i>Elanus caeruleus</i>	Accipitridae	Resident	LC
70	Booted Eagle	<i>Hieraaetus pennatus</i>	Accipitridae	Passage migrant	LC
71	Egyptian vulture	<i>Neophron percnopterus</i>	Accipitridae	Resident	EN
72	White-Rumped vulture	<i>Gyps benghalensis</i>	Accipitridae	Resident	CR
73	Montagu's harrier	<i>Circus pygargus</i>	Accipitridae	Migratory	LC
74	Pallid harrier	<i>Circus macrourus</i>	Accipitridae	Migratory	NT
75	Marsh harrier	<i>Circus aeruginosus</i>	Accipitridae	Migratory	LC
76	Cinereous vulture	<i>Aegypius monachus</i>	Accipitridae	Migratory	NT
77	Griffon vulture	<i>Gyps indicus</i>	Accipitridae	Migratory	LC
78	Long-legged buzzard	<i>Buteo rufinus</i>	Accipitridae	Migratory	LC
79	White-eyed buzzard	<i>Butastur teesa</i>	Accipitridae	Resident	LC
80	Rose ringed parakeet	<i>Psittacula krameri</i>	Psittaculidae	Resident	LC
81	Blue throat	<i>Luscinia svecica</i>	Muscicapidae	Migratory	LC
82	Brown rock chat	<i>Oenanthe fusca</i>	Muscicapidae	Resident	LC
83	Desert wheatear	<i>Oenanthe deserti</i>	Muscicapidae	Migratory	LC
84	Indian robin	<i>Copsychus fulicatus</i>	Muscicapidae	Resident	LC
85	Oriental magpie robin	<i>Copsychus saularis</i>	Muscicapidae	Resident	LC
86	Dusky crag martin	<i>Ptyonoprogne concolor</i>	Hirundinidae	Resident	LC
87	Greater flamingo	<i>Phoenicopterus roseus</i>	Phoenicopteridae	Migratory	LC
88	Rufous treepie	<i>Dendrocitta vagabunda</i>	Corvidae	Resident	LC
89	House crow	<i>Corvus splendens</i>	Corvidae	Resident	LC
90	Indian silverbill	<i>Euodice malabarica</i>	Estrildidae	Resident	LC
91	House sparrow	<i>Passer domesticus</i>	Passeridae	Resident	LC
92	Pale rock sparrow	<i>Carpospiza brachydactyla</i>	Passeridae	Migratory	LC



93	Spanish sparrow	<i>Passer hispaniolensis</i>	Passeridae	Migratory	LC
94	Little swift	<i>Apus affinis</i>	Apodidae	Migratory	LC
95	Common moorhen	<i>Gallinula chloropus</i>	Rallidae	Resident	LC
96	Common green shank	<i>Tringa nebularia</i>	Scolopacidae	Migratory	LC
97	Wood sandpiper	<i>Tringa glareola</i>	Scolopacidae	Migratory	LC
98	Ruff	<i>Calidris pugnax</i>	Scolopacidae	Migratory	LC
99	Common buttonquail	<i>Turnix sylvaticus</i>	Turnicidae	Resident	LC
100	Indian courser	<i>Cursorius coromandelicus</i>	Glareolidae	Resident	LC
101	Barn owl	<i>Tyto alba</i>	Tytonidae	Resident	LC
102	Osprey	<i>Pandion haliaetus</i>	Pandionidae	Migratory	LC
103	Common kestrel	<i>Falco tinnunculus</i>	Falconidae	Migratory	LC
104	Lesser kestrel	<i>Falco naumanni</i>	Falconidae	Passage migrant	LC
105	Laggar falcon	<i>Falco jugger</i>	Falconidae	Resident	NT
106	Rufous fronted prinia	<i>Prinia buchanani</i>	Cisticolidae	Resident	LC

4.2 RAPTOR DIVERSITY AND SIGNIFICANCE:

Tal Chhappar has rightfully earned its reputation as a raptor paradise, supporting an exceptional diversity of birds of prey. The sanctuary's open grassland habitat provides ideal hunting grounds for these species, while scattered trees offer suitable perching and nesting sites. The raptor community includes eagles, hawks, falcons, buzzards, kites, and vultures, creating a complete predatory guild that regulates ecosystem health. Among the most significant raptor species is the Steppe Eagle (*Aquila nipalensis*), classified as Endangered by IUCN, which uses the sanctuary as a wintering ground. The Critically Endangered Indian Vulture (*Gyps indicus*) and White-rumped Vulture (*Gyps bengalensis*) find crucial refuge here, representing some of the last remaining populations of these species. The sanctuary also supports healthy populations of Tawny Eagles (*Aquila rapax*), classified as Vulnerable, and several falcon species including the Laggar Falcon (*Falco jugger*) and Red-necked Falcon (*Falco chicquera*), both listed as Near Threatened. The importance of Tal Chhappar for raptor conservation cannot be overstated, particularly in the context of the Asian vulture crisis that has seen catastrophic declines in vulture populations across the Indian subcontinent. The sanctuary provides a relatively safe habitat free from the veterinary drug diclofenac, which is primarily responsible for vulture declines, making it a potential ark for the recovery of these ecologically important scavengers.

4.3 NON-RAPTOR AVIFAUNA:

While raptors represent the flagship species of Tal Chhappar, the sanctuary supports a diverse array of other bird groups that contribute significantly to its ecological value. The winter months bring an influx of migratory waterfowl despite the arid environment, including species such as the Common Pochard (*Aythya ferina*), Northern pintail (*Anas acuta*), Eurasian wigeon (*Mareca Penelope*), Northern shoveler (*Spatula clypeata*) and Common Coot (*Fulica atra*) that utilize the sanctuary's limited water bodies.

The grasslands support specialized species such as the Indian Courser (*Cursorius coromandelicus*) and various larks including the Rufous-tailed Lark (*Ammomanes phoenicura*). The sanctuary is also important for several species of conservation concern beyond raptors, including the Sociable Lapwing (*Vanellus gregarius*), Common green shank (*Tringa nebularia*) and Wood Sandpiper (*Tringa glareola*) which uses the habitat as a wintering ground.

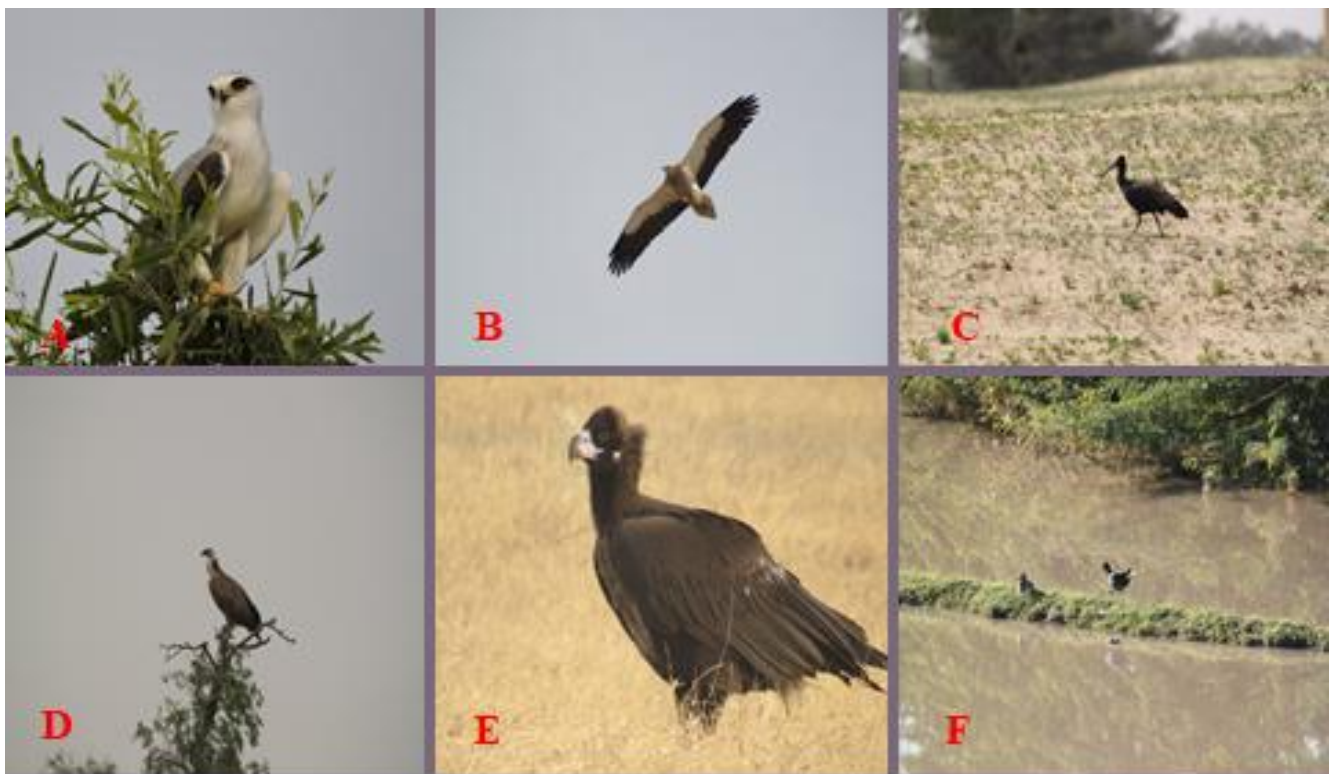


Plate 1. A- Black-winged Kite
 D- Griffon Vulture
 B- Egyptian Vulture
 E- Cinereous Vulture
 C- Red-naped Ibis
 F- Common Moorhen



Plate 2. A- Black-winged Stilt
 D- Shikra
 B- Osprey
 E- Steppe Eagle
 C- Imperial Eagle
 F- White-throated Kingfisher

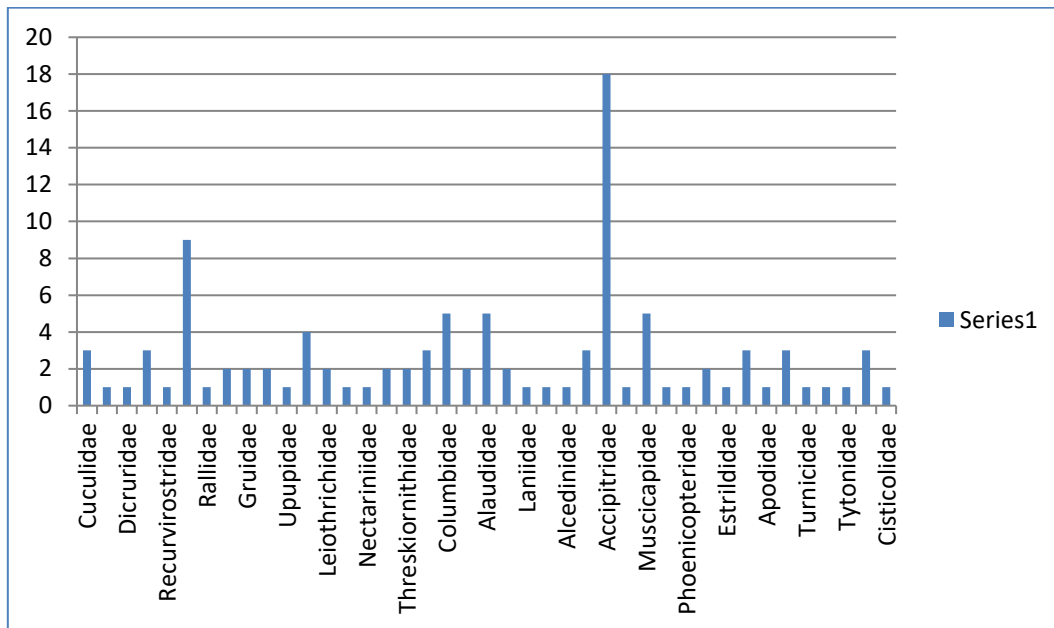


Figure 2: Bar diagram showing number of species (Family wise)

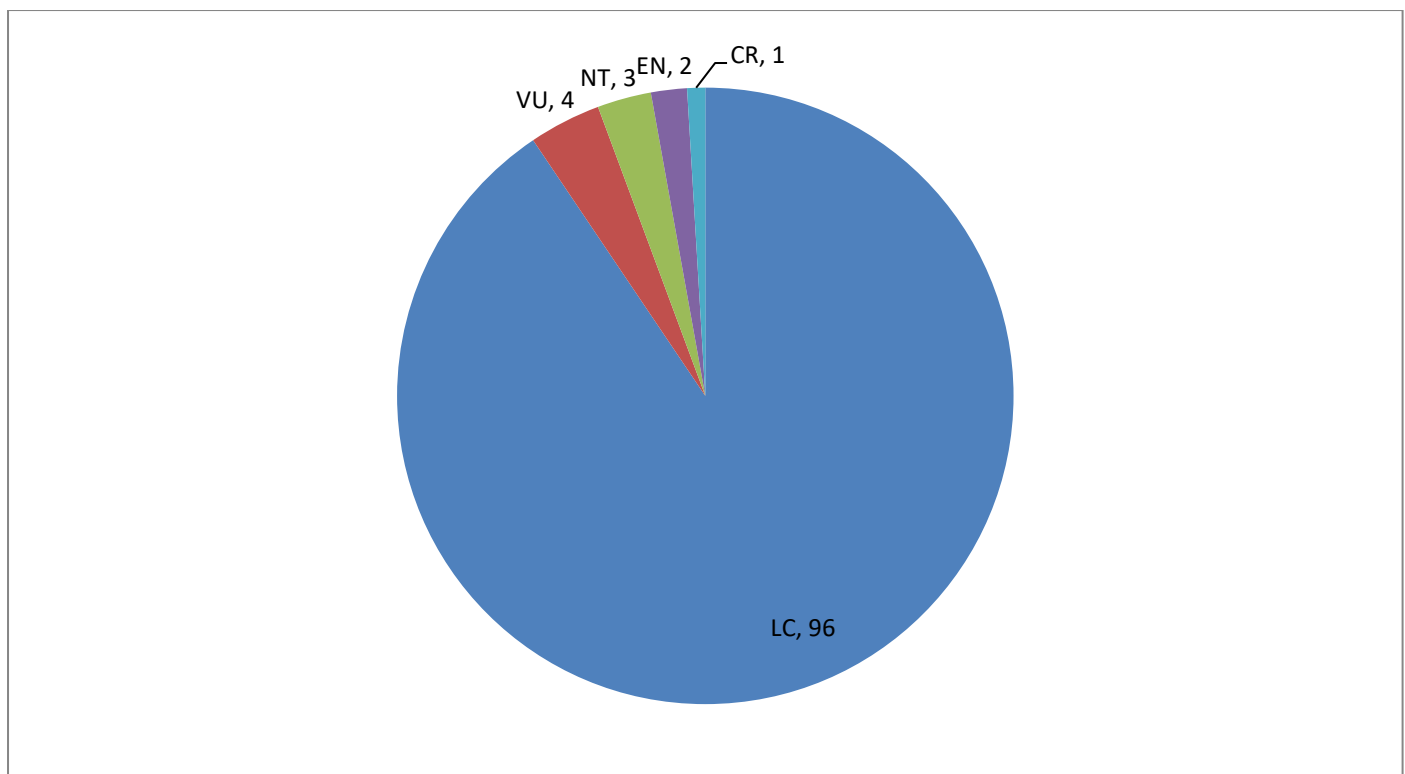


Figure 3: Pie chart showing IUCN status

LC- Least Concern

VU- Vulnerable

NT- Near Threatened

EN- Endangered

CR- Critically Endangered



5. CONSERVATION CHALLENGES AND MANAGEMENT:

5.1 THREATS TO AVIAN POPULATIONS:

Despite its protected status, Tal Chhappar Sanctuary faces numerous conservation challenges that threaten its avian populations. Habitat degradation represents a primary concern, with changing land use patterns in the surrounding areas potentially impacting the sanctuary's ecological balance. The invasive species proliferation, particularly of certain plant species, could alter the grassland ecosystem that many birds depend upon for nesting and foraging. Perhaps the most significant threat comes from human disturbances, including religious tourism and increasing visitor pressure that may disrupt nesting and feeding activities, particularly for sensitive species. The potential for water scarcity due to changing climate patterns and increasing extraction of groundwater from the surrounding region poses another critical threat, as the limited water bodies within the sanctuary represent essential resources for avian survival, especially during the intense summer months.

Additionally, the sanctuary's proximity to human settlements creates the potential for human-wildlife conflict and the risk of poisoning events, which could be catastrophic for vulture populations. The small size of the sanctuary (approximately 7.19 km²) also creates inherent vulnerabilities, as it limits the available habitat and makes populations more susceptible to stochastic events and environmental changes.

5.2 CONSERVATION STRATEGIES AND MANAGEMENT RECOMMENDATIONS:

Effective conservation of Tal Chhappar's avian diversity requires a multifaceted management approach that addresses both ecological and anthropogenic threats. Based on the findings of this research, the following strategies are recommended:

- **Habitat Management:** Implement a program of controlled grazing and periodic grassland management to maintain the open character of the habitat while preventing woody encroachment. This should include measures to control invasive plant species that might alter habitat structure.
- **Water Resource Management:** Develop sustainable water management strategies to ensure the availability of reliable water sources throughout the year, possibly through the creation of additional small water bodies and rainwater harvesting structures to enhance the carrying capacity of the sanctuary.
- **Visitor Management:** Establish regulated tourism protocols that minimize disturbance to sensitive species, particularly during breeding seasons. This could include designated viewing areas, seasonal closure of sensitive zones, and visitor education programs.
- **Community Engagement:** Develop partnerships with local communities to reduce pressures on the sanctuary and create buffer zones around the protected area. Programs to promote conservation awareness and involve local residents in monitoring and protection could enhance conservation outcomes.
- **Research and Monitoring:** Establish long-term monitoring programs to track population trends of key species, especially threatened raptors. Further research into the movement ecology of migratory species using satellite tracking could enhance our understanding of connectivity between Tal Chhappar and other important bird areas.

6. DISCUSSION:

The avian diversity of Tal Chhappar Sanctuary represents a remarkable ecological phenomenon—a thriving bird community in an otherwise arid landscape. The sanctuary's significance stems from its unique habitat combination of grasslands, water sources, and scattered trees that provide resources for a wide variety of species. Particularly impressive is the density of raptor species, which ranks among the highest concentrations in India, making Tal Chhappar a site of global importance for birds of prey conservation. The presence of multiple critically endangered species, particularly vultures, underscores the sanctuary's role as a refuge for species that have experienced catastrophic declines across the Indian subcontinent. The relatively small size of the sanctuary belies its importance, demonstrating that even limited protected areas can provide crucial habitat when they contain the right combination of resources. This finding has significant implications for conservation planning in arid regions, suggesting that targeted protection of key resource areas can yield disproportionate benefits for biodiversity conservation. The seasonal dynamics of Tal Chhappar's avian communities highlight its role in the broader ecological network of bird migration. The influx of migratory species during winter months connects this sanctuary to breeding grounds across Central Asia and beyond, making its effective conservation a matter of international importance. Protecting Tal Chhappar contributes to the conservation of migratory species throughout their annual cycle, fulfilling national obligations under international agreements such as the Convention on Migratory Species.

Future conservation efforts must address the potential impacts of climate change on this sensitive ecosystem. Changes in precipitation patterns and increasing temperatures could alter the delicate balance of water availability that



makes this oasis possible. Adaptive management strategies that enhance the resilience of the ecosystem to climate change will be essential for long-term conservation of Tal Chhapar's avian diversity.

7. CONCLUSION:

Tal Chhapar Sanctuary stands as a testament to the ecological importance of specialized habitats in supporting avian diversity, particularly in challenging environments like the Thar Desert. This research has documented the sanctuary's remarkable bird life, highlighting its global significance for raptor conservation and its role as a wintering ground for numerous threatened migratory species. The concentration of 106 species from 17 orders and 43 families, including 3 Near threatened, 4 Vulnerable, 1 Critically Endangered and 2 Endangered species, in such a limited area underscores the conservation value of this unique ecosystem. The conservation challenges facing Tal Chhapar—including habitat degradation, human disturbance, and water scarcity—require urgent attention and coordinated management responses. The implementation of the recommended strategies, particularly regarding habitat management, water resource enhancement, and regulated tourism, will be essential for maintaining the sanctuary's ecological integrity. The small size of the sanctuary necessitates a landscape-level approach to conservation that integrates protected area management with sympathetic practices in surrounding areas.

Future research should focus on long-term monitoring of key species populations and further studies on the habitat requirements of threatened species to inform management decisions. The potential for community-based conservation initiatives represents a promising avenue for enhancing protection while benefiting local communities. Tal Chhapar Sanctuary serves as a reminder that even small protected areas can make disproportionate contributions to global biodiversity conservation when they protect critical resources in otherwise challenging environments.

REFERENCES:

1. Ali, S., & Ripley, S. D. (1983/1987). Handbook of the Birds of India and Pakistan. Oxford University Press.
2. Bird Life International (2024). IUCN Red List and species accounts for regional bird taxa (regional abstracts and conservation status).
3. Choudhary, N.L. and Chishty N. (2020). Effect of anthropogenic Disturbance on Raptor abundance and species richness in Udaipur District, Rajasthan, India. JPS Scientific Publications, India 316, pp 788 -792.
4. Government of Rajasthan, Forest Department. (2024). Chhapar Wildlife Sanctuary management plan and habitat maps.
5. Grimmett, R., Inskipp, C., & Inskipp, T. (2010). The Birds of India: A Regional Guide (supplemental field notes). Oxford University Press.
6. Grimmett, R., Inskipp, C., and Inskipp, T. (1999). Birds of the Indian Subcontinent. Oxford University Press.
7. Jhahria, D.A. (2021). Emerging trends of ecotourism in threatened Tal Chhapar sanctuary of India. Int.J. Fauna Biol. Stud. 8(2): pp 102–106.
8. Kohli, R. (2017). Tal Chhapar : Blackbuck Sanctuary and Raptors Paradise. 7660(1):pp 72–74
9. Markandya, A., Taylor, T., Longo, A., Murty, M. N., Murty, S. and Dhavala, K. (2008). Counting the cost of vulture decline: An appraisal of the human health and other benefits of vultures in India. Ecological Economics. pp 194-204
10. Ogada, D. L., Keesing, F. and Virani, M. Z. (2012). Dropping dead: Causes and consequences of vulture population declines worldwide. Annals of the New York Academy of Sciences, 1249: pp 57-71.
11. Rasmussen, P. C., and Anderton, J. (2005). Birds of South Asia: The Ripley Guide. Smithsonian Institution.
12. Sharma, A.K. and Tripathi, A.K. (2024). Avifaunal diversity in south central Rajasthan, India: A case study of threatened avian species. Flora and fauna . 30. pp 225-232.
13. Ulman, Y. (2023). Bird Diversity of Acharya Narendra Deva University of Agriculture & Technology Campus, Ayodhya. Indian Journal of Ecology. 50(1): pp 262-271.