



Distribution of the Indian Bustard *Ardeotis nigriceps* (Gruiformes: Otididae) in Gujarat State, India

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Abstract: The last surviving population of the Indian Bustard (IB) of Gujarat State was found to be distributed in the coastal grasslands of the Abdasa and Mandvi talukas of Kachchh District. The major part of the present distribution range of IB falls in the Abdasa Taluka and a small portion of this range falls in the Mandvi Taluka of Kachchh District in Gujarat. Geographically, this distribution of the IB is located on the northern coast of the Gulf of Kachchh. The total area of this distribution range of the IB in Gujarat covers a total of 996.4km² area. The entire area of the distribution range is more or less flat as compared to the surrounding typical topography of Kachchh District. The area within the distribution range of IB is mainly composed of grassland followed by open flat land.

Keywords: Distribution, Indian Bustard, Kachchh, Naliya grasslands.

Distribution is the ecological occurrence of a species in geographical areas, and information on distribution of any animal plays an important role in ecological research because the size, shape, orientation of the

distribution range and distribution pattern explains the conservation status of a species on a spatial scale. Such information is important for formulating future management strategies for the species under study. In view of the paucity of such information on the Critically Endangered (Biodiversity International 2008) Indian Bustard (IB) [also known as the Great Indian Bustard (GIB)] in Gujarat, the present study was conducted to demarcate the boundaries of their distribution range in Gujarat based on systematic and scientific data collection.

Study area

This study was carried out in Naliya grasslands and surrounding areas in Abdasa as well as adjoining talukas (i.e. Mandvi, Lakhapat and Nakhtrana) of Kachchh District (Fig. 1). The area is located in the southwestern province of the district. On the southern side, it joins with the Gulf of Kachchh. Low precipitation and frequent drought condition in this area do not support the growth of big tree species; moisture from the air supports the growth of grass. Ecologically, this area is of the type of 5A/DS 4-Dry grassland with few scattered patches of 5A/DS 2-Dry Savannah forest as per Classification of Forest Types of India (Champion & Seth 1968). The study area was composed of both continuous and discontinuous patches of grassland. A part of the area was covered with only grasses and forbs, while other areas had grass cover as well as scattered bushes of *Acacia* spp., *Prosopis juliflora*, *P. cineraria*, *Zizyphus* spp., *Salvadora* spp., and *Caparis* spp.

Methods

Preliminary information on the distribution of Indian Bustards in Gujarat was collected with the help of secondary literature and consultation with experienced ornithologists and nature lovers. The area under the intensive study (i.e. Naliya grassland) was

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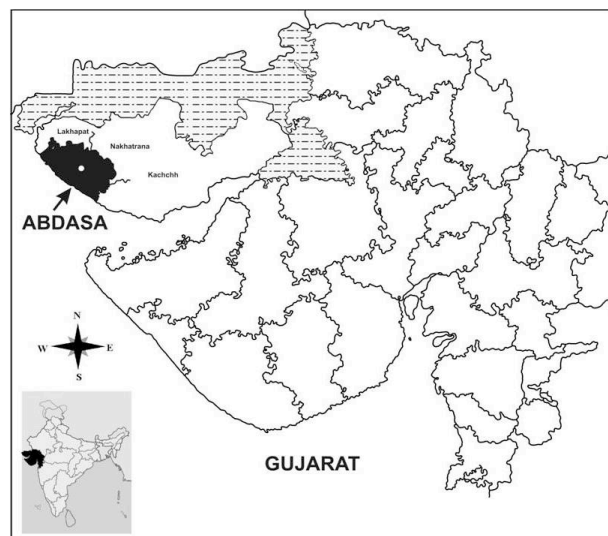


Figure 1. Stuey area

visited at least once a month. A total of 22 field visits were made from May 2006 to October 2007 and each field visit was of 4 to 10 days. The field visits were made to ensure data collection in all the seasons of the year as well as breeding and non-breeding phases of the species. Field observations were made with the help of powerful binoculars (Nikon-10X50) and spotting scope (Nikon-20X80). During each field visit, various physical and ecological parameters were noted upon sighting of the Indian Bustard [e.g. time of sightings, number of individuals (group size), their sex/age group (Male/Female/Juvenile), vegetation type where birds were sighted, activities of the birds, and the location of the birds]. The location of each sighting of the bustards was noted using GPS for studying distribution patterns and habitat preferences with respect to grass species, vegetation pattern etc.

Results

The population of Indian Bustards was found to be distributed in the coastal grasslands of the Abdasa and Mandvi talukas of Kachchh District (Fig. 2). This area is located in the southwestern province of Kachchh District in Gujarat (Fig. 2). A major part of the present distribution range of Indian Bustards falls in the Abdasa Taluka and a small portion of this range falls in the Mandvi Taluka of Kachchh District in Gujarat. The main locations of sightings of the species were grasslands and scrublands of some villages of Mandvi and Abdasa Taluka such as Bhanad, Kunathia, Naliya, Kalatalav, Jakhau, Jasapar, Gahdavada plot,

Bhavanipar, Budiya, Rampar, Jasapar, Vinghaber, Khauda, Lala, Lala Bustard Sanctuary, Lathedi, Bhachunda, Parjav, Ranpar, Sandhan, Suthari, Udheja Van and Vinjan (GPS locations in Table 1). Geographically, this distribution of Indian Bustard was located on the northern coast of the Gulf of Kachchh and the western-most part of the state and the country. This population, distributed in Kachchh District, is known to be the last surviving population of Indian Bustards in Gujarat State as the species is not found to breed or be localized in any other parts in the state. The total area of this distribution range of Indian Bustard in Gujarat covered 996.4km². The Indian Bustard's population was distributed in 0.51% of the total area of Gujarat State and 2.18% total area of Kutch District. The distribution range lie between 23°12'32.3"–23°11'1.1"N to 68°40'14.4"–69°9'26.4"E in an east-west direction and from 23°17'28.1"–23°0'8.8"N to 68°54'25.3"–69°3'54.0"E in a north-south direction. The distribution range of the Indian Bustard overlapped the revenue land of more than 37 villages, forest areas and "Kachchh Bustard Sanctuary" in Gujarat. The spread of the distribution range of Indian Bustards started from Mothala Village in the east to Jakhau Village in the west and from Tera Village in the north to Babhadai Village (of Mandvi tehsil) in the south. The entire area of the distribution range was more or less flat as compared to the surrounding topography typical of Kachchh District. The habitat use pattern within the distribution range of the Indian Bustard suggested that the majority of the area was composed of grassland (28%) followed by open flat land (27%).

Discussion

Apart from the present distribution range, the Indian Bustard was not sighted anywhere else in the state throughout the study period. The Indian Bustard once had a widespread distribution in Saurashtra and Kachchh (Fig. 3). In Kathiawar Peninsula, it was found in all areas except the forest areas of Gir, Girnar and Bardahills (Dharmakumarsinhji 1957). From 1950 to 1979 the distribution range of Indian Bustard was restricted to five districts of Gujarat i.e. Kachchh, Rajkot, Surendranagar, Jamnagar and Bhavnagar. Later they were sighted in Velavadar National Park, Bhavnagar in 1980 (Rahmani & Manakadan 1990). By the end of the 1980s a few birds were recorded from Surendranagar and Rajkot (Rahmani & Manakadan 1990) (Fig. 3).

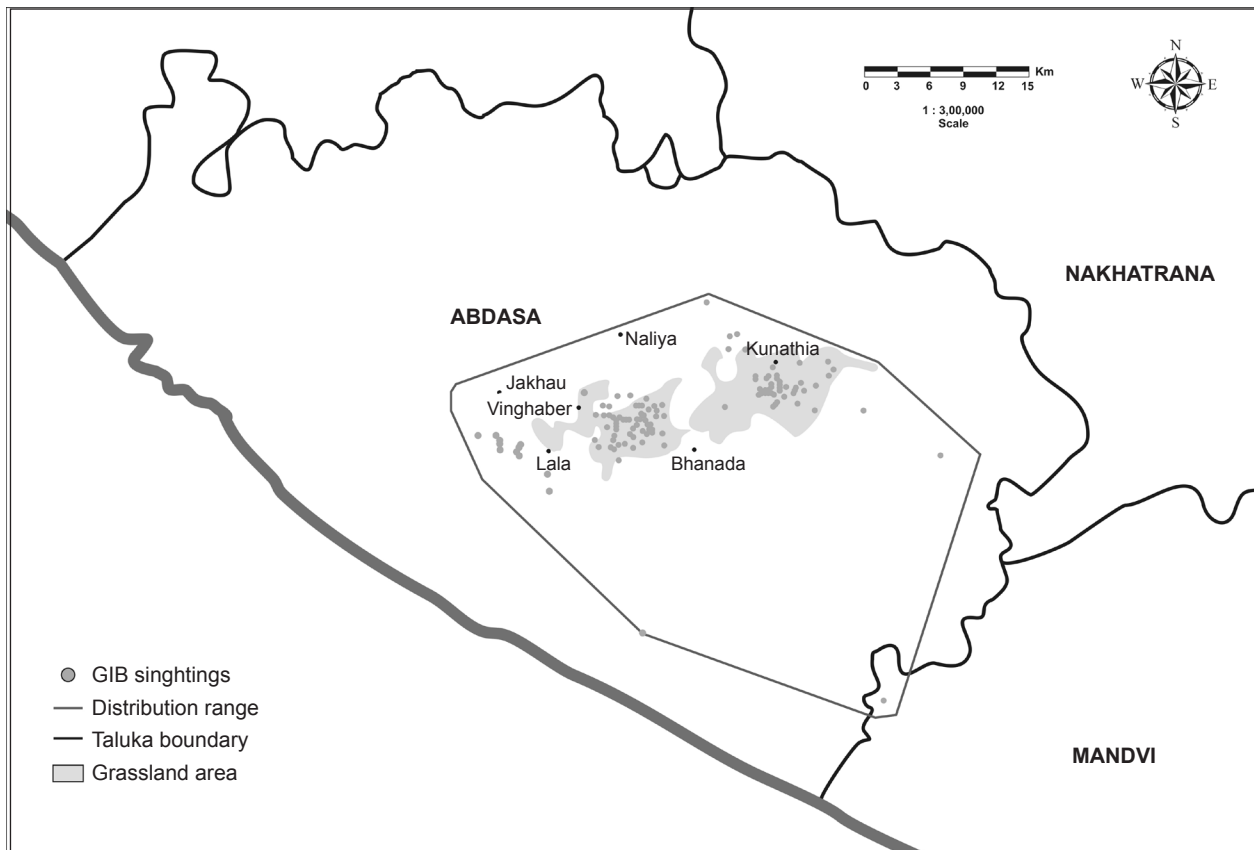


Figure 2. Annual distribution of Indian Bustard in Kachchh (Gujarat) between 2006–2007

In Jamnagar, it was last sighted from 1985 to 1986 at Ghoghera Talab and Kalyanpur Taluka. At the end of 1990 Indian Bustard became rare in most parts of the state and the distribution range was restricted to the Kachchh District. After the year 1990 no sighting records of the Indian Bustard were made from other areas of the state except Kachchh. However, recently, a pair of Indian Bustards was recorded for a short duration in the grasslands of Velavadar National Park in Saurashtra region in December 2005 (V. Rathod, RFO, Gujarat Forest Department pers. comm.). Apart from this, very recently in May 2008 one individual Indian Bustard was observed (Yogendra Shah pers. comm.) in the sparse saline grassland habitat of Little Rann of Kachchh in Surendranagar District of Gujarat. These recent records suggest that the Indian Bustard may be dispersing from the source population either from its distribution in Gujarat or from Rajasthan. It is also likely that the populations of Indian Bustard in the Thar Desert of Rajasthan and the grasslands of Kachchh are mixing. It is likely that the birds are moving along the marginal grass patches on the edge of Great

Rann and Little Rann of Kachchh in Banaskantha, Patan and Surendranagar districts in Gujarat. The Indian Bustard is confirmed to be distributed only in six states of India that include Rajasthan, Madhya Pradesh, Andhra Pradesh, Karnataka, Maharashtra and Gujarat (Rahmani 2006). The Indian Bustard is not only locally extinct from its former range, it has also disappeared from the three sanctuaries declared 25 years ago for its protection (Rahmani 2006). One of these is Gaga Bustard Sanctuary, which lies in the Saurashtra peninsula in Gujarat. It is in this context that the present distribution range in Kachchh has great conservation significance as the present distribution range has been holding the population of the Indian Bustard for a long duration compared to many other habitats in Gujarat and across India (Fig. 3).

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Table 1. GPS coordinates of Indian Bustard's sightings in study area

| | Latitude | | | Longitude | | |
|----|----------|----|------|-----------|----|------|
| | dd | mm | ss | dd | mm | ss |
| 1 | 23 | 09 | 07.7 | 68 | 45 | 43.7 |
| 2 | 23 | 09 | 50.3 | 68 | 45 | 39.1 |
| 3 | 23 | 09 | 54.6 | 68 | 45 | 37.7 |
| 4 | 23 | 10 | 29.9 | 68 | 49 | 32.4 |
| 5 | 23 | 10 | 43.8 | 68 | 43 | 54.2 |
| 6 | 23 | 10 | 46.6 | 68 | 42 | 56.7 |
| 7 | 23 | 10 | 49.4 | 68 | 42 | 56.8 |
| 8 | 23 | 10 | 53.6 | 68 | 43 | 04.5 |
| 9 | 23 | 10 | 56.1 | 69 | 07 | 20.1 |
| 10 | 23 | 10 | 56.8 | 68 | 49 | 18.8 |
| 11 | 23 | 10 | 57.2 | 68 | 44 | 01.6 |
| 12 | 23 | 11 | 00.4 | 69 | 07 | 09.7 |
| 13 | 23 | 11 | 00.7 | 68 | 48 | 25.8 |
| 14 | 23 | 11 | 01.1 | 68 | 50 | 19.3 |
| 15 | 23 | 11 | 02.9 | 68 | 44 | 06.4 |
| 16 | 23 | 11 | 06.5 | 68 | 42 | 55.5 |
| 17 | 23 | 11 | 08.9 | 68 | 49 | 31.7 |
| 18 | 23 | 11 | 10.3 | 68 | 49 | 51.0 |
| 19 | 23 | 11 | 15.4 | 68 | 42 | 57.7 |
| 20 | 23 | 11 | 17.9 | 68 | 50 | 48.4 |
| 21 | 23 | 11 | 18.8 | 68 | 48 | 15.5 |
| 22 | 23 | 11 | 20.5 | 68 | 49 | 13.3 |
| 23 | 23 | 11 | 24.8 | 68 | 42 | 44.5 |
| 24 | 23 | 11 | 25.4 | 68 | 41 | 46.6 |
| 25 | 23 | 11 | 27.4 | 68 | 50 | 20.1 |
| 26 | 23 | 11 | 31.8 | 68 | 49 | 16.8 |
| 27 | 23 | 11 | 35.8 | 68 | 50 | 10.2 |
| 28 | 23 | 11 | 37.9 | 68 | 51 | 05.5 |
| 29 | 23 | 11 | 36.9 | 68 | 51 | 56.6 |
| 30 | 23 | 11 | 40.8 | 68 | 51 | 21.4 |
| 31 | 23 | 11 | 42.2 | 68 | 51 | 08.6 |
| 32 | 23 | 11 | 43.8 | 68 | 50 | 48.5 |
| 33 | 23 | 11 | 49.2 | 68 | 49 | 22.1 |
| 34 | 23 | 11 | 49.8 | 68 | 50 | 24.3 |
| 35 | 23 | 11 | 50.9 | 68 | 51 | 19.8 |
| 36 | 23 | 11 | 51.2 | 68 | 48 | 53.2 |
| 37 | 23 | 11 | 52.4 | 68 | 50 | 16.9 |
| 38 | 23 | 11 | 52.9 | 68 | 50 | 18.2 |
| 39 | 23 | 11 | 53.6 | 68 | 51 | 10.1 |
| 40 | 23 | 11 | 59.2 | 68 | 51 | 16.1 |
| 41 | 23 | 11 | 59.8 | 68 | 49 | 27.1 |
| 42 | 23 | 12 | 00.0 | 68 | 50 | 31.2 |
| 43 | 23 | 12 | 04.9 | 68 | 51 | 11.2 |
| 44 | 23 | 12 | 05.6 | 68 | 51 | 06.2 |
| 45 | 23 | 12 | 09.0 | 68 | 50 | 04.5 |
| 46 | 23 | 12 | 09.8 | 68 | 50 | 08.2 |
| 47 | 23 | 12 | 11.5 | 68 | 49 | 44.6 |
| 48 | 23 | 12 | 11.6 | 68 | 49 | 59.6 |
| 49 | 23 | 12 | 11.9 | 68 | 51 | 00.3 |
| 50 | 23 | 12 | 12.5 | 68 | 49 | 16.3 |
| 51 | 23 | 12 | 13.4 | 68 | 51 | 02.2 |
| 52 | 23 | 12 | 13.8 | 68 | 50 | 41.0 |
| 53 | 23 | 12 | 14.3 | 68 | 49 | 33.1 |
| 54 | 23 | 12 | 14.4 | 68 | 50 | 56.2 |
| 55 | 23 | 12 | 14.8 | 68 | 50 | 29.9 |
| 56 | 23 | 12 | 15.7 | 68 | 49 | 35.3 |
| 57 | 23 | 12 | 15.9 | 68 | 49 | 11.4 |
| 58 | 23 | 12 | 19.5 | 68 | 48 | 42.2 |
| 59 | 23 | 12 | 21.2 | 68 | 49 | 00.1 |
| 60 | 23 | 12 | 22.1 | 68 | 52 | 00.8 |

| | Latitude | | | Longitude | | |
|-----|----------|----|------|-----------|----|------|
| | dd | mm | ss | dd | mm | ss |
| 61 | 23 | 12 | 22.2 | 68 | 48 | 16.0 |
| 62 | 23 | 12 | 23.7 | 68 | 50 | 58.8 |
| 63 | 23 | 12 | 28.9 | 68 | 50 | 44.4 |
| 64 | 23 | 12 | 33.3 | 68 | 51 | 37.1 |
| 65 | 23 | 12 | 37.3 | 68 | 51 | 09.3 |
| 66 | 23 | 12 | 42.8 | 69 | 00 | 17.8 |
| 67 | 23 | 12 | 43.8 | 68 | 48 | 59.6 |
| 68 | 23 | 12 | 44.2 | 69 | 03 | 01.3 |
| 69 | 23 | 12 | 45.0 | 68 | 48 | 38.2 |
| 70 | 23 | 12 | 47.6 | 68 | 50 | 26.3 |
| 71 | 23 | 12 | 48.0 | 68 | 50 | 48.9 |
| 72 | 23 | 12 | 49.3 | 68 | 50 | 35.9 |
| 73 | 23 | 12 | 49.8 | 68 | 51 | 59.3 |
| 74 | 23 | 12 | 50.0 | 68 | 51 | 52.0 |
| 75 | 23 | 12 | 50.5 | 68 | 58 | 00.5 |
| 76 | 23 | 12 | 51.6 | 68 | 55 | 20.4 |
| 77 | 23 | 12 | 51.9 | 68 | 55 | 20.4 |
| 78 | 23 | 12 | 59.8 | 68 | 59 | 20.8 |
| 79 | 23 | 13 | 00.9 | 68 | 58 | 11.6 |
| 80 | 23 | 13 | 04.1 | 68 | 51 | 03.0 |
| 81 | 23 | 13 | 08.8 | 68 | 49 | 25.5 |
| 82 | 23 | 13 | 13.2 | 68 | 50 | 06.7 |
| 83 | 23 | 13 | 15.8 | 68 | 47 | 36.6 |
| 84 | 23 | 13 | 17.4 | 68 | 57 | 10.4 |
| 85 | 23 | 13 | 19.4 | 68 | 57 | 23.9 |
| 86 | 23 | 13 | 20.8 | 68 | 58 | 04.9 |
| 87 | 23 | 13 | 24.5 | 68 | 57 | 47.8 |
| 88 | 23 | 13 | 25.4 | 68 | 59 | 05.2 |
| 89 | 23 | 13 | 25.5 | 68 | 57 | 27.5 |
| 90 | 23 | 13 | 27.1 | 68 | 57 | 28.0 |
| 91 | 23 | 13 | 30.4 | 68 | 59 | 10.9 |
| 92 | 23 | 13 | 30.7 | 68 | 58 | 21.1 |
| 93 | 23 | 13 | 33.4 | 68 | 57 | 14.1 |
| 94 | 23 | 13 | 33.5 | 68 | 59 | 41.7 |
| 95 | 23 | 13 | 36.1 | 68 | 57 | 52.8 |
| 96 | 23 | 13 | 37.7 | 68 | 59 | 16.3 |
| 97 | 23 | 13 | 38.9 | 68 | 58 | 25.1 |
| 98 | 23 | 13 | 39.8 | 68 | 58 | 42.6 |
| 99 | 23 | 13 | 44.5 | 69 | 00 | 17.5 |
| 100 | 23 | 13 | 45.8 | 68 | 58 | 21.0 |
| 101 | 23 | 13 | 46.6 | 68 | 57 | 53.2 |
| 102 | 23 | 13 | 48.9 | 68 | 58 | 23.1 |
| 103 | 23 | 13 | 50.7 | 68 | 59 | 30.9 |
| 104 | 23 | 13 | 56.9 | 68 | 57 | 03.8 |
| 105 | 23 | 14 | 00.0 | 68 | 58 | 12.3 |
| 106 | 23 | 14 | 02.7 | 68 | 57 | 38.8 |
| 107 | 23 | 14 | 05.6 | 68 | 57 | 48.0 |
| 108 | 23 | 14 | 08.1 | 68 | 58 | 14.6 |
| 109 | 23 | 14 | 11.3 | 69 | 01 | 03.2 |
| 110 | 23 | 14 | 25.1 | 69 | 01 | 16.7 |
| 111 | 23 | 14 | 27.3 | 68 | 58 | 00.5 |
| 112 | 23 | 14 | 42.2 | 68 | 59 | 26.4 |
| 113 | 23 | 14 | 44.1 | 69 | 01 | 00.0 |
| 114 | 23 | 15 | 09.1 | 68 | 56 | 27.3 |
| 115 | 23 | 15 | 11.3 | 68 | 55 | 31.3 |
| 116 | 23 | 15 | 42.6 | 68 | 55 | 33.7 |
| 117 | 23 | 15 | 49.8 | 68 | 55 | 56.2 |
| 118 | 23 | 17 | 09.8 | 68 | 54 | 14.4 |

dd - degree; mm - minute; ss - second

* Many times, more than one bird was sighted at the same locations

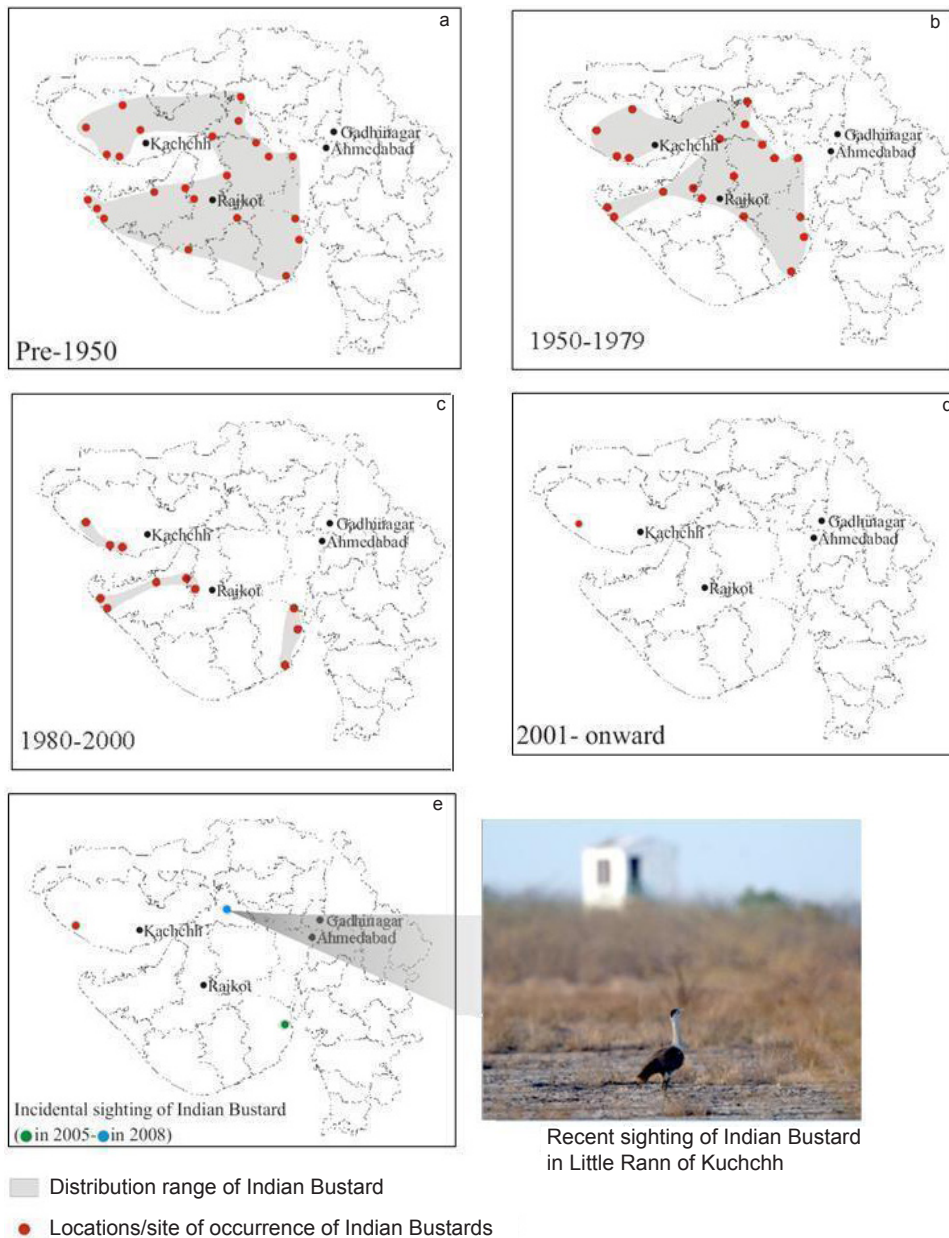


Figure 3. Shrinking of distribution range of Indian Bustard in Gujarat. Maps adapted from 3(a) - Dharmakumarsinhji (1957); 3(b) - Rahmani & Manakadan (1990); 3(c) - Rahmani & Manakadan (1990) and Rahmani (2001); Incidental sightings of the species of 2005 and 2008 have not been shown in the map which indicates 3(d) - distribution from 2001 onwards; 3(e) - Based on present study and incidental sighting.

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