International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 10 Issue: 11 | Nov 2023 www.irjet.net p-ISSN: 2395-0072

Wings of Khichan: Unraveling the Ecology, Migration, and Conservation Challenges of Demoiselle Cranes in the Thar Region

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Abstract - *The Thar region in Rajasthan provides a habitat for a diverse range of migratory avian species, with the Demoiselle Crane (Anthropoides virgo) being prominent among them. These cranes gather in Khichan village, in search of favorable ecological conditions to sustain, lodge, and nurture their young ones. Anthropoides virgo, the smallest crane, boasts an average adult length of 90cm, featuring streamlined bodies, long rounded grey wings, and short toes and bills. Engaging in a cyclic migration pattern, Demoiselle cranes undertake a demanding journey, covering 5000 kilometers in around two weeks. Originating from Siberia, China, Mongolia, Russia, the Tibetan plateau, they navigate through the Dead Sea, Afghanistan, and Central Asia before settling in their winter habitat in India. Arrival in Khichan typically occurs in late September, and the cranes stay until early March before migrating back to the northern region during spring via the Central Asian Flyway (CAF). The conservation status of Demoiselle cranes, according to the IUCN Red List, is categorized as 'Least Concern.' Research data from 2022-23 indicates a peak winter population of up to 40,000, with estimates in early October ranging between 5000-7000 in Khichan Bird Sanctuary. Key roosting sites include waterbodies such as Vijaysagar Talab, Ratri Nadi, Nibli Nadi, and Teejaniyo Ki Nadi, while the 'Chugga Ghar' serves as a vital feeding ground.*

Despite their resilience, these cranes face threats such as food poisoning, predation by dogs, temperature fluctuations, and electric shocks from power lines. The primary cause of increased mortality is linked to power lines and excessive insecticide use in agricultural areas where the birds roost at night. This study closely examines the Demoiselle crane population, emphasizing habitat utilization, ecological behavior, and the challenges encountered during their winter stay in Khichan village, Rajasthan.

Key Words: Thar region, Migratory avian species, Demoiselle Crane (Anthropoides virgo), Khichan village, Ecological behavior, Threats to Demoiselle Cranes, Population dynamics, Rajasthan.

1.INTRODUCTION

The Central Asia Flyway (CAF), a migratory route guiding Demoiselle cranes to Gujarat and Rajasthan in India, underscores the significance of protected sites such as Important Bird Areas (IBAs), bird sanctuaries, wildlife refuges, and national parks in wetlands. These areas serve as crucial stopovers and wintering grounds for approximately half of India's 243 water bird species and 67 wetland-dependent birds [1] [12].

There are a total of fifteen crane species distributed globally [5]. Among them five crane species found in India, the Demoiselle Crane stands out, embarking on a majestic winter migration journey. Recognized locally as the Kurjan bird, the Demoiselle Crane's distinctive features include long legs, neck, and a compressed bill, with a bluish-grey body adorned by dark and light grey markings. Notably, the Demoiselle Crane holds a conservation status of "Least Concern" according to the IUCN Red List and is listed in Appendix II of CITES (2012). Winter sees thousands of Demoiselle Cranes descending upon Rajasthan's Thar Desert, with Khichan village in Phalodi district standing out as a world-renowned wintering ground, hosting the second-largest population globally (Gehlot et al., 2021). The region's Flyways, often considered as 'routes' for bird migration, play a pivotal role, with India positioned in three key flyway zones: Central Asian Flyway (CAF), East-Asian Australasian Flyway (EAAF), and Asian East African Flyway (AEF). Birds migrating across the Himalayan region confront significant physiological and climatic challenges as they traverse the highest peaks in the world. Ringing programs have contributed valuable data regarding the origins and destinations of these birds [6].

Approximately 370 migratory bird species utilize these flyways, with the Central Asian Flyway alone supporting at least 274 waterbird populations. Demoiselle Cranes, Siberian Cranes, and Hooded Cranes are among the species relying on the Central Asian Flyway [10]. Migratory birds are confronted with perilous threats resulting from human activities, including the use of

pesticides, deforestation, and industrialization [9]. Conservation hurdles in the area stem from inadequate management practices driven by a lack of understanding of Demoiselle Crane ecology, a shortage of scientific research, unchecked tourism, periodic pond desiccation, the hazard of electric cables leading to crane fatalities, and insufficient medical care for sick or injured birdS [8]. However, this study sets out to uncover the secrets of the Demoiselle Crane: understanding its population dynamics, unraveling migratory mysteries, and confronting the major threats it faces in the enchanting Khichan village in Thar Desert of Rajasthan, India.

1.1 Avian Migration and Its Importance

The ecological significance of migration, as evident in its impact on food production, climate, and conservation, underscores the importance of studying this phenomenon [10]. The Demoiselle Crane's migratory journey, spanning thousands of kilometers, highlights the need for conservation efforts to counter increased anthropogenic threats, habitat destruction, and alteration of resting grounds in their wintering sites [2] [3]. The migratory birds exhibit their highest winter population levels in December, January, and February.

The migration routes spanned between 2170 to 5600 km, while the transit migration covered distances from 1900 to 4600 km, lasting between seven to 13 days. Clearly, the Demoiselle Crane manages this period without the need for immediate energy replenishment, relying on resources accumulated before initiating the transit migration [7].

Every winter, numerous flocks of Demoiselle Cranes make their way to the Thar Desert in Rajasthan. Originating from Siberia, China, Mongolia, Ladakh, and the Tibetan Plateau, their migratory journey extends through Afghanistan and Central Asia before concluding in the north-western part of India, specifically at the Thar Desert. The purpose of this migration is to escape the harsh cold of the Arctic region by seeking warmer climates.

2. Historical perspective; Khichan as Wintering Ground

Khichan, recognized as a crucial wintering site, experiences an annual increase in the Demoiselle Crane population due to distinctive community initiatives [4]. Situated on the outskirts of the Thar Desert, Khichan lies along the migratory route of Demoiselle Cranes as they travel from their breeding grounds in Eurasia to bask in the milder winter climate of India. In late September, the initial flocks embark on their aerial journey from the plateaus, steppes, and wetlands of Mongolia and the Caucasus region. Covering approximately 5,000 kilometers in about two weeks, they traverse numerous international borders, soaring over the Himalayas. By November, a multitude of birds descends, and for a duration of five months, Khichan transforms into a 'crane village.'

3. Study Site

The latitude of Khichan village is 27.142930, and the longitude is 72.420227. The population density of this village is 7,025, as per the records collected in 2011. Khichan has been recognized by the Rajasthan Tourism Development Corporation (RTDC) as a tourist hotspot. Thousands of cranes spend the winter in Khichan, and they can be seen right in the middle of the village. Various sites were studied during the survey for data collection, such as agricultural fields, feeding grounds, wetlands, lakes, ponds, etc.

3.1 Feeding Ground (Chugga ghar)

The feeding ground of these cranes is the “chugga ghar,” which is located on the entry pathway of the village and covers an area of 6416 square meters where they feed upon grains. On a daily basis, a total of 2500 kilograms of grains are provided to the birds during the peak winter season. They come to the feeding ground in the early morning, forming a 'V'-flight pattern in the sky.

Fig -1: feeding ground in Khichan

Fig -2: “V” Flight formation

3.2 Rivers (nadi) and Ponds (talab)

In the northern side of the village, there are two water bodies, "Vijaysagar Talab" (Pond) and "Ratri Nadi" (River). Another water body is situated in the southern region of the feeding ground, and that's "Teerjaniyo ki Nadi" (River). These rivers and ponds are used by the cranes as resting sites in the evening and a source of drinking water.

Fig -3: Roosting site (Vijaysagar talab)

4. Materials and Methods

Selected locations within Khichan's wintering grounds were surveyed for Demoiselle cranes from early September 2022 to late March 2023. Additional information was gathered from secondary sources, including newspapers, magazines, literature, and Mr. Seva Ram Mali, a local shop owner in Khichan. Mr. Mali has been maintaining records of the daily visits to the feeding ground, as well as details about injured, deceased, and rescued birds since October 2010. Surveys encompassed various areas in Khichan village, chosen based on previous data and local knowledge.

4.1 Data Collection

An initial reconnaissance survey was executed in the study area, specifically Khichan village, with the aim of identifying potential habitat locations for Demoiselle cranes. After identifying these sites, additional data collection activities were initiated. Surveys were conducted on foot within the study area, allowing for direct observations during both early morning and daytime hours. Binoculars (8 x 40), iPhone13 and a Canon PowerShot SX40 HS camera, equipped with a 12MP CMOS-based superzoom featuring a 35x zoom and a lens with a 24-840mm equivalent zoom range, were employed for this purpose. The selection of study sites was determined based on the distribution range of the Demoiselle crane.

The "Block Method" was employed to count the number through binoculars, as it proves to be a straightforward and precise technique for estimating the quantities of cranes within sizable and densely populated flocks, whether in flight or on the ground and with the aid of binoculars, tagged birds were also sought to determine their migratory patterns and origin. Comprehensive information regarding the birds' activities and daily routines was gathered through a questionnaire survey conducted among the locals of the village.

5. Findings and Interpretations

The migratory avian species, Demoiselle cranes, are observed in early September during the survey for the research. Our findings indicate that only a few of them migrate towards the Thar region of Rajasthan in the early winter. Their numbers range between 100-200 in the initial winter period, but by late September, it increases significantly to 3000-5000. These cranes cover vast distances, flying thousands of kilometers in search of optimal ecological conditions and habitats for feeding, roosting, breeding, and raising their young.

The Demoiselle cranes are observed in various regions of the Thar Desert, possibly due to the availability of suitable habitats and protection from the local community in Rajasthan. The ponds situated in Satlana village, Jodhpur district, serve as a secondary habitat for Demoiselle cranes in the Thar Desert. This village, located in Jodhpur district, provides a picturesque setting where Demoiselle cranes coexist with local bird species [11]

Survey Data was recorded from September 2022 to March 2023, representing the annual period of their migration. According to the data, the peak population is observed in January and February, coinciding with the peak of the winter season. During these months, the population status ranged from 35,000 to 40,000, marking the highest count to date. The entire Khichan village was surveyed and recorded an average species count of 35,000-40,000 during the peak winter season.

Table -1: Population status recorded in each month along with time from October 2022 to March 2023

DATE	TIME TO REACH THE FEEDING GROUND	TIME TO LEAVE THE GROUND	POPULATION
06/10/22	07:03 a.m.	10:13 a.m.	5000
06/11/22	07:45 a.m.	09:46 a.m.	9000
06/12/22	07:28 a.m.	09:27 a.m.	18000
06/01/23	07:08 a.m.	09:56 a.m.	32000
06/02/23	07:51 a.m.	11:12 a.m.	40,000
06/03/23	07:54 a.m.	10:43 a.m.	12000

we can conclude that during the early months of winters only few individuals are seen in the khichan village, and the population size increases as the winter increases in the central Asian parts and birds migrate towards the marshy areas of khichan.

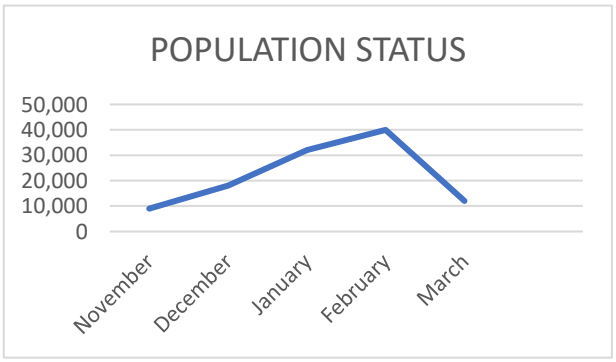

Fig -4: Population status of annual migration.

Mortality Of Demoiselle cranes

A total of 234 deceased individuals were documented between 2010 and 2021 in Khichan and its surrounding areas. The majority of these mortalities were discovered at Vijaysagar Talab and Ratri Nadi, identified as the two primary roosting areas for Demoiselle cranes. Chugga ghar served as their main foraging site. The causes of these mortalities were varied and included food poisoning, collisions with power lines, attacks by feral dogs, temperature increases, and injuries from Chinese manja. In some instances, natural factors were identified as the cause of mortality. They confront numerous other threats, including illegal trades, habitat loss, and hunting or capturing. Given these challenges, the conservation and management of Demoiselle cranes are imperative for the survival of this beautiful species [13]

Vijaysagar, a significant water source for birds to quench their thirst, attracts substantial congregations, consequently drawing predators like stray dogs. The power lines traversing the pond region, a major roosting site, have been accountable for obstructing the flight of birds and contributing to mortality. Figure 5 illustrates recorded reasons such as collisions with power lines, predation by stray dogs, and food poisoning caused by insecticides used in grain agriculture with high phosphorus content.

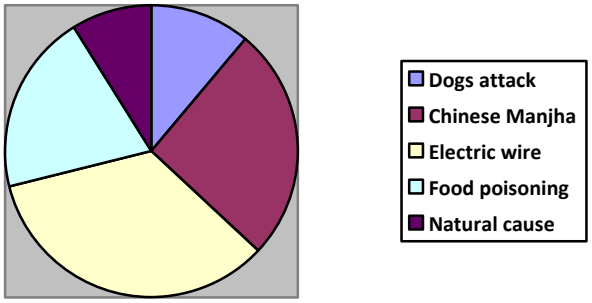

Fig -5: Major threats causing harm to Cranes.

The primary threat to the cranes in Khichan village arises from the presence of electric powerlines within the roosting and feeding grounds of the cranes. Another significant threat contributing to a high mortality rate is food poisoning. This is attributed to the ingestion of fertilizers and insecticides used in agricultural practices, which contain elevated concentrations of phosphorus. The cranes consume these substances through food grains or water in the ponds, which serve as their roosting sites and are contaminated by fertilizers and insecticides.

Fig -6: Demoiselle crane injured by feral dog attack.

Fig -7: Demoiselle crane collapsed with electric wires.

6. Conclusion

The population status is summarized in table 1 and their detail is plotted in the line graph shown in figure 4. We recorded 35,000 – 40,000 individuals in the peak month of winters i.e., January and February. They migrate to the thar region of Rajasthan by the month of September, and they stay there till late march and migrate back to their breeding grounds. The major threats causing the mortality of the cranes are summarized in Figure 5. The incidents and mortality rate of the birds are highest at the roosting site, with the primary causes being electric wires and food poisoning. The overuse of fertilizers and pesticides, particularly those with elevated phosphorus levels, can lead to infections in the gut of cranes, ultimately causing diseases and individual fatalities.

Fig -8: Demoiselle Cranes in Midair.

ACKNOWLEDGEMENT

I extend my deepest gratitude to Mr. Sevaram Mali, an invaluable collaborator in my research endeavors. His unwavering support in data collection and survey activities in the village has been instrumental in the comprehensive exploration of Demoiselle cranes. His dedicated care for the well-being, sustenance, and living conditions of these cranes since 2010 reflects not only his profound commitment but also his remarkable humility and kindness. His invaluable contributions have significantly enriched the depth and quality of this research, and for that, I am truly indebted.

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