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RESEARCH ARTICLE

Conservation Strategies of Great Indian Bustard- Ardeotis nigriceps of Rollapadu wild life sanctuary in India: An Overview

DR.S.MOHAMMED GHOUSE [1] PROF. P. INDIRA [2]

1. Osmania college, Kurnool. A.P, India,
2. Head of dept. of Zoology, S.K.University, Anantapur, A.P, India.
E-mail: syed0002001@rediffmail.com

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Abstract:
Indian Bustard (Ardeotis nigriceps) popularly known as the Great Indian Bustard (GIB), is one of the critically endangered birds in the world. The Great Indian Bustard (Ardeotis nigriceps) or Indian Bustard is a bustard found in India and the adjoining regions of Pakistan . An estimated less than 300 individuals are reported to be surviving sporadically in different parts of the country. The GIB is categorized as 'critically endangered' under the IUCN Red List and listed in Schedule I of the Indian Wildlife (Protection) Act, 1972 . Rollapadu Wild life Sanctuary was established for the conservation of Great Indian Bustard and also its associated species in Nandikotkur of Kurnool district. At present this bird is seen in 6 states of India, Andhra Pradesh, Gujarat, Maharashtra, Madhya Pradesh , Rajasthan and Karnataka . There is a urgent need of project bustard. The present paper focus upon the reasons for the decline and mitigation measures for the increase in the population of this beautiful bird.

Keywords: Indian Bustard, Rollapadu, agricultural activities, hunting, urbanization decline , grazing policy ,project bustard.

Introduction

The great Indian bustard popularly known as the majestic bird of grass lands .The Great Indian Bustard (Ardeotis nigriceps) has been up listed to critically endangered category in 2011 by Bird Life International and IUCN based on the research conducted by the Wildlife Institute of India (WII). Population of the Great Indian Bustard (Great Indian Bustard) has been dwindling very fast. Human induced threats have increased and likely to increase manifold. Currently not more than 300 birds left in the world with no known breeding .

The Great Indian Bustard was first described to science as Otis nigriceps (Vigors 1830) from specimens collected at the Himalayan foothills of Northwest India. The current classification recognizes 11 genera and 25 species.

This group lacks hind toe, flies rarely and is strictly terrestrial (del Hoyo et al. 1996). The lineage originated 77 million years ago in Africa, at three focal points, Sub Sahara, East Africa and South Africa. Ardeotis with the largest generic range is hypothesized to be the earliest stock that spread across Eurasia, India and Australia, crossing oceanic barriers and speciating in discreet ranges.

Historically Great Indian Bustard was distributed throughout the western half of India in 11 states; from Punjab and Haryana in north to Tamil Nadu in south, and from Gujarat and Rajasthan in west to Orissa in east; spanning eleven states (Rahmani 1989). The last three decades have seen a drastic reduction in the range occupancy of this species (Dutta et al. 2010).

The current distribution is restricted to fragmented pockets in six states of the country namely Madhya Pradesh,, Andhra Pradesh, Raiasthan, Gujarat, Maharastra, Karnataka.

The great Indian bustard is a Omnivorous and opportunistic bird. It changes its food accordingly depending on the season and abundance of food. Animal food consists of grasshoppers, locusts, crickets, mole crickets, mantids, beetles, caterpillars, centipedes, spiders etc, vertebrate food includes many types of reptiles, , birds eggs , birds, mice , rats, gerbils, snakes upto 60 cms .(Bhushan and Rahmani 19920At the time of breeding it prefers animal food. It Prefers arid and semi arid grasslands and generally avoids cultivated lands. Breeding occur s in the month of March to September. Male is 122cms in length and weighs around 8- 14.5 kgs, with balck breast band gular pouch, polygamous , without parental care ,where as Female is about 92 cms length weight 3.5 to 6.75 kgs , breast band rudimentary or absent, lays only one or two eggs and incubates**.**

In general, the species requires four subtly different types of habitat: (1) *nesting habitat*, consisting of open areas with moderate to short grass, mainly on well-drained stony ground; (2) *display habitat*, involving open ground, usually slightly elevated to provide greater visibility; (3) *feeding habitat*, composed of many different types of open country (scrubland, grassland, pasture, crop fields and stony wasteland) but rarely ever with a damp substrate; and (4) *roosting habitat*, supplied by bare ground at night and, where possible,a shaded site (e.g. next to or under small trees or shrubs) by day. (Rahmani 1989e).

Male Great Indian bustard

Threats

Predation and disturbance Nesting female Great Indian Bustards show considerable alarm in the presence of Egyptian Vultures *Neophron percnopterus*, much less with other vulture species, suggesting that the Egyptian's egg-breaking habit extends to bustards (Rahmani and Manakadan 1987, Rahmani 1992b). Eagles cause avoidance reactions, although one adult male bustard was once seen to attempt to defend his position at a termite hole when the insects were emerging from an eagle which "took over" the site (Rahmani and Manakadan1987). Jungle cats *Felis chaus*, desert cats *F. libyca*, jackals *Canis aureus* and stray dogs occasionally take chicks (Saxena and Sen 1983, Sharma 1983). The wolf *Canis lupus* will prey on the species (Sharma1983, Dharmakumarsinhji 1985) and is suspected to have taken anincubating female at night, when the egg itself was left intact (Rahmani and Manakadan 1987). Foxes *Vulpes vulpes* and crows *Corvus splendens* and/or *C. macrorhynchos* ***are*** documented egg-predators, and the Indian mongoose *Herpestes edwardsi* and the monitor *Varanus benghalensis* are a similar threat (Dharmakumarsinhji 1962a, Saxena and Sen 1983,Rahmani and Manakadan 1987). The point of listing natural predators is merely to indicatethat general management regimes need to take account of different ecological balances to be struck, so as to avoid creating undue but often unrecognised pressures on such already disadvantaged species as Great Indian Bustard.

A more urgent problem appears to be posed by the impact of high numbers of either domestic or protected ungulates. At Nanaj abnormally high numbers of blackbuck may increase the chances of nest-trampling, and circumstantial evidence of this was found(Rahmani and Manakadan 1987). In addition, the great proliferation of blackbucks in the erstwhile Karera Bustard Sanctuary (to 3,000 individuals after re-introduction in the absence of natural predators) caused severe problems as the vegetation was eaten down and eggs of the bustard were crushed (V. Tiwari *in litt*. 2000). Rahmani (2001) points out that during the"crucial phase" of breeding, "the egg is frequently destroyed by the hordes of useless cows which roam all over its range.

2.Poaching

3.Agricultural changes : use of pesticides, change of crops

4.Mining and construction of Irrigation canals,

5.Roads and motor vehicle disturbances ,

6.lack of grazing policy,

7.Irresponsible management inputs

Rollapadu wild life sanctuary

Rollapadu WLS is established in 1988 ,it is distributed in the area of 6.14 square kilometers. Kurnool Rollapadu is a small village, 18 km southeast of Nandikotkur town, in the plains between the Nallamalai and Erramalai ranges of the Eastern Ghats. The River Krishna flows northwest of Nandikotkur. Rollapadu shot to fame in July 1984 when a flock of 35 Great Indian Bustard Ardeotis nigriceps was discovered (Manakadanand, Rahmani 1989, 1993). Recommendations were made by the Endangered Species Project of the Bombay Natural History Society to the Andhra Pradesh Forest Department to establish a sanctuary. Soon after, the State Forest Department

declared the Rollapadu Great Indian Bustard Sanctuary. The Sanctuary, though established primarily to protect the Great Indian Bustard, has benefited the rest of the wildlife in the area. Prior to its establishment, the animals were persecuted by professional trappers and hunters from nearby towns and villages (Manakadan and Rahmani 1989).Most of the Sanctuary is covered by grasses. Shrubs and small trees are common near the two small streams that flow within the Sanctuary. In the 1980s, there were about 60-70 bustards in and around Rollapadu and the Sanctuary was developing very well, but dueto subsequent mismanagement of the grasslands, and poaching of bustards during their movement away from Rollapadu, the bustard population has come down drastically. Not more than 20-25 birds remain. Large flocks of 15-20 birds are rarely sighted now. Another globally threatened species that is now regularly seen is the Lesser Florican Sypheotides indica (Sankaran and Manakadan1990, Manakadan and Rahmani 1999).

Bustard bird resembles like a young Ostrich of Africa with deep buff colored wings with black sides and conspicuous black-crusted crown an out stretched neck which is white in color with self design and the white under parts with beautiful long legs walks gracefully in the meadows keeping its head high looking at the sky like a royal queen in the jungle. It is a ground bird occasionally its flights & landing are beautiful sights for the viewers.

Other fauna of Rollapadu:
Indian wolf, Jackal, Indian fox, Black buck, Hare, Great Indian Bustard, Lesser Florican, Harriers, Horned Owl, Sandgrouse, Indian courser, Cobra, Rock Python, Russel's viper, Saw scaled viper and moniker lizard. Flamingoes, Barheaded geese, Pinkheaded Duck, Mountain Quail, Jerdon's Coursers, Forest Spotted Owlet, and Demoiselle Cranes migrate to Rollapadu areas in winter.

Threat and conservation issues in Rollapadu wls
1.Poaching
2.Irresponsible management inputs
3.Irrigation projects
4.Lack of grazing policy
5.The decline in bustard population has been blamed on the increase in the population of black bucks.
6.Irrigation projects at Rollapdu WLS changed the crop pattern dramatically, which resulted in the fragmentation of habitat of bustards.

Current Status of GIB in India
More than three decades ago, 1260 individuals of GIB were known to be thriving in the western parts of India (Dharmakumarsinhji 1957, 1971). That population came down to 745 individuals in 1978 (R. S. Dharmakumarsinhji 1978). Western Rajasthan is the only place where it is found in continuous stretch: in other areas it has disjointed distribution. It has disappeared from Uttar Pradesh, Punjab, Haryana, Orissa and Tamil Nadu, except for stray individuals here and there (Rahmani1987).In 2001, the numbers further dwindled to 600 birds (Birdlife International 2001). The situation continued to worsen and the numbers of GIBs decreased to less than 300 individuals in 2008 (A R Rahmani 2006; Guideline for the GIB recovery programme MoEF, human persecution for its alleged aphrodisiac value, the species is facing immense threat of extinction not only in Pakistan but also in India. GIBs have been hunted as game birds (Hume and Marshall 1878; Ali 1927; Rahmani 1989) and continue to be hunted in neighboring Pakistan (Khan et al. 2008) (Dutta et al. 2010).Low intensity poaching still persists within India as well (Dutta et al. 2010)The bird is also facing another critical threat of loss of habitat due to encroachment resulting from the expansion of agricultural fields, and alteration of the habitat for urbanization and industrial infrastructure. These result into the habitat loss for the birds, which lead to the decrease, dispersal or migration in the population. In addition, increasing infrastructural development like high-tension electrical wires and windmills coupled with vehicular disturbance, within the GIB habitats increasesthe chances of fatal bird strikes. GIBs are known to abandon nests due to human disturbance (Rao and Javed 2005).The last two decades have seen a drastic reduction in the range occupancy and population size of the GIB in India. India has declared 13 sanctuaries for the protection of this bird. One of these, the Kutch Bustard Sanctuary (2 sq. km), is located near Lala village in Abdasa taluka, Kutch. However, a major breeding population of GIB thrives outside the protected area in Abdasa taluka. Currently, the wildlife of Abdasa area of Kutch is under extreme anthropogenic pressures.

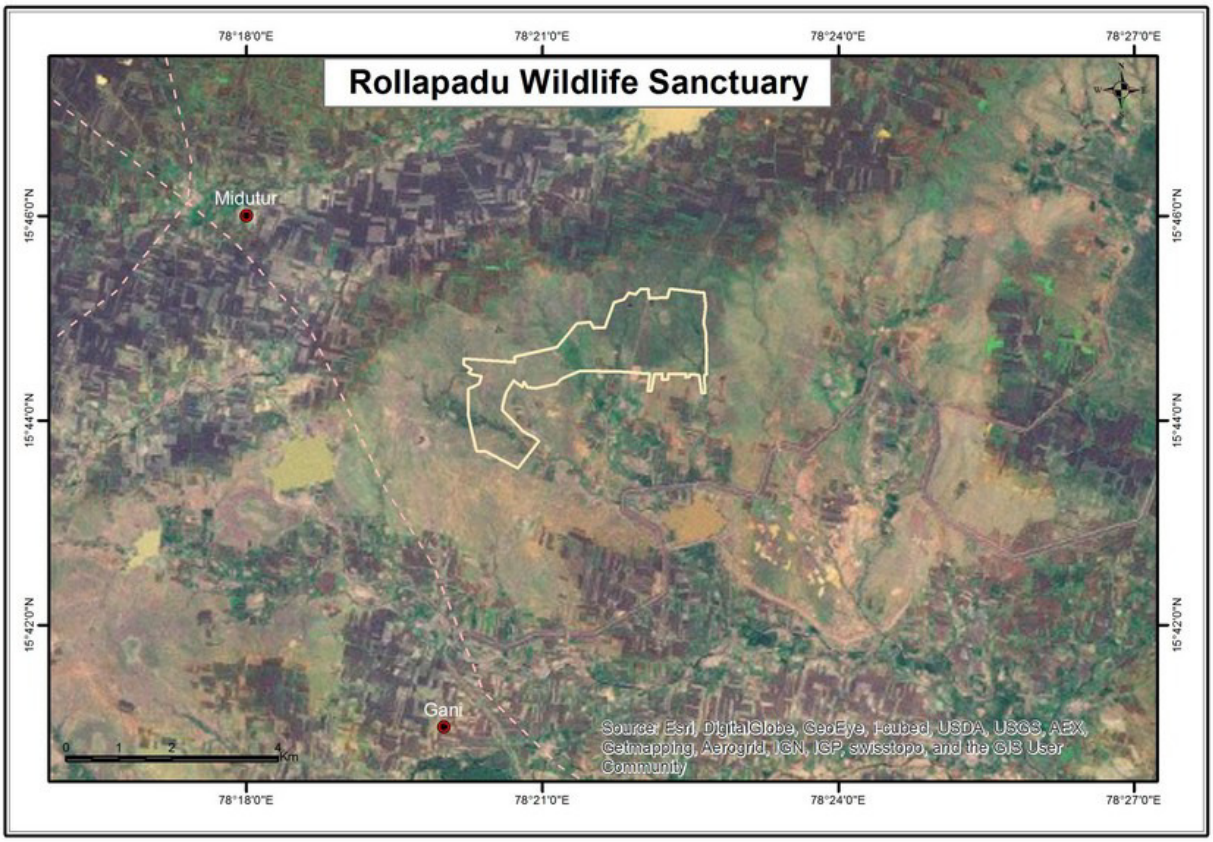
Interesting facts of the bird
Reproductive System & Rate

Age of producing 1st offspring (sexual maturity)	3 years (♀) & 4 years (♂)
Max. age of reproduction	20 years
Average. no of progeny/year	1
Sex ratio at birth	1♀:1♂
% Adult ♀ breeding/year	50 ± 10 §
% ♂ in breeding pool	25

Mortality rate

1st year	50 ± 10%
2nd year	10 ± 2% (♀) & 16 ± 3% (♂)
Adults	5 ± 1% (♀) & 8 ± 1.5% (♂)

Source : Ministry of Environment and Forests, Government of India
Suggestions for the long-term conservation of Indian



Satellite image of Rollapadu

Table 1**: Protected areas**

S.NO	NAME OF THE PROTECTED AREA	DISTRICTS	AREA	Year of Establishment	STATE
1	Desert national park	Jaisalmer	3162 km²	1992	Rajasthan
2	Kutch Bustard Sanctuary or Lala-Parjau sanctuary , or Kachchh Great Indian Bustard Sanctuary	1)Kuch , 2)Jamnagar	2 square kilometers	July 1992	Gujarat(Smallest)
3	Karera wild life sanctuary	Shivpuri	202 km^2	1981	Madhya Pradesh
4	Great Indian bustard sanctuary or Jawaharlal Nehru Bustard Sanctuary of Maharashtra	Solapur	849,644 hectares (3,280.49 sq mi)	1979	Maharashtra
5	Rane bennur balck buck sanctuary	Haveri	119 km²	1974	Karnataka
6	Rollapadu wild life sanctuary	Kurnool	6.14 square kilometers	1988	Andhra Pradesh

Table 2: status of past and present population of Great Indian Bustard

	State	Past(1980s estimates)	Present estimated number
1	Andhra Pradesh	80-100	35-40
2	Karnataka	20-30	<20
3	Maharashtra	60	20-25
4	Madhya Pradesh	30-35	<5
5	Gujarat	50	30
6	Rajasthan	500	80-100

Source : Ministry of Environment and Forests, Government of India

Table 3. Decline of Great Indian Bustard populations in India in 1980s and 1990s (following Rahmani 2001)

S.No	Sanctuary/Area	1985 population	1999–2000 population
1	Karera Bustard Sanctuary	25–30	0
2	Ghatigaon Bustard Sanctuary	15–18	2–3
3	Ranibennur Sanctuary	5–10	2–3
4	Nanaj area, Solapur	15–25	30–40
5	Sorsan	10–15	0?
6	Sonkhaliya	80+	declining
7	Desert National Park	200-400	declining
8	Rollapaddu	60+	15-20
9	Lala and Naliya	-	25-30
10	near Nashik	-	8-10
11	Nashik–Aurangabad border	-	20-25

Bustards

1. Enhanced protection given to Indian Bustards in the State .
2. During the breeding season of Bustards, anthropogenic disturbances should be controlled by the Forest Department to ensure safe and successful breeding of this critical endangered species henceforth.
3. A campaign like 'Save Indian Bustard' started by the The Corbett Foundation should be made popular in the local villages, to encourage local communities towards Bustard conservation.

Appropriate land use Great Indian Bustards range widely and cannot be conserved withinprotected areas alone, however important these may be as havens to maximise breedingsuccess. Indeed, 80% of the remaining population is thought to fall outside protected areas,meaning that the participation of local communities in conserving the species is essential (Rahmani 2001).

Legal enforcement and education An independent anti-poaching task force has been called for to counter the persistent poaching of game by hunting tribes (Dharmakumarsinhji 1983), and the criminal gangs of well-equipped city-based poachers that threaten wildlife even in remote portions of the Thar desert (Rahmani 2001).

"Project Bustard" Such is the plight of the four species of bustard in India (three breeding species, Great Indian Bustard, Lesser Florican and Bengal Florican *Houbaropsis bengalensis*, plus the wintering Houbara), as well as their grassland habitat, that the time has now come for an integrated national project along the lines of Project Tiger and Project Elephant. The aims of this project would be to conserve all four bustards in India and their habitat types, to establish more bustard sanctuaries, to upgrade existing closed areas, to coordinate the management of sanctuaries, to coordinate research on the species and their habitats, and to integrate grassland conservation with national grazing policy (Rahmani 1996). A whole suite of other threatened and endemic animal species would benefit from this initiative, including wolf, jackal, chinkara, blackbuck, Swamp Deer *Cervus duvaucelii* and Swamp Francolin *Francolinus gularis* (see relevant account) (Rahmani 1996a). Rajsthasthan Govt. has initiated the Project Bustard for the protection of GIB in Desert national park , where there is 50% of the GIB population exists ,similar initiates should be made by the other state govt for the conservation of this rare bird.

Conclusion :

The Great Indian Bustard is listed in Schedule I of the Indian Wildlife Protection Act. It has been declared as State Bird of Rajasthan. It was also listed in National Wildlife Action Plan 2002-2016. As per the National Forestry Commission recommendation No. 172, 'Project Bustards' should be initiated to protect highly endangered Great Indian Bustard. IUCN urged India for the project bustard for the protection of this beautiful bird in India Captivity breeding may increase their number . A better understanding of GIB behaviour is essential for both ex situ and in situ conservation.

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