JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

RAPTOR DIVERSITY OF JORBEER: AN OVERVIEW OF SPECIES COMPOSITION AND ITS CONSERVATION IMPLICATIONS

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Abstract
The raptor diversity at Jorbeer area of Marusthali region of Thar Desert of Rajasthan lies at north-western part of India is rich and wide ranging. This region is home to a range of raptor species, which play an important ecological role in maintaining the balance of the local ecosystem. The present study aims to provide an insight into the diversity of raptors in Jorbeer, an arid region in the state of Rajasthan, India. Raptor populations are indicative of the health and biodiversity of an ecosystem. Understanding their diversity and distribution is crucial for effective conservation and management strategies. The study utilized extensive field surveys, literature reviews, and interactions with local communities to gather information on raptor species present in study area. A total of 31 raptor species from 4 families were recorded. The study highlights the need for continued conservation efforts to safeguard the rich raptor diversity of Jorbeer.

Key words: Conservation, Diversity, Ecosystem, Management, Raptors,

I. INTRODUCTION

The term "raptor" is derived from the Latin word *rapere* (meaning to seize or take by force).[1] Raptors or Birds of Prey are one of the least studied groups of birds (Newton 1979) [2]. These are formally classified into five families and include birds—such as eagles, ospreys, kites, true hawks, buzzards, owls, harriers, vultures, and falcons—that are familiar and recognized by many observers. These diurnal birds of prey are found on every continent except Antarctica [3] and are known for their impressive hunting abilities and aerial acrobatics. They are a group of predatory birds that are known for their sharp talons and beaks, which they use to catch and kill their prey. They are highly skilled hunters and have excellent eyesight and hearing [4], [5], allowing them to detect and track their prey from great distances. Feeding strategies, including cannibalism (in which individual eats a member of the same species), are an important aspect of predator ecology. Cannibalism comprises five forms in raptors[6].

Importance of Raptors in the Ecosystem

Raptors provide critical ecosystem services based on their role in natural food chains. They have evolved ecologically to specialize and adapt to different habitats and food resources[7]. As apex predators, they occupy the top of the food chain and help regulate the populations of their prey species. Raptor diversity is often considered a strong indicator of ecosystem health and stability.
Here are some reasons why raptors are important in the ecosystem:

1. Control of prey populations: Raptors help control the population of their prey, which can include small mammals, birds, reptiles, and even larger animals. By hunting and removing weaker or sick individuals from the population, raptors help to prevent overpopulation and ensure the survival of healthier individuals. This, in turn, helps to maintain the balance of the ecosystem.

2. Scavenging and waste management: Vultures, a type of raptor, are specialized scavengers that feed on carrion (dead animals). They play a vital role in cleaning up the environment by consuming and disposing of carcasses. By doing so, they prevent the spread of diseases and reduce the potential for harmful bacteria to enter the ecosystem.

3. Indicator species: Raptors often serve as indicators of ecosystem health. Their population trends and behaviors can provide valuable insight into the overall condition of an ecosystem. For example, a decline in raptor populations may indicate a decrease in prey availability, habitat degradation, or the presence of environmental contaminants.

4. Seed dispersal: Some raptors, such as owls, play a role in seed dispersal. They consume small mammals and birds, which often ingest seeds. As the raptors move from one location to another, they excrete the seeds in the form of droppings, helping to disperse seeds and promote plant diversity.

5. Ecotourism and education: Raptors, with their impressive hunting skills and aerial acrobatics, are a popular attraction for wildlife enthusiasts and birdwatchers. The presence of raptors in an ecosystem can contribute to local economies through ecotourism activities, such as birdwatching tours and photography. Additionally, raptors serve as important educational tools to raise awareness about the environment and conservation efforts.

In summary, raptors play a vital role in maintaining the balance and functioning of ecosystems. Their predatory nature helps control prey populations, while their scavenging behavior aids in waste management. Raptors also serve as indicator species, providing valuable insight into ecosystem health. Their presence contributes to ecotourism and education, promoting the conservation and sustainable use of natural resources.

II. STUDY AREA

The study area Jorbeer of Bikaner district is situated south east at a distance of 12 km from city behind NRCC (National Research Centre on Camel). The geographical location of study area is 28˚3' North latitude and 73˚5' East longitude at the height of 234.84 MSL. The 4 sq. km Jorbeer conservation reserve area has proved to be a source of attraction for vultures and other raptors as about 20-35 carcasses are dumped per day by the municipal board. The study area is dominated by the desert sand dunes and typical desert plantation. Bikaner, a city in the north-western state of Rajasthan, India, is known for its rich biodiversity and diverse ecosystem. The area is particularly known for its raptor diversity, besides this there are still other several species of birds that can be found in the area. The arid landscape of Jorbeer offers a challenging environment for raptors, and understanding their diversity and distribution in this region is essential for effective conservation planning. It is important to note that the diversity and distribution of raptors can vary depending on the season and habitat conditions. Birdwatchers and wildlife enthusiasts in study area can explore the various natural habitats, such as desert landscapes, agricultural fields, and wetlands, to spot a wide range of raptors and other avian species.

Fig. 1: Location map of the study area Jorbeer

III. METHODS

The study utilized a combination of field surveys, literature reviews, and local knowledge to gather information on raptor diversity at Jorbeer. Both the point count and strip transect methods are used to study raptors [8] Field surveys were conducted across various habitats, including agricultural fields, scrublands, and protected areas. Data was collected between March 2024 to March 2025, encompassing both resident and migratory raptor species.

The vultures and other birds sighted in present investigations were identified and classified with the help of field guides (Ali and Ripley, 1983, 1987; Kazmierczak, 2000; Grimmet *et al., 2001*). Difficult groups of birds were photographed with the help of digital camera canon 50SX and Sony handy cam. The field characters and necessary information related to their daily activities were noted in the field book and sightings were recorded along with GPS coordinates.

IV. RESULTS

A total of 31 raptor species belonging to 4 families and 20 genera were recorded in study area. The family Accipitridae was the most diverse, with 23 species, followed by Falconidae (4 species), Strigidae (3 species), and Tytonidae (1 species).

Table 1: A checklist of birds of prey found in the area

S. No.	Common Name	Scientific Name	Status*	Abundance#
Family: Accipitridae				
1	Oriental Honey-buzzard	*Pernis ptilorhynchus*	W	SC
2	Black-shouldered Kite	*Elanus careuleus*	R	C
3	Black-kite	*Milvus migrans*	R	VC
4	Black eared Kite	*Milvus lineatus*	W	C
5	Shikra	*Accipiter badius*	R	C
6	Eurassian Sparrowhawk	*Accipiter nisus*	W	SC
7	Long-legged Buzzard	*Butteo rufinus*	W	C
8	Common Buzzard	*Butteo buteo*	W	SC
9	White-eyed buzzard	*Butastur teesa*	PM	UC

10	Booted Eagle	*Hieraaetus pennatus*	W	SC
11	(Eastern) Imperial Eagle	*Aquila heliacal*	W	UC
12	Tawny Eagle	*Aquila rapax*	R	C
13	Steppe Eagle	*Aquila nipalensis*	W	VC
14	Greater Spotted Eagle	*Aquila clanga*	W	UC
15	White-tailed Eagle	*Haliaeetus albicilla*	W	SC
16	Red-headed Vulture	*Sarcogyps calvus*	R	SC
17	Cinereous Vulture	*Aegypius monachus*	W	C
18	Egyptian Vulture	*Neophron percnopterus*	R	VC
19	Eurasian Vulture	*Gyps fulvus*	W	VC
20	Himalayan Vulture	*Gyps himalayensis*	W	C
21	Long-billed Vulture	*Gyps indicus*	R	SC
22	Pallid Harrier	*Circus macrourus*	PM	SC
23	Short-toed Snake Eagle	*Circaetus gallicus*	R	UC
Family: Falconidae				
1	Saker Falcon	*Falco cherrug*	W	SC
2	Laggar Falcon	*Falco jugger*	R	C
3	Common Kestrel	*Falco tinnunculus*	W	UC
4	Red-necked Falcon	*Falco chicquera*	R	SC
Family: Tytonidae				
1	Barn Owl	*Tyto alba*	R	UC
Family: Strigidae				
1	Eurasian Eagle Owl	*Bubo bubo*	R	SC
2	Short-eared Owl	*Asio flammeus*	W	SC
3	Spotted Owlet	*Athene brama*	R	VC

*(R= Resident, S=Summer Visitor, P= Passage Migrant, W= Winter visitor, V= Vagrant, Rare visitor or accidental, M=Monsoon visitor)
(VC= Very Common, C= Common, U= Uncommon, SC= Scarce/Rare)

Table 2: Family-wise distribution of various genera and species

S. No	Family	No. of genera	No. of species
1	Accipitridae	15	23
2	Falconidae	01	04
3	Strigidae	03	03
4	Tytonidae	01	01

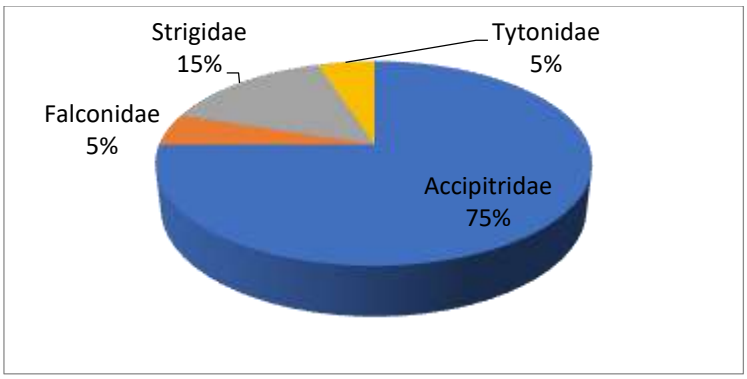

Fig: 2 Distribution family wise

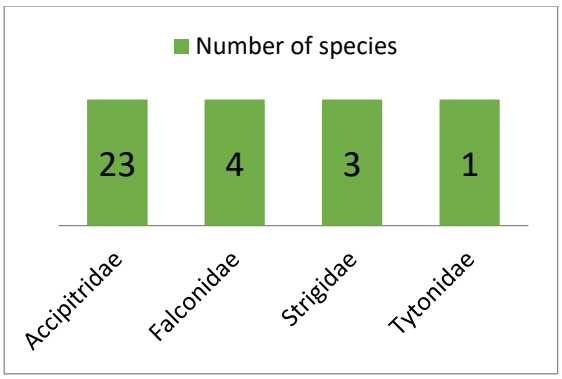

Fig: 3 Distribution species wise

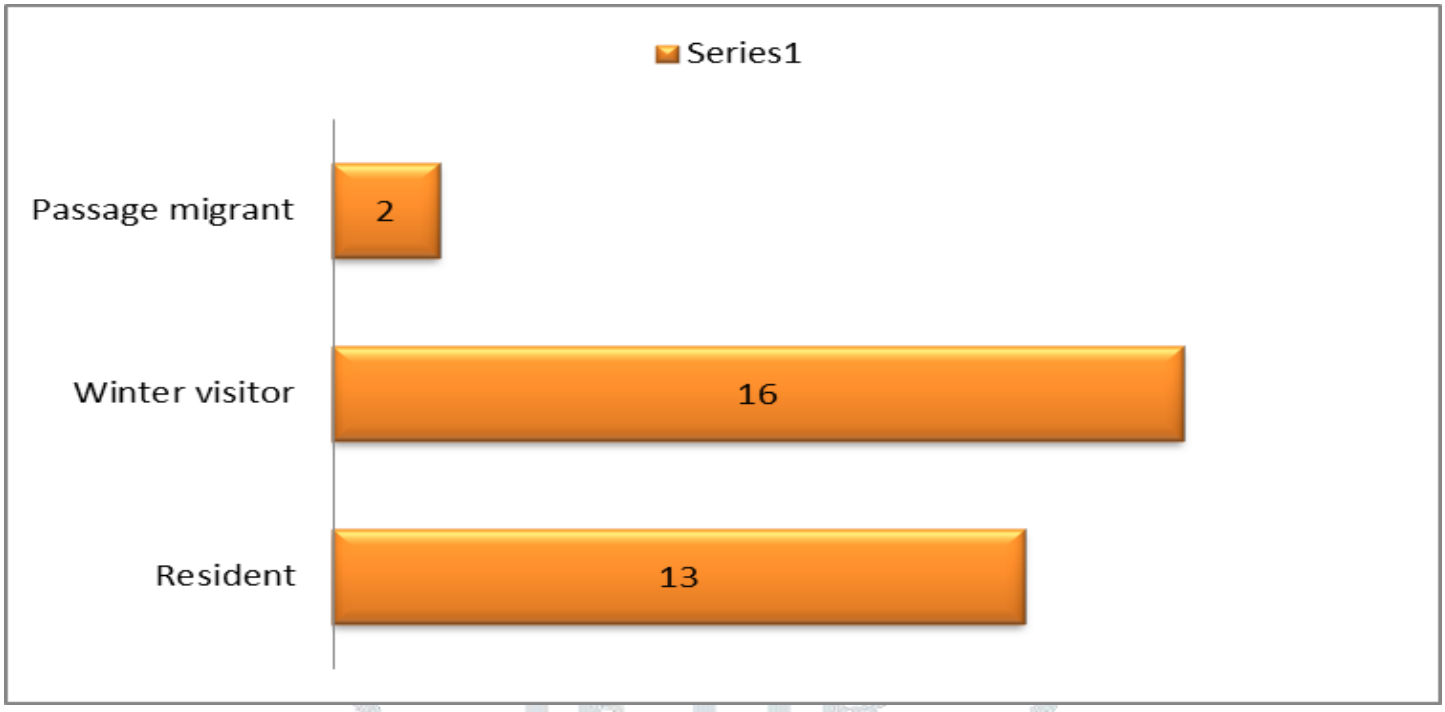

Fig: 4 Status wise distribution

Plate 1: A-Black-Shouldered Kite B-Common Kestrel C-Cinereous Vulture D-Himalayan Griffon

E-Eurasian Griffon F-Indian Vulture G-Spotted Owlet H-Laggar Falcon

Plate 2: I-Egyptian Vulture J-Imperial Eagle K-Long-legged Buzzard L-Pallid Harrier

M-Saker Falcon N-Short-toed snake eagle O-Tawny Eagle P-White-eyed buzzard

V. DISCUSSION

The study identified a total of 31 bird species belonging to 4 families and 20 genera in study area. The *Pernis ptilorhynchus, Milvus lineatus, Accipiter nisus, Butteo rufinus, Butteo buteo, Hieraaetus pennatus, Aquila heliacal, Aquila nipalensis, Aquila clanga, Haliaeetus albicilla, Aegypius monachus, Gyps fulvus, Gyps himalayensis* species belongs to Accipitridae family are winter visitors in which *Milvus migrans, Aquila nipalensis, Gyps fulvus* species are very common but *Milvus lineatus, Butteo rufinus, Aegypius monachus, Gyps himalayensis* species are common. *Elanus careuleus, Milvus migrans, Accipiter badius, Aquila rapax, Sarcogyps calvus, Neophron percnopterus, Gyps indicus, Circaetus gallicus* species are resident in which *Milvus migrans* and *Neophron percnopterus* are very common species, *Elanus careuleus, Accipiter badius, Aquila rapax* species are common and *Circaetus gallicus* are scarce or rare resident species in the study area. Four species of Falconidae family identified in the area in which *Falco cherrug and Falco tinnunculus* are winter visitors. *Falco cherrug* is a scarce *and Falco* tinnunculus is a uncommon species. *Tyto alba species of* Tytonidae family identified which is a resident and uncommon species. Three species of Strigidae family were identified in which *Bubo bubo and Athene brama* are resident having scarce and very common abundance respectively. *Asio flammeus* is a winter visitor is of scarce abundance in the study area at Jorbeer.

Factors Influencing Bird Diversity

Several factors were identified that influence bird diversity in Bikaner. These factors include habitat heterogeneity, food availability, water resources, and disturbance levels caused by human activities. Urbanization and industrialization had negative impacts on avian diversity.

Threats to Raptors in Jorbeer

However, the raptor populations in Jorbeer face numerous threats, including habitat degradation, electrocution from power lines [13], illegal hunting, and pesticide contamination. These factors pose a significant conservation challenge for the region.

Conservation efforts should focus on minimizing habitat destruction and promoting sustainable land-use practices that are compatible with raptor conservation. Public awareness campaigns and community-based initiatives can play a crucial role in mitigating human-wildlife conflicts and reducing the negative impacts of illegal hunting. Additionally, long-term monitoring programs should be established to assess population trends and identify areas of conservation concern.

Conservation Implications

This study highlights the importance of conserving the diverse habitats in Jorbeer to ensure the conservation of raptor biodiversity. Habitat restoration, creation of protected areas, and public awareness campaigns are recommended as key conservation measures. Efforts to mitigate human-induced factors such as pollution, habitat fragmentation, and disturbance are essential to safeguard the bird species inhabiting the region.

1. Protection of Endangered Species: The study sight is home to critically endangered raptors, such as the Indian Vulture and Red-headed Vulture. Preserving their diversity helps in the conservation of these endangered species and prevents their extinction.

2. Conservation of Biodiversity: Raptors are an important component of the biodiversity in Jorbeer. By conserving their diversity, we contribute to the overall conservation of the region's biodiversity, ensuring the survival of various animal and plant species.

3. Environmental Education and Awareness: Conserving raptor diversity provides an opportunity to educate and create awareness among the local community, tourists, and students about the importance of raptors in the ecosystem. This helps in promoting a sense of responsibility and generating support for conservation efforts.

4. Sustainable Tourism: The presence of diverse raptors in Jorbeer has the potential to attract birdwatchers and nature enthusiasts. Conservation efforts can focus on creating sustainable tourism opportunities that promote the appreciation of raptors and their habitats, benefiting both the local economy and raptor conservation initiatives.

5. Preservation of Ecological Balance: Raptors play a crucial role in maintaining the ecological balance by controlling the population of their prey species, such as rodents and small birds. Conserving raptor diversity ensures the stability of the local ecosystem [14].

6. Research and Monitoring: Conserving raptor diversity in study sight requires continuous research and monitoring programs. These efforts help gather data on population trends, habitat preferences, migration patterns, and any threats faced by raptors. This information is crucial for formulating effective conservation strategies.

7. Collaboration and Networking: Conservation initiatives for raptors in the area require collaboration between government agencies, local communities, conservation organizations, and research institutions. Networking and partnerships enhance the effectiveness of conservation efforts and promote knowledge sharing.

By fulfilling these objectives, the conservation of raptor diversity in Jorbeer contributes to the overall environmental health and wellbeing of the region, while also ensuring the conservation of these magnificent birds of prey for future generations.

VI. CONCLUSION

The birds of prey at study sight are characterized by a rich avifauna, including both resident and migratory species. However, raptors are also highly vulnerable to habitat loss, fragmentation, pollution, and climate change. The study emphasizes the need for conservation strategies tailored to the unique ecological context of the area, considering different habitats and their importance for supporting various bird species. The findings of this research contribute to the understanding of raptor diversity in arid regions and can guide future conservation efforts in study area and similar ecosystems worldwide. The raptor diversity of the study area showcases the unique ecological value of the region. Understanding and conserving raptors is crucial for maintaining the ecological balance and overall health of the ecosystem. The findings of this study provide a baseline for future research and conservation efforts, emphasizing the need for sustained efforts to protect the raptor diversity of study area.

VII. ACKNOWLEDGEMENT

Authors are gratefully acknowledged to Dr. Digvijay Singh Shekhawat, Principal Dungar College, Bikaner and Dr. Partap Singh, Head Zoology Department, Dungar College for their help in identification of species in the study area. Authors are also thankful to department of forest to grant permission to visit in the conservation area.

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