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# Population Dynamics and Conservation Challenges of the Indian Bustard (*Ardeotis nigriceps*) in Western Rajasthan

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**Abstract:** ***The Great Indian Bustard (Ardeotis nigriceps) is one of the most critically endangered bird species in the world, with Western Rajasthan hosting the last viable population. This study investigates population dynamics, habitat ecology, and conservation challenges of the Indian Bustard in the Thar Desert, particularly focusing on Jaisalmer, Barmer, and Bikaner districts. Field surveys conducted between 2014 and 2017 employed distance sampling, habitat mapping, transect monitoring, and community interviews. The population was estimated to be less than 150 individuals, with the majority concentrated in the Desert National Park (DNP). Key limiting factors identified include habitat fragmentation, collision with high-tension powerlines, predation, reduced breeding success, and anthropogenic pressures such as agriculture expansion, livestock grazing, and disturbance from renewable energy infrastructure.***
***Findings reveal that the species prefers open grasslands, semi-arid scrublands, and fallow agricultural fields with sparse vegetation. Breeding success is highly dependent on rainfall and food availability. Conservation challenges persist due to slow reproductive rate, restricted habitat, and severe human-induced mortality. The study emphasizes the urgency of implementing strong protective measures, including underground powerlines, community participation, habitat restoration, and scientifically managed breeding centres. Ultimately, the survival of the Indian Bustard hinges on integrated conservation strategies and long-term ecological management.***

**Keywords: Indian Bustard, population dynamics, Desert National Park, grassland ecology, Rajasthan biodiversity, endangered species conservation.**

## 1.1 Introduction

The Great Indian Bustard, Ardeotis nigriceps, is one of the heaviest flying birds and a flagship species of the arid grasslands of the Indian subcontinent. Historically widespread across Pakistan and India, the species has witnessed drastic population declines over the last half-century. Today, Rajasthan hosts nearly 85–90% of the global population, making the region critical for its survival (Rahmani, 1997).

Grasslands and arid scrublands—once considered "wastelands"—are the primary habitats for the bustard. Large-bodied ground-nesting birds are inherently vulnerable to habitat modification, predation, and anthropogenic disturbance. The Great Indian Bustard is now categorized as Critically Endangered under the IUCN Red List.

The Thar Desert ecosystem is undergoing rapid transformation due to agricultural expansion under the Indira Gandhi Canal (IGNP), infrastructure growth, and renewable energy development. Consequently, bustard habitats are shrinking and becoming increasingly fragmented (Dutta et al., 2011).

This study examines the species' population status, distribution patterns, habitat requirements, and conservation threats in Western Rajasthan, with the ultimate aim of providing scientific recommendations for long-term survival.

## 1.2 Objectives

1. To estimate population size and distribution of the Indian Bustard in Western Rajasthan.
2. To analyze habitat preferences and ecological requirements.
3. To examine breeding behavior and reproductive success in different habitat types.
4. To identify key anthropogenic and natural threats.
5. To recommend effective conservation strategies based on field evidence.

## 1.3 Methodology

**I. Study Duration**

Data were collected over a three-year period (2014–2017) covering pre-monsoon, monsoon, and winter seasons.

**II. Study Area Selection**

Major bustard habitats surveyed:

Desert National Park, Jaisalmer

Pokhran Field Firing Range

Barmer grasslands

Bikaner–Jodhpur arid plains

**III. Data Collection Techniques**

**1. Distance Sampling**

Line transects of 5–12 km were used for bustard sighting and density estimation.

**2. Direct Ground Surveys**

Car-mounted and foot transects during early morning and late evening.

**3. Habitat Characterization**

Recorded:

(a.) Grass height
(b.) Vegetation density
(c.) Human activity indices
(d.) Livestock presence
(e.) Agricultural land proportion

**4. Breeding Observations**

Nesting sites were monitored for:
(a.) Nest location
(b.) Clutch size
(c.) Hatching success
(d.) Chick survival

**5. Local Community Interviews**

Discussions with herders and farmers for traditional ecological knowledge.

**IV. Data Analysis**

1. Shannon diversity index for habitat association
2. Spatial mapping of sightings
3. Mortality classification (powerline, predation, human disturbance)

## 1.4 Study Area

The study region lies within the western arid zone of Rajasthan, dominating the Thar Desert landscape.

**I. Desert National Park, Jaisalmer**

1. Largest bustard habitat
2. Sand dunes, scrublands, and grass patches
3. Low human density

**II. Pokhran Field Firing Range**

1. Military-controlled zone
2. Minimal human disturbance
3. Critical breeding habitat

**III. Barmer Grasslands**

1. Traditional grazing landscapes
2. Increasing agricultural conversion

**IV. Bikaner–Jodhpur Plains**

1. Irrigated farms expanding
2. Threats from powerlines

## 1.5 Observations

**I. Population Estimates**

1. Total population observed: 120–150 individuals
2. Breeding adults: ~50
3. Major concentration: DNP (70–80 individuals)

**II. Habitat Preferences**

**Bustards prefer:**

1. Open grasslands with sparse shrubs
2. Mixed scrub-grass mosaics
3. Traditional fallow agricultural fields
4. Areas with grass height 15–60 cm

**Avoid:**

1. Dense vegetation
2. Highly cultivated areas
3. High-traffic zones
4. High-tension powerline corridors

**III. Feeding Behavior**

Diet mainly consists of:

1. Grass seeds
2. Beetles
3. Grasshoppers
4. Small reptiles
5. Berries
6. Rainfall influences food abundance, increasing breeding activity.

**IV. Breeding Observations**

1. Nesting occurs on the ground in open landscapes.
2. Clutch size: one egg (rarely two).
3. Chick mortality: high, mainly due to
4. foxes
5. dogs
6. livestock trampling

**V. Human-Induced Threats Identified**

1. Overhead powerlines: major cause of mortality
2. Agricultural mechanization
3. Wind turbines and solar infrastructure
4. Free-roaming dogs
5. Mining and road construction
6. Disturbance due to tourism

## 1.6 Discussion

**I. Population Decline**

The GIB population has declined by more than 90% since the 1960s (Rahmani, 1997). Our study confirms that the remaining population is extremely small and faces severe reproductive challenges.

**II. Habitat Fragmentation and Loss**

Grasslands converted to crop fields under IGNP have fragmented bustard habitats. Though bustards utilize fallow and post-harvest fields, year-round cultivation reduces habitat suitability.

**III. Mortality from Powerlines**

Collision with powerlines is the single greatest threat, particularly in Jaisalmer and Bikaner. Large, low-flying birds with poor frontal vision cannot detect wires. Mortality rate estimated: up to 15% annually.

**IV. Breeding Constraints**

Breeding success is low due to:

1. Predation
2. Human and livestock disturbance
3. Vehicle movement in habitat areas
4. Habitat alteration during monsoon

**V. Role of Protected Areas**

Desert National Park remains the last secure stronghold but suffers from:

1. Low productivity

2. Grazing pressures

3. Unregulated tourism

**VI. Traditional Practices vs. Modern Pressures**

Historically, grasslands managed by pastoral communities supported bustards. Modern agriculture and infrastructure expansion now threaten these landscapes.

## 1.7 Results

1. Population is confined to isolated pockets, mostly within DNP and PFFR.

2. Habitat preference shows strong affinity to open grasslands.

3. Breeding success remains critically low, with high chick mortality.

4. Powerline collisions account for major adult mortality.

5. Anthropogenic activities significantly reduce habitat quality.

6. Military-protected areas provide relatively safer breeding zones.

7. Conservation efforts require integration of local communities.

## 1.8 Conclusion

The Indian Bustard faces imminent extinction without urgent intervention. Western Rajasthan remains its last surviving refuge, but rapid landscape transformation, infrastructural development, and habitat fragmentation continue to threaten its survival. The species' slow reproduction rate and vulnerability to disturbances exacerbate population decline.

Long-term conservation of the GIB requires restoring grasslands, eliminating powerline risks, regulating land-use changes, and enhancing breeding programs. Multi-stakeholder collaboration involving local communities, government agencies, military authorities, and scientific organizations is essential.

## 1.9 Recommendations

**I. Habitat Management**

1. Designate inviolate grassland zones in Jaisalmer and Barmer.

2. Restore native grass species to expand habitat.

**II. Powerline Mitigation**

1. Underground wiring in core habitats.

2. Marking of unavoidable lines with bird diverters.

**III. Predator Control**

1. Control feral dog populations.

2. Prevent livestock grazing in breeding grounds.

**IV. Strengthen Breeding and Conservation Programs**

1. Expand Great Indian Bustard Conservation Breeding Centre at Sam.

2. Reintroduce individuals after habitat improvement.

**V. Community Engagement**

1. Educate pastoral communities about bustard-friendly practices.

2. Provide incentives for protecting grasslands.

**VI. Policy and Monitoring**

1. Implement strict regulation on wind and solar farms in DNP.

2. Long-term monitoring of population dynamics and habitat condition.

## References


[1.]Ali, S., & Ripley, S. D. (1987). Compact Handbook of the Birds of India and Pakistan. Oxford University Press.

[2.]BirdLife International. (2001). Threatened Birds of Asia: The BirdLife International Red Data Book. BirdLife International.

[3.]Dutta, S., Rahmani, A. R., & Jhala, Y. V. (2011). Running out of options: Finding potential habitat for the critically endangered Great Indian Bustard (Ardeotis nigriceps). Bird Conservation International, 21(1), 40–52.

[4.]Grimmett, R., Inskipp, C., & Inskipp, T. (1998). Birds of the Indian Subcontinent. Oxford University Press.

[5.]Rahmani, A. R. (1997). The Great Indian Bustard: Final Report. Bombay Natural History Society.

[6.]Sankaran, R. (1995). Some aspects of the ecology of the Great Indian Bustard. Journal of Ecological Society, 8, 47–63.

[7.]Sharma M.K. et.al. (2009). Applied Biodiversity, Rachana Publication, Jaipur

[8.]Sharma M.K. et.al. (2010). Biological Spectrum of Vegetation Geography of Khetri, Ritu Publication, Jaipur

[9.]Sharma M.K. et.al. (2015). Desert Plant Ecology. Ritu Publication, Jaipur

[10.]Sharma M.K.(2019) Amniotic Biodiversity of Reptiles of Sariska Region, Rajasthan, Journal -Parisheelan, Volume-(15), Issue- 2, April-June.2019, 0974-7222, p.379-388.

[11.]Sharma M.K.(2019) Amniotic Biodiversity Conservation and Future Management Strategis of Sariska Region, Rajasthan, Journal - Universal Review Journal, Volume-(10), Issue-1,Jan-June..2019, 2277-2723, p.423-430..