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ENVIRONMENTAL AND ANTHROPOGENIC FACTORS AFFECTING THE MIGRATION OF HOUBARA BUSTARD AND CRANE IN AREAS ASSOCIATED WITH SABAKZAI DAM, DISTRICT ZHOB

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Abstract

*This research aims to evaluate the anthropogenic and environmental factors influencing the migration rates of Houbara Bustard (*Chlamydotis undulata*) and Demoiselle Crane (*Anthropoides virgo*) in Sabakzai Dam and its associated areas Zhob, Balochistan. The Data was collected from September-March for Houbara and January to February for Crane (2021 and 2022) by using point surveys and community interviews – including hunters and local residents. Findings show a notable decline in migratory bird populations: Demoiselle Cranes decreased from 7,820 in 2021 to 6,200 in 2022 (20.7%), Eurasian Cranes from 80 to 68 (15%), and Houbara Bustards from 255 to 170 (33.3%). Key contributing factors include hunting, habitat destruction, deforestation, urban expansion, overgrazing, the Afghan conflict, and illegal wildlife trade. Continued human activity threatens further declines in migratory bird populations. Immediate implementation of targeted conservation strategies is essential to protect the avian fauna of Balochistan.*

Keywords: Anthropogenic factors, Crane, Houbara Bustard, Zhob

INTRODUCTION

The major species of birds that migrate from Siberia to Pakistan include the Houbara, Cranes, Pintails, Geese, Teals, Pelicans, Waders, Spoonbills, and Mallards. In search of suitable weather, a number of bird species pass through Pakistan, temporarily staying at various lakes and water bodies along their route. Pakistan provides beautiful wetlands that attract a large number of migratory birds, especially during the winter season. Basically, Pakistan serves as the middle Asian flying route for migratory birds (1). In Pakistan, the Zhob, Makran, and Nag valleys of Balochistan; Bakar and Jang regions of Punjab; and D.I. Khan in Khyber Pakhtunkhwa are the most common habitats for the Houbara and Cranes. However, in Balochistan and Punjab, the population of these migratory birds is declining at a rate of 10% annually (2).

The primary cause of the decline in Houbara populations is the rapid degradation of their natural habitats, largely due to human activities in deserts and forests. Industrial growth, environmental pollution (3), climate changes due to certain human activities (Mazumder, 2014; Scanes, 2018) have a significant impact to habitat loss of migratory birds. Furthermore, urban development over the past few decades has fragmented ecosystems, forcing even native bird species to migrate (4). Large-scale surveys are essential to understand population dynamics and develop long-term conservation strategies to protect migratory bird species (3).

Zhob is located at 31° 39' 42"N and 68° 24' 5"E. The Sabakzai Dam and surrounding areas serve as an important breeding ground for several migratory birds, including the Houbara and Crane. However, this area remains unprotected despite being located in Pakistan's largest province by area. According to local observations, these migratory birds are seen annually using this wetland. However, little information is available about the existing status and threats to Houbara and Cranes in this part of the country (5).

The local communities in this region is primarily Pashtoons. The socio-economic conditions are underdeveloped, with low literacy rates, limited human development, widespread poverty, and a strong tribal culture. A major concern is the lack of awareness about natural resource conservation. Hunting is the common trend, besides this global warming and water pollution plays a main role in the loss of habitat for



wild life (6). This study aims to determine the current population status of Houbara and Crane in the region and to identify the environmental and anthropogenic factors affecting their migratory patterns.

METHODOLOGY

STUDY AREA

Sabakzai dam is located on the Sawar River in the Meena Bazar area of district Zhob, Balochistan. It is situated about 61 km south of Zhob City and is accessible via the Zhob-Kuchlak Motorway (N-50). The climate of Zhob is semi-arid, the winter is cold, mostly clear and short, while summer is hot, clear, and long, the annually temperature fluctuate from 32°F to 97°F and is rarely exceeds 103°F or drops below 27°F.

COLLECTION OF DATA

The research study was conducted over two consecutive years, covering the migration periods of both Cranes and Houbara Bustards. For Cranes, observations were carried out from September to March in both 2021 and 2022, while for Houbara Bustards, data were collected during January to February of both years. The point survey method was employed using Nikon PROSTAFF 5 10x42 binoculars, with bird monitoring conducted from 3:00 PM to late night and sunrise to 11:00 AM during the autumn and winter months, corresponding to the peak migratory seasons. In this region, migratory activity typically spans from early October to March, as birds enter Pakistan via the Indus Flyway between September and November, crossing over the Karakoram and Suleiman mountain ranges, and remain in the wetlands until February or March before returning to their breeding habitats (1).

The migratory route of the Houbara extends from the eastern Nile Valley, through the Gulf countries, Central Asia, and Mongolia, reaching as far as the Gobi Desert of China (7Khan et al., 2019), in contrast, the Common and Demoiselle Cranes breed in Russia and migrate south through Pakistan's northern and western flyways (8).

The study recorded 255 and 170 Houbara Bustards; 7,900 and 6,268 Cranes in 2021 and 2022, respectively. To supplement observational data, structured interviews were conducted with an estimated 58 hunters, 68 local residents, and 4 captive breeders of Houbara and Cranes to gain insights into hunting practices, perceived threats, and community awareness. These interviews were conducted using a questionnaire developed based on relevant literature and expert input, although no formal validation procedures, such as pilot testing or statistical reliability analysis, were performed.

ANTHROPOGENIC AND ENVIRONMENTAL FACTORS

The anthropogenic and environmental factors associated with migration i.e., Hunting, falconry, overgrazing, food deficiency, habitat loss, pesticides, eutrophication, unsustainable fisheries practices, invasive species, human activity, agrochemical contamination were also studied.

RESULTS

DECLINE IN MIGRATORY POPULATIONS

During the study, a total of 7,900 Cranes and 255 Houbara Bustards were recorded in 2021, which declined to 6,268 Cranes and 170 Houbara Bustards in 2022, indicating a significant downward trend in migratory populations. This suggests increasing threats affecting these species during their seasonal passage through the area.

HUNTING TRENDS

Data from 23 hunting camps in 2021 and 28 in 2022 revealed increased hunting activities as shown in Fig. 1. In 2021, the average Crane captured per camp was 15 ± 10 , and killed were 20 ± 15 , while in 2022, the numbers rose to 32 ± 16 captured and 30 ± 14 killed. Houbara captures per camp averaged 15 ± 12 in 2021 and 13 ± 9 in 2022. Total Houbara captured across both years was 65 (2021) and 78 (2022). Cranes were primarily caught using decoy birds and soai, a traditional trap tool. Demoiselle Cranes were captured in far

greater numbers (1,200 in 2021 and 2,500 in 2022) compared to common Cranes (95 in 2021, 102 in 2022), suggesting the latter's alarming scarcity due to overhunting as shown in Fig 2.



Fig. 1. Certain human activities i. e. shooting, hunting and trapping of Crane and Houbara Bustard

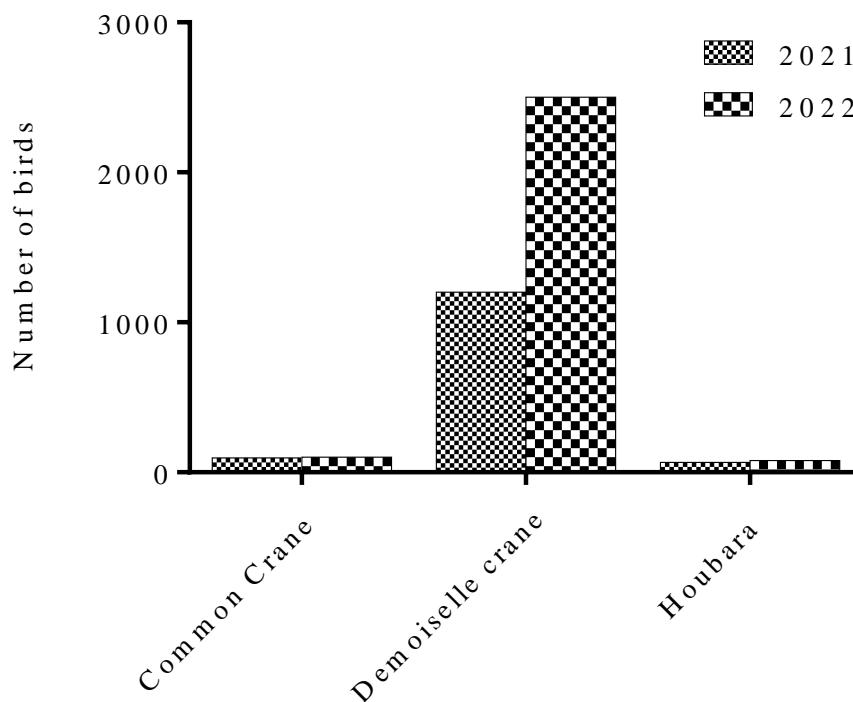


Fig. 2. Number of Crane species and Houbara captured by the hunters during 2021 & 2022

INTERVIEW-BASED DATA (STRUCTURED)

The information presented here highlights the diverse motivations and methods associated with hunting practices. Under "Hunting reasons," it is evident that people engage in hunting for various purposes. The majority, at 60%, partake in hunting for the purpose of keeping pets, which may involve capturing or procuring animals for domestication. Meanwhile, 25% of hunting is attributed to "For sale," indicating that a significant portion of hunting activities may be driven by economic factors, potentially involving the sale of animals or their byproducts. Additionally, 15% of hunting is categorized as "For Eating," suggesting that hunting for sustenance or traditional consumption remains a notable motivation. This particular category underscores the importance of hunting in some communities as a means of securing food. On the other hand, the "Hunting Method" section sheds light on the techniques employed in hunting. "Net" stands out as the primary method, accounting for 50% of hunting activities. This could imply the use of nets as a prevalent tool for trapping or capturing animals. Meanwhile, "Gun fire" represents 30% of hunting, indicating that firearms play a significant role in the hunting process, likely for larger or more elusive game. Lastly, "Soai" (The trapping tool, a long string with a ball, is a key tool used by these

tribesmen to capture Cranes) at 20% suggests an unconventional method, potentially referring to alternative or non-lethal approaches to wildlife management or hunting as shown in Table I.

Table I. Hunting methods and reasons

Hunting reasons	Percentage	Hunting Methods	Percentage
Keeping pets	60%	Net	50%
For sale	12%	Gun fire	30%
For Eating	15%	Soai	20%

HABITAT PREFERENCES

Migratory birds were observed most frequently near shrubs and grasslands (42%), followed by barren lands (27%), water bodies (18%), and rocky/mountainous zones (13%) as shown in Fig. 3. These habitat preferences highlight the critical areas needing conservation efforts to ensure safe stopovers for migrating species.

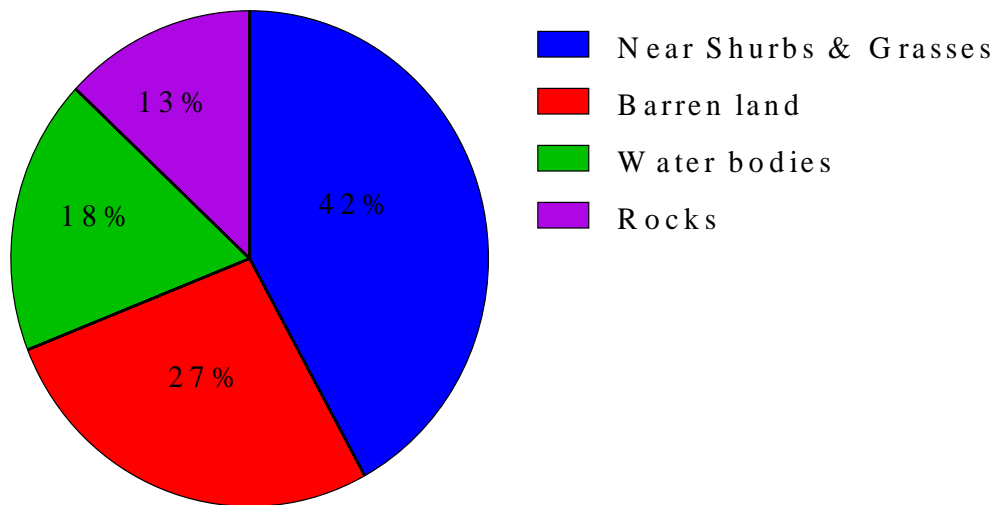


Fig. 3. Percentage of Crane and Houbara found near Sabakzai dam territories

DISCUSSION

The decline in both Houbara Bustard and Crane populations between 2021 and 2022 aligns with broader national and global concerns regarding overhunting, habitat degradation, and climate impact on migratory species. These findings are consistent with prior studies conducted in southern Pakistan (9), which also report sharp population declines due to increased anthropogenic pressure. Similarly, Parveen (2012) documented that hunting in Pakistan is often recreational, deeply embedded in local tribal customs (10). The climate of Zhob, which is characterized by hot summers and cold winters, can affect the timing of migration and the availability of food resources.

This study confirms that habitat destruction, such as shrub removal for fuel or construction, directly affects bird nesting and shelter availability. Pesticide spraying, pollution, and illegal hunting are additional critical threats. Compared to global trends, the findings resonate with Bazmir Khan published report "Hubara Bustard Conservation Project, Balochistan, Pakistan 2013-2014" (11). The author emphasized human disturbance as a primary disruptor of migratory behavior. Since, the hunting and birds breeding is the major source of income for the native population of the area. The study also revealed a noticeable decrease in the number of both migratory birds supports the hypothesis of species-specific vulnerability based on hunting pressure and habitat availability. Previously, it was also reported that the population of crane was declined in southern districts of Pakistan due to overhunting (9). It is a well-known fact that the numbers of many migratory birds including Houbara and Cranes decrease due to over hunting and certain environmental changes (10, 12, 13).

Hunting migratory birds for food, sport, or other purposes can lead to a significant decline in their population, particularly for vulnerable species such as Houbara and crane due to their size and flight speed.

Hunters from Lakki Marwat and Bannu, both natives and visitors, hunt mainly for food and recreation and often gather eggs and Houbara chicks for the market (9).

Local practices such as using shrubs for livestock pens and firewood reduce vegetation cover, making the area unsuitable for breeding and resting birds. Moreover, urban encroachment and lake drainage continue to alter the ecological balance. Without intervention, continued population declines are likely, potentially leading to local extinction. As far as the migratory birds are concerned particularly in the study area anthropogenic and environmental factors can come in various forms such as illegal hunting, smuggling, urbanization, deforestation, Pollution and Climate change are the most common features responsible for the declination of these migratory birds.

CONCLUSION

In conclusion, it is important to minimize human disturbance in the Sabakzai Dam and its associated area in District Zhob in order to protect the migratory birds, particularly houbara bustard and Crane. Measures such as implementing hunting bans, protecting habitats, reducing pollution, and minimizing noise pollution can help to ensure the successful migration and conservation of these species.

RECOMMENDATIONS

- Strict enforcement of anti-hunting laws during migratory seasons, especially around key stopover sites like Sabakzai Dam is necessary.
- Community-based conservation awareness programs to educate locals about the ecological importance of migratory birds and sustainable practices.
- Habitat restoration initiatives, including protection of shrublands and regulation of deforestation and pesticide use in surrounding areas.

Conflict of interest:

The authors have no conflict of interest.

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Authors' contribution:

ZN performed research work and write up; MN conceptualized and supervised, AK critical analysis.

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