PROGRESS REPORT 2011

Assessing the Possibilities of Restoring the Habitat and Population of Great Indian Bustard (Ardeotis nigriceps) in Sokaliya area of Ajmer District

FES
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ASSESSING THE POSSIBILITIES OF RESTORING THE HABITAT AND POPULATION OF GREAT INDIAN BUSTARD (ARDEOTIS NIGRICEPS) IN SOKALIYA AREA OF AJMER DISTRICT, RAJASTHAN

PROGRESS REPORT

SUBMITTED BY
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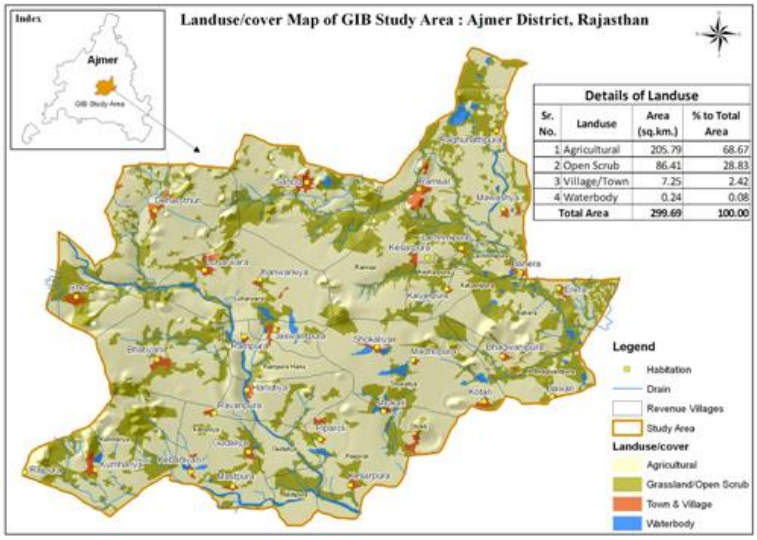
CONTENT

1 STATUS OF GREAT INDIAN BUSTARD IN INDIA

The endangered Great Indian Bustard (Ardeotis nigriceps) is highly endemic to the Indian Subcontinent but now this bird is facing serious threats of extinction from habitat conversion to agriculture, infrastructural development, and hunting (Rahmani 1989, IUCN 2008). Mostly this bird is seen in the grassy plains, sometimes overgrazed by livestock or wild herbivores, and strictly avoided hilly and forest regions (Ali & Ripley 1987, Rahmani 1989). The estimated population was 1260 in 1969 (Dharmakumarsinhji 1971) which has dwindled down to around 600 individuals at the turn of the millennium (Birdlife International 2001). Presently 300-350 (Rahmani 2006) are surviving restricted to isolated pockets in Rajasthan, which holds the largest global population of around 150 -175 (Dutta et al. 2010) followed by Maharashtra, Andhra Pradesh, Gujarat, Karnataka and Madhya Pradesh (Dutta et al. 2010) which holds populations of less than 35 birds each (Birdlife International 2001).

2 STATUS OF SOKALIYA, AJMER, RAJASTHAN

Sokaliya is located in the central part of Ajmer district and has been identified as an Important Bird Area (Zafar-Il Islam and Rahmani 2005) mainly for the conservation of GIB, Lesser Florican and other grassland birds, (Map 1), where once nearly 30 birds were supposed to be present (Rahmani 1989). Presently it is reported that only 25-30 birds survive in Ajmer, Pali and Tonk districts (Dutta et al. 2010).



Based on the secondary information and peoples' knowledge it was found that earlier birds used the village environs of Sokaliya and other 27 adjoining villages (Map 1) and hence the term Shokliya landscape. The small population of birds were said to use the community grasslands or Panchayat grazing lands, revenue lands and the agricultural lands including the fallow lands also. In the recent years the quality of the agro-pastoral landscape has deteriorated significantly, reasons being high degradation of Panchayat grazing lands and revenue lands due to overgrazing, encroachment by shrubs and trees, encroachment for agriculture by locals and mining for Feldspar.

In view of its conservation significance the Rajasthan Forest Department had a few years ago sought to have the area notified as a protected area, mainly as a "Community Reserve," but failed in the endeavour due to resistance from local communities (Personal Communication Rajasthan Forest Department). It is said that mining interests spread a fear of loss of access to the lands by local communities in the event of a protected area being declared and hence the opposition from the local community.

3 THE PROJECT

Considering the fact that even small population is very crucial for conservation, and the level of degradation of this argo-pastoral habitat, the Rajasthan State Forest Department discussed with the Foundation for Ecological Security (FES) the possibilities of conserving the GIB habitat and ways

in which conservation objectives may be achieved also allaying community fears around loss of use and access to the landscape.

With this in mind FES initiated the present study in October 2009 with the funding support of Rufford Small Grants, UK. The main aim was to "Assess the feasibility of restoring the Grasslands/Grazing lands through local people's participation both in protecting and managing them for Great Indian Bustard and their fodder security." It is a "Species and Habitat Restoration/ Recovery Perspective," with the following objectives:

- Assess the present status of GIB in the area
- Identify the cluster of habitats (villages) for the conservation initiative based on GIB presence and distribution.
- Assess the existing status of the habitat including its biomass productivity.
- Assess the existing threats in the cluster pertaining to grasslands and GIB.
- Assess the possibility of restoration and management of grasslands through peoples' participation

4 PRESENT STATUS OF GIB IN SOKALIYA: STUDY REPORT

Monitoring for GIB was done every month by perambulating through the different village environs covering all grazing lands, other village common lands and the agriculture lands. Whenever a bird was sighted information on the habitat in which seen, total number of birds seen, their age and sex composition along with time of sighting, the threats in the area and GPS locations were recorded.

The total number of GIB seen each month was derived through two basic considerations:

1. The maximum number of birds recorded in each age and sex class in a day of the month.

2. If there were two sightings in a day at two different sites, then depending upon the time of sightings (usually if both sightings were within an hour's time) and the distance between two sightings of GIB was taken care of. The aspect of direction of movement of the birds was also taken care while deriving the number of birds. The breeding season of GIB in the area was from mid June to November (includes monsoon and post monsoon periods), while the rest of the months were considered as non-breeding season.

On the whole, the 14 months (November '09 to January '11) of monitoring resulted in 15 GIBs from 29 sightings. Of which 20 sightings were in the breeding season and only nine sightings were in non-breeding season with no GIBs seen in January and February (2010), thus clearly showing that GIB still uses this area just for breeding and also that it is a very rare visitor during non-breeding season (Table 1).

Table 1: No. of Sightings and Status of Great Indian Bustard in Sokaliya

Month	B/NB	No. of Sightings	Number of						Total
			AI	AJ	SAI	SAJ	Juvenile	Chick	
March	NB	3	1	4	0	0	0	0	5
April	NB	1	0	2	1	0	0	0	3
May	NB	2	1	3	0	1	0	0	4
June	B	2	2	0	0	0	0	0	2
July	B	3	2	2	0	0	0	0	4
August	B	4	2	7	2	2	0	0	13
September	B	3	1	3	2	2	0	0	10
October	B	3	0	6	1	1	0	2	10
November	B	5	2	7	2	1	0	2	14
December	NB	3	1	4	1	2	2	0	10
Total		**29**	**2**	**7**	**2**	**2**	**2**		**15**

Based on the maximum number of birds seen, the total number of individual recorded in Sokaliya during this study was 15 of which two were adult males, seven adult females, two sub-adult males, two sub adult females and two juveniles (Table 1).

The analysis of breeding and non-breeding population data showed that during non-breeding season, total 10 birds were found to use this area of which one was adult male, four adult females, one sub-adult male, two sub-adult females and two Juveniles. Similarly during breeding season 15 individuals were recorded in the area, which included two adult males, seven adult females, two sub adult males, two sub-adult females and two chicks (Table 2).

Table 2: No. of Sightings and Status of Great Indian Bustard in Different Seasons

Month	No. of Sightings	Number of						Total
		AI	AJ	SAI	SAJ	Juvenile	Chick	
Non-Breeding	9	1	4	1	2	2	0	10
Breeding	20	2	7	2	2	0	2	15
Total	**29**	**2**	**7**	**2**	**2**	**2**		**15**

The presence of two chicks clearly showed that the bird still breeds in this area and the two juvenile birds seen in December could be the grown up chicks. However, seven adult females were seen during breeding season but only two chicks were seen, so it could be possible that the other females did not breed or probably they had nested but did not hatch successfully, which could be due to disturbance to the nest resulting in desertion of the nest. The typical breeding habitat preferred by nesting GIB females occurs in undisturbed grasslands, characterized by a mosaic of less grazed and relatively tall grass (Dutta and Jhala unpublished data in Dutta et al. 2010). In the case of the Sokaliya landscape however with the degradation of the grassland area the GIB in the present in the agriculture lands using the crops as cover. With the farmers continuously moving in their lands during the daytime, it is inevitable that breeding females would be disturbed, which may be the cause of desertion. Though the exact reason could not be determined, it is very important to secure habitat and disturbance free sites be established for these females to breed successfully as most of the ground nesting birds prefer undisturbed habitat for nesting.

5 IDENTIFICATION OF HABITAT – VILLAGES BASED ON GIB PRESENCE AND DISTRIBUTION

The main or intensive used cluster of villages from the 28 villages, where the birds were said to be present earlier, was identified based on the sightings of the GIB during this study and the information given by the grazers and other villagers on the sightings of the species. Demarcation of villages showed that GIB was found to use Ramsar, Sanod, Kesarpura, Kalyanipura, Sokaliya and Behra villages more intensively, that clearly depicts areas of these villages are very crucial for the conservation of GIB in the region. While trying to demarcate the cluster, it was found that Lachhmipura and Bhagwantpura villages were either in between these selected villages or had large area with grass (Bhagwantpura) lying contiguous with Sokaliya and Behra (Map 2). Here, it was very crucial to identify the cluster of villages / habitats or a large landscape for the conservation perspective, as it was clearly stated by Rahmani (2006) that even if we are able to save small patches of grasslands in bits and pieces, it cannot guarantee long-term survival of bustards or floricans, added that we may be able to save relic populations, which will always be in danger of extinction.

5.1 Land Use Status of the Intensive GIB Use Area

The overall land use of the eight GIB use villages was dominated by agriculture lands, which occupied 86 km^2 (63.1%) of the total (136.29 km^2) extent of land of the cluster of villages, where major portions were cultivated (rain fed cultivation) only during rainy season. Local communities mainly grow maize, jowar and wheat. In discussions with farmers, when the rainfall was better, groundnut and black gram (chana) was grown in large quantities, but now due to change in climate and rainfall pattern, these crops have been replaced by less water intensive mung dal. The grasslands, which are mainly the Panchayat grazing lands and the revenue lands, the main GIB habitat, ar These are interspersed with the agriculture lands and cover a total area of 47.41 km^2 that formed 34.8 % of the total area of the cluster. The third land use was the habitation area and it extended to 2.87 km^2 and the fourth land use, water bodies that was present only in Ramsar vouched for 0.04 km^2 (Table 3), thus showing that water availability for the birds is less.

In this agro-pastoral bustard landscape, Ramsar had the largest (17.04 km2) grassland & open scrub, followed by Sanod (9.14 km2), Behra (7.41 km2), Sokaliya (5.23 km2) and others (Table 3). These are the main habitat for the birds in addition to the agriculture areas.

Table 3: Extent (km2) and Relative % of Different Land Use in Intensive GIB Use Areas

Village	Agriculture		Grassland & Open Scrub		Village/Town		Water Bodies		Over all
			Extent (km2)	Relative %	Extent (km2)	Relative %	Extent (km2)	Relative %	
Ramsar	30.69	62.8	17.04	34.9	1.12	2.3	0.04	0.1	**48.89**
Sanod	14.93	60.7	9.14	37.2	0.54	2.2	0.00	0.0	**24.60**
Kesarpura [2]	2.24	55.3	1.81	44.6	0.01	0.2	0.00	0.0	**4.06**
Kalyanipura	1.54	69.8	0.61	27.7	0.05	2.5	0.00	0.0	**2.21**
Behra	9.79	56.5	7.41	42.7	0.14	0.8	0.00	0.0	**17.33**
Sokaliya	18.45	76.0	5.23	21.6	0.58	2.4	0.00	0.0	**24.26**
Bhagwantpura	6.27	59.3	4.07	38.5	0.24	2.3	0.00	0.0	**10.58**
Lachhmipura	2.05	47.3	2.10	48.3	0.19	4.5	0.00	0.0	**4.35**
Total	**86**		**47.41**		**2.87**		**0.04**		**136.29**

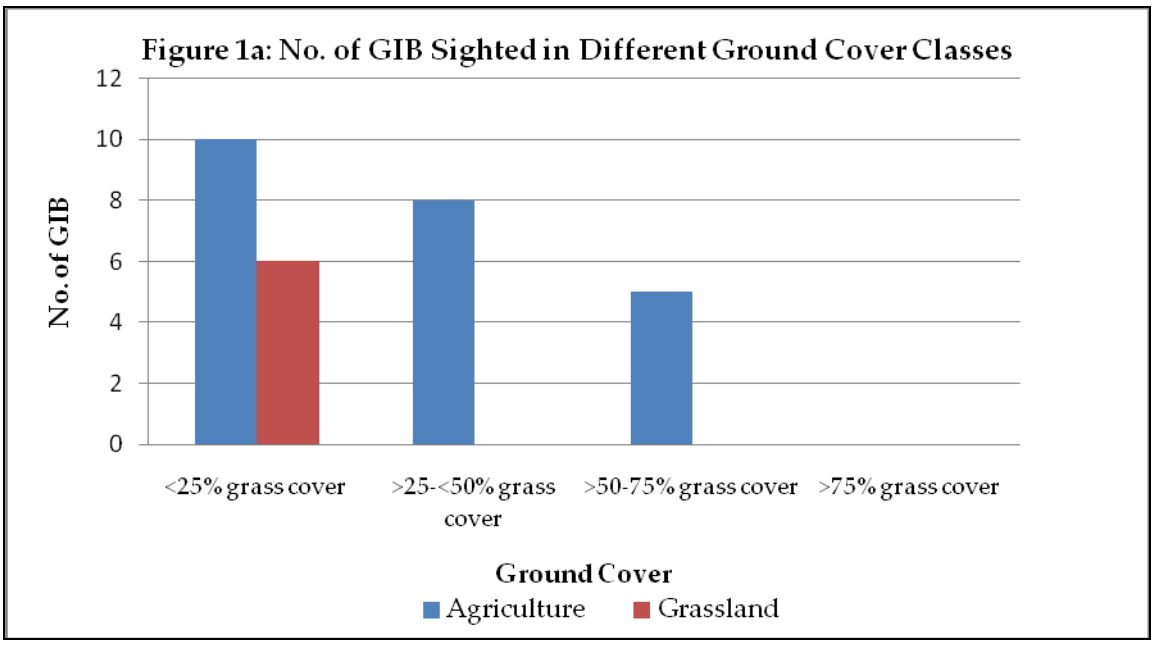
1- Ramsar, 2- Sanod, 3- Kesarpura, 4- Kalyanipura, 5- Behra, 6- Sokaliya, 7- Bhagwantpura, 8- Lachhmipura

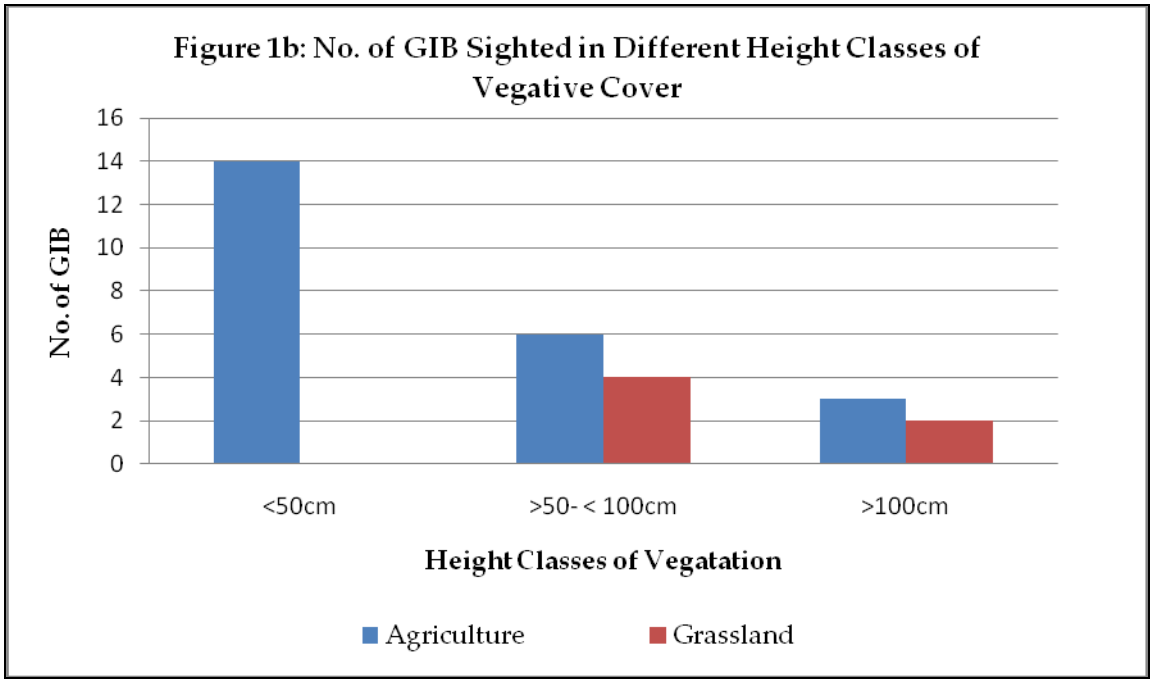
5.2 Habitat Use by GIB in the Intensive Use Area

Out of our 29 sighting, 23 were in agricultural lands that resulted in counting 15 birds, while the remaining six sightings were in grasslands resulting in only four different individuals. This fact could be attributed to bad quality of grassland or probably these grasslands were not suitable for the birds. Further, presence of chicks and juveniles in agricultural lands showed that GIB probably nests in this land use. This was the same when sightings in different seasons were considered, with more sightings and birds recorded from agricultural lands than from grasslands (Table 4). All this was probably due to the presence of more shrubs, trees and P.chilensis and low grass cover in the grasslands.

Table 4: Habitat / Land use used by GIB in Breeding and Non-Breeding Seasons in Sokaliya

Month		Total	No. of Sightings							Mean No. of P. chilensis + SE
			Grass (Vegetation) Cover				Height of Vegetation Cover			
			<25%	>25-<50%	>50-75%	>75 %	<50cm	>50- < 100cm	>100cm	
Breeding	Agriculture	17	4	8	5	0	9	5	3	0.65+0.17
	Grassland	3	3	0	0	0	0	3	0	2+0
Non-Breeding	Agriculture	6	6	0	0	0	5	1	0	0.83+0.31
	Grassland	3	3	0	0	0	0	1	2	0.33+0.33
Total	**Agriculture**	**23**	**10**	**8**	**5**	**0**	**14**	**6**	**3**	**0.7+0.2**
	Grassland	**6**	**6**	**0**	**0**	**0**	**0**	**4**	**2**	**1.2+0.4**





6 EXISTING STATUS AND PRODUCTIVITY POTENTIAL OF THE GRASSLANDS

Plots of varying size, tree (>20 cm) 15m radius, shrubs, climbers and tree recruitment (ht>50 cm & gbh <20cm) 8m radius and for grass and herb, five 1x1m plots, were used to assess the vegetation. The ground biomass was estimated by using two 30 x30 cm in each 1x1m plots where the grass and herb was removed and weighted to nearest gram. The ground or grass and herb cover in the grassland was assessed through line intercept method in each 1x1m plot, based on which the percentage cover was estimated. These plots were nested and laid at every 150 m interval starting from one end of the grassland and ending at the other end. The Global Positioning System (GPS) was used to record the co-ordinates of each sample point. Care was taken to cover the longest stretch of the grassland. The number of plots varied according to the length and size of the grazing lands. The biomass and ground cover was assessed, both before and after the rainy season at the same points, while trees, shrubs, climbers and recruitment was quantified before rains.

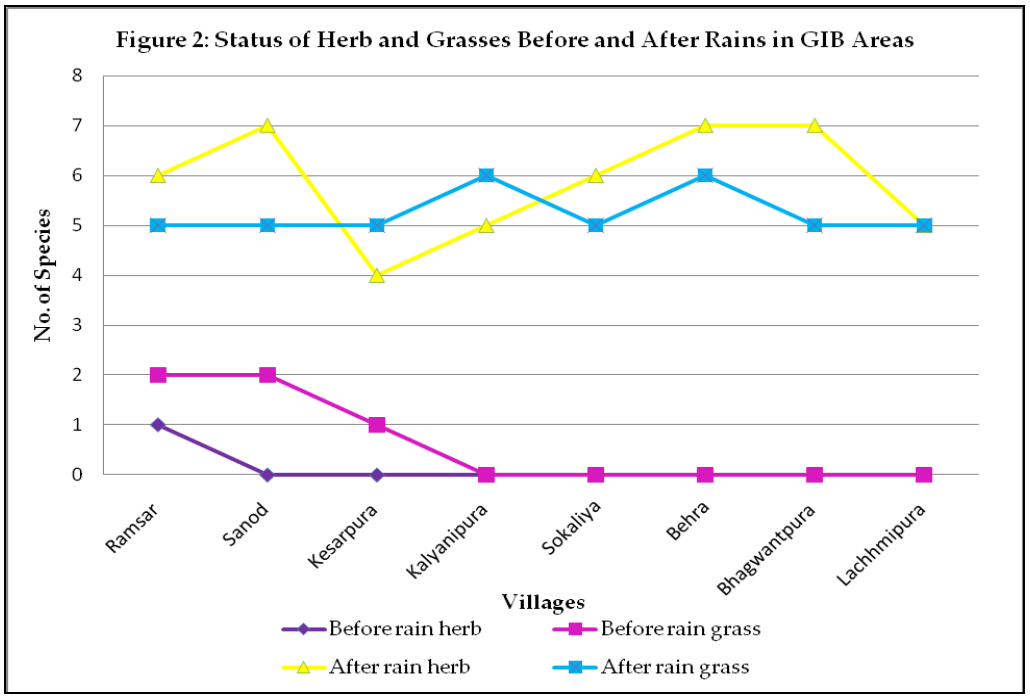
6.1 Richness of Plants in GIB Use Areas

The overall richness of plants in the cluster before rains was 14 species of which seven were trees, three shrubs, one herb and three grass species compared to 25 plants species after rains of which trees (seven species) and shrubs (three) were the same as that recorded before rains, while herbs and grass increased by seven and four species respectively, thus totalling to eight herbs and seven grass species. This resulted in an increase of 11 species (Table 6).

As discussed above however, the number of tree and shrub species was the same before and after rains, an increase in the richness of herb and grass species was recorded in all the eight grazing lands after rains (Figure 2). The total number of plant species in all the eight grazing lands increased by eight species in Ramsar, 10 in Sanod, eight in Kesarpura, 11 in Kalyanipura, 11 in Sokaliya, 13 in Behra, which was the maximum increase, 12 in Bhagwantpura and 10 in Lachhmipura (Table 6). The grass and herb grows during rains but due to over grazing these species are never allowed to flower and seed due to which these are not abundant.

Table 6: Richness of Plants in the Grasslands of GIB Use Areas

Village	No. of Species										Increase in Species between - before & after rains
	Before Rains					After Rains					
	Tree	Shrub	Herb	Grass	Total	Tree	Shrub	Herb	Grass	Total	
Ramsar	2	3	1	2	8	2	3	6	5	16	8
Sanod	3	2	0	2	7	3	2	7	5	17	10
Kesarpura	5	1	0	1	7	5	1	4	5	15	8
Kalyanipura	4	2	0	0	6	4	2	5	6	17	11
Sokaliya	5	2	0	0	7	5	2	6	5	18	11
Behra	5	1	0	0	6	5	1	7	6	19	13
Bhagwantpura	6	1	0	0	7	6	1	7	5	19	12
Lachhmipura	5	1	0	0	6	5	1	5	5	16	10
Total	**7**	**3**	**1**	**3**	**14**	**7**	**3**	**8**	**7**	**25**	**11**



6.2 Status of Tree species

6.2.1 Density of Trees

The trees (>20cm gbh) were recorded in five of the intensively used eight grazing lands, which were represented by three species at an overall density of 16.7/ha. The maximum tree density of 36.4/ha was found in Sokaliya that had only two tree species of which Acacia nilotica had maximum density (22.7/ha). This was followed by 26 trees/ha recorded in Behra grazing land, in which all three species were found, with A. leucophloea recording the maximum density of 20.3/ha. The third highest tree density of15.9/ha was noted in Bhagwantpura grazing land, which also had two species. Among rest of the grazing lands, Sanod and Kesarpura were with only one tree species at a density of 12.7/ha and 8/ha respectively, while in other three there were no trees of >20cm gbh (Table 7).

Table 7: Density (in ha) of Trees in GIB area

Species	1	2	3	4	5	6	7	8	Overall
Acacia leucophloea	-	12.7	8.0	-	13.6	20.3	11.9	-	8.9
Acacia nilotica	-	-	-	-	22.7	2.9	4.0	-	4.2
Capparis deciduas	-	-	-	-	-	2.9	-	-	0.6
Total	**-**	**12.7**	**8.0**	**-**	**36.4**	**26.0**	**15.9**	**-**	**16.7**

1- Ramsar, 2- Sanod, 3- Kesarpura, 4- Kalyanipura, 5- Behra, 6- Sokaliya, 7- Bhagwantpura, 8- Lachhmipura

6.2.2 Density of Recruitment of Tree Species

The recruitment (height of >0.5m to <2m and <20 cm gbh) of trees in these eight grazing lands led by Lachhmipura that had the highest density of tree recruitment (1082.3/ha) represented by five species and Balanites aegyptiaca with the maximum density of 933.3/ha, among these, followed by Bhagwantpura (five species) with density of 657.8/ha, Kesarpura 260.6/ha (five species) and Kalyanipura 211.6/ha (four species). The least density of 62.1/ha was recorded in Sanod and 69.5/ha in Ramsar. The overall tree recruitment density in the GIB landscape was 317.7/ha, thus clearly showing that all the grazing lands are being encroached by trees and shrubs, which would form visual interference to the GIB. Further, it is also evident that Prosopis chilensis, an exotic and invasive species was found in all the eight grazing lands at a minimum of 12.4/ha in Bhagwantpura and maximum of 111.7/ha in Kesarpura (Table 8). There was no addition to recruitment after rains.

Table 8: Density (in ha) of Tree Recruitment in GIB area

Species	1	2	3	4	5	6	7	8	Overall
Acacia leucophloea	-	-	24.8	-	-	4.5	6.2	9.9	5.2
Acacia nilotica	-	12.4	-	74.5	-	-	-	-	7.3
Acacia tortalis	-	-	-	-	-	-	-	-	-
Balanites aegyptiaca	-	-	-	-	-	-	508.9	933.6	183.3
Capparis deciduas	-	-	37.2	37.2	63.8	63.2	124.1	79.4	59.4
Maytenus emarginatus	-	-	62.1	-	-	-	-	-	5.2
Prosopis cineraria	29.8	-	24.8	24.8	7.1	22.6	6.2	9.9	15.6
Prosopis chilensis	39.7	49.7	111.7	74.5	21.3	31.6	12.4	49.6	41.7
Total	**69.5**	**62.1**	**260.6**	**211.6**	**92.2**	**121.9**	**657.8**	**1082.3**	**317.7**

1- Ramsar, 2- Sanod, 3- Kesarpura, 4- Kalyanipura, 5- Behra, 6- Sokaliya, 7- Bhagwantpura, 8- Lachhmipura

6.3 Status (Density) of Shrub in GIB area

In total three species of this life form was recorded from the GIB use areas, which were found at an overall density of 225.0/ha, with Ziziphus nummularia being the most dominant with density of 208.3/ha. Among the different grazing lands, Bhagwantpura had the highest shrub density of 1076/ha represented by only one species, followed by Ramsar 168.8/ha (two species), Sanod 148.9/ha (three species), Sokaliya 134.8/ha (two species) and Kalyanipura 86.9/ha (two species) (Table 9). This also clearly shows that the grasslands or grazing lands are being encroached by shrubs, which would be a hindrance for the GIB.

Table 9: Density (in ha) of Shrubs in the GIB Use Areas

Species	1	2	3	4	5	6	7	8	Overall
Calotropis procera	-	12.4	-	-	-	-	-	-	1.0
Leptadenia reticulata	148.9	111.7	12.4	12.4	14.2	-	-	-	15.6
Ziziphus nummularia	19.9	24.8	-	74.5	120.6	4.5	1067.4	19.9	208.3
Total	**168.8**	**148.9**	**12.4**	**86.9**	**134.8**	**4.5**	**1076.4**	**19.9**	**225.0**

1- Ramsar, 2- Sanod, 3- Kesarpura, 4- Kalyanipura, 5- Behra, 6- Sokaliya, 7- Bhagwantpura, 8- Lachhmipura

6.4 Status of Ground Cover

The ground cover was assessed to know the status of the spread of the ground vegetation, i.e., what percent of the area is covered with grass and herb and how much of the area is barren.

6.4.1 Status of Ground Cover before rains

The sampling carried out before rains indicated that cover was recorded only in Ramsar, Sanod and Kesarpura grazing lands and the overall percent cover was only 2.55%, thus showing that these grazing lands were totally barren before rains. The major contribution was from the short grass species C. dactylon. Among the three grasslands where cover was recorded Sanod had a maximum cover of 27 %, while the other two areas had ground cover of <10 % (Table 10).

Table 10: Status of Ground Cover (%) in the Grasslands of GIB Use Areas

Species	1	2	3	4	5	6	7	8	Overall
Aristida adscensionis	2.30	-	5.80						0.40
Cynodon dactylon	5.60	26.70						-	2.10
Desmostachya bipinnata	-	0.30						-	0.02
Indigofera cordifolia	0.60	-						-	0.03
Total	**8.50**	**27.00**	**5.80**						**2.55**

1- Ramsar, 2- Sanod, 3- Kesarpura, 4- Kalyanipura, 5- Behra, 6- Sokaliya, 7- Bhagwantpura, 8- Lachhmipura

6.4.2 Status of Ground Cover after rains

The assessment of ground cover after rains indicated presence of seven grass species and eight herb species and a considerable increase in ground cover compared to that recorded before rains. The overall ground cover after rains was 41.7%, from which it is apparent that nearly 60 % of the area is barren and shows the state of degradation of the grasslands in the GIB use areas, which was mainly due to over grazing, spread of P. chilensis, trees, shrubs and encroachment for agriculture and mining. Similar trend was also observed in the eight grasslands used by GIB, with maximum ground cover recorded in Sanod (44.7%) followed by Kalyanipura (42.7%).

The lowest ground cover of 35.4% and 36.7% was recorded in Ramsar and Bhagwantpura respectively (Table 11). This showed that in all the grasslands there are larger stretches, which are barren, while the presence of 15 grass and herb species provides insight that there is potential for restoring these grazing or grasslands, which is degraded mainly due to over grazing and absence or weak community institutions being unable or unwilling to manage the grasslands.

Table 11: Status of Ground Cover (%) in Different Grasslands of GIB Intensive Use Areas

Species	Lifeform	1	2	3	4	5	6	7	8	Overall
Aristida adscensionis	Grass	11.0	-	12.1	10.3	8.3	8.7	9.5	8.2	9.5
Cynodon dactylon	Grass	9.0	16.0	-	12.3	10.5	6.9	5.5	5.3	8.2
Desmostachya bipinnata	Grass	-	7.2	7.7	6.4	5.3	-	-	5.3	4.1
Aristida funiculate	Grass	-	5.2	8.6	7.4	3.3	4.6	4.8	7.4	5.4
Cenchrus ciliaris	Grass	4.0	6.4	-	4.2	4.8	5.9	-	-	3.7
Dichanthium annulatum	Grass	3.0	4.2	4.3	-	3.3	4.6	4.8	-	3.1
Melanocenchris jacquemontii	Grass	2.0	-	-	-	-	4.6	5.5	6.2	2.3
Justicia procumbens	Herb	-	1.2	1.0	0.6	0.7	-	-	1.1	0.7
Xanthium strumarium	Herb	-	0.8	-	0.5	0.7	0.6	1.3	0.7	0.7
Cassia tora	Herb	1.2	0.7	1.3	0.3	0.9	0.6	1.3	1.1	0.9
Indigofera cordifolia	Herb	1.1	1.2	-	-	1.5	-	0.9	1.1	0.7
Lepidogathis cristata	Herb	0.6	-	-	0.2	-	1.1	0.9	-	0.5
Tridax procumbens	Herb	1.2	0.7	1.2	-	0.4	1.1	0.9	0.7	0.7
Convolvulus prastratus	Herb	1.0	0.4	-	0.5	-	1.1	0.9	0.7	0.7
Euphorbia hirta	Herb	1.3	0.7	1.4	-	0.4	-	0.9	0.7	0.7
Total		**35.4**	**44.7**	**37.6**	**42.7**	**40.2**	**39.8**	**36.7**	**38.5**	**41.7**

1- Ramsar, 2- Sanod, 3- Kesarpura, 4- Kalyanipura, 5- Behra, 6- Sokaliya, 7- Bhagwantpura, 8- Lachhmipura

6.5 Status of Grass Biomass

It is important to assess the biomass production of these grasslands, as it is very crucial when it come to restoration of these, as the local livestocks are dependent on them.

6.5.1 Status of Grass Biomass before rains

Before rains grass species was recorded only in three, Ramsar, Sanod and Kesarpura out of the eight grazing lands, and was represented by only three species. The overall biomass estimated was 35.2 kgs/ha, with the major contribution from the short perennial grass species Cynodon dactylon (30.7 kgs/ha). The maximum biomass among the three grasslands was recorded in Sanod (86.4 kgs/ha) with main contribution from C. dactylon, while other two had very low biomass (Table 12). This clearly shows that the productive potential of these grasslands presently is very poor.

Table 12: Biomass Recorded in Different Grasslands of GIB Intensive Use Areas

Species	1	2	3	4	5	6	7	8	Total
Aristida adscensionis	5.6	-	11.1	-	-	-	-	-	4.4
Cynodon dactylon	11.1	84.4	-	-	-	-	-	-	30.7
Desmostachya bipinnata	-	2.2		-	-	-	-	-	0.1
Overall	16.7	86.4	11.1	-	-	-	-	-	35.2

1- Ramsar, 2- Sanod, 3- Kesarpura, 4- Kalyanipura, 5- Behra, 6- Sokaliya, 7- Bhagwantpura, 8- Lachhmipura

6.5.2 Status of Grass Biomass after rains

The assessment of grass biomass after rains revealed that on the whole seven species of grass were present in the eight grasslands with an account of a total biomass of 162.7 kgs/ha. Among the different grasslands Sanod recorded the maximum biomass of 197.9 kgs/ha with the short grass Cynodon dactylon contributing 102.4 kgs/ha of the total, followed by Ramsar, with 187.2 kgs/ha, Kalyanipura (158.7 kgs/ha) and Kesarpura (154.8 kgs/ha). The lowest biomass of 97.7 kgs/ha and 98.7 kgs/ha was recorded from Lachhmipura and Bhagwantpura respectively (Table 13). This clearly showed that even after rains the production of these grasslands is very low and poor. This condition is mainly due to uncontrolled and overgrazing by the livestock and less growth of grass, but the most encouraging and emerged fact is that with proper management and protection the productivity of these grazing lands can be improved and increased. The grass species presently found in these grasslands are dominated by thin and short grass that is not suitable for the GIB.

Table 13: Biomass Recorded in Different Grasslands of GIB Intensive Use Areas

Species	1	2	3	4	5	6	7	8	Total
Aristida adscensionis	54.6	-	46.1	39.3	25.7	26.8	29.2	24.1	34.4
Cynodon dactylon	66.3	102.4	-	48.3	32.5	23.9	17.1	18.3	43.7
Desmostachya bipinnata		22.2	38.4	24.3	17.3			19.4	17.1
Aristida funiculate	-	30.7	56.6	26.4	19.3	16.6	17.4	16.6	21.7
Cenchrus ciliaris	21.5	24.4		20.2	16.2	25.9			18.6
Dichanthium annulatum	20.2	18.2	17.3		20.4	19.2	16.7		14.3
Melanocenchris jacquemontii	24.6					19.4	18.3	19.3	12.9
Total	**187.2**	**197.9**	**154.8**	**158.7**	**131.4**	**131.8**	**98.7**	**97.7**	**162.7**

1- **Ramsar**, 2- **Sanod**, 3- **Kesarpura**, 4- **Kalyanipura**, 5- **Behra**, 6- **Sokaliya**, 7- **Bhagwantpura**, 8- **Lachhmipura**

7 THREATS TO GRASSLANDS AND GREAT INDIAN BUSTARD

The threats prevailing in the grasslands or the agro-pastoral landscape were recorded while assessing the habitat as well as when the birds were sighted. This was further substantiated by the information on the threats acquired through regular meetings and discussions with the local communities.

7.1 Overgrazing

The main reason for the decline in GIB population is the degradation of the grassland habitat. Both the panchayat grazing lands and the revenue lands which once provided ideal GIB habitat have greatly deteriorated due to the absence or disappearance of management practices resulting in uncontrolled grazing. Until a few decades ago most of the villages had systems to protect the grazing/ grasslands during the four months of rainfall from July to October, some of the villages even practised rotational grazing, all of which has disappeared. Now the entire 14,582 (3205 cattle, 3630 buffalos, 4738 sheep and 4177 goats) livestock population (Livestock Census 2003) grazes in these grasslands without any management system, which has led to the total degradation of these lands. The grazing lands of the eight intensive GIB use areas have lost their productive potential as is evident from the maximum biomass of only 35.2 kgs/ha before rains and 162.7 kgs/ha after rains (Tables 12 & 13).

While milk production and sale by the local communities is a significant source of income, most of the better off house holds now purchase fodder for their animals from neighbouring states of Haryana, Uttar Pradesh and Madhya Pradesh significantly lowering their stakes and interest in maintaining the grasslands.

7.2 Encroachment by Other Floral Life forms:
Related fallout is that these grasslands are being taken over by trees and shrubs, which was apparent based on the densities of these life forms across the eight intensive use areas (Tables 8 & 9).

7.3 Invasive Species
Prosopis chilensis, an exotic species was also seen to have encroached upon the grazing lands due to which the area with grass cover has reduced. The densities of P. chilensis revealed that the species had spread most over the grazing lands of Kesarpura i.e. 111.7/ha and least in Behra minimum i.e. 12.4/ha (Table 8). It is evident that this exotic species has started spreading into the common lands from all sides, with more being observed in south and south-western sides.

7.4 Other Threats
With the decline in institutional mechanisms encroachments on the grasslands particularly on the revenue lands has gone up and these are being converted in to mining areas and in to farms.

Reportedly 50% of the lands in Lachhimpura and up to 80% of the grazing lands in Ramsar have been encroached up on for agriculture. In discussions members from the local community claim that rainfall has declined in recent years and this has forced not just a change in the cropping pattern and techniques but lowered productivity has also tempted many farmers in to encroaching in to adjacent grazing lands. While the decrease in grazing lands and declining grass cover seems to have forced the GIB in using the farms as habitat, the shift from traditional methods of ploughing and increased use of tractors together with intensive pesticide use has in all likelihood greatly disturbed the GIB. The area under mining while not very large in the intensive use villages is certainly playing a role in further fragmenting the already shrunken habitat for the GIB.

All these threats, i.e., overgrazing, spread of invasive species (P. chilensis) and conversion to agriculture lands are said to have dubious impact on the grasslands (Rahmani 2006), the main habitat of the Great Indian Bustard.

8 POSSIBILITY OF RESTORATION AND MANAGEMENT OF GRASSLANDS

Recent studies on GIB reveal that typical breeding habitat of GIB occurs in undisturbed grasslands, characterized by a mosaic of less grazed and relatively tall grass preferred by nesting females, interspersed with well grazed and short grass preferred by displaying males (Dutta and Jhala

unpublished data in Dutta et al. 2010). Development of core areas for GIB breeding and habitat protection in large multiple-use areas coupled with support and involvement of local communities (Rahmani 2006) could help in increasing GIB population and its long term conservation.

The Sokaliya landscape despite the many challenges still holds promise. The local community is fully aware of the presence of GIB in the area and also believes that the species needs to be conserved. It is also obvious to both the local community and the forest department that without the support of the former revival of the grasslands and thereby the population of the GIB cannot be achieved.

In discussions with local community leaders from across the eight intensive use villages while there is interest in protecting the GIB, the challenge is to build/ revive community institutions and through these reinstate some of the earlier grassland management practices. This would also eventually have to graduate to making efforts towards rolling back encroachment of the grasslands wherever possible. The community would also have to be convinced, trained and support in developing GIB friendly agricultural practices.

There is some scepticism within the community on whether it is possible to restore the productivity of the grasslands as also some questions on the issue of building/reviving institutions. It is in order to demonstrate that this is possible FES seeks to implement a pilot grassland restoration plan.

9 PILOT RESTORATION PLAN

An area of around twenty hectares, ten hectares each, in the grasslands of two of the intensively used areas will be selected and restored during the year. The following is envisaged:

A. The selected area would be prepared (removal of exotic species, trees and shrubs, ploughing to loosen the hard top soil and setting up thorn fence), seeds of local grass species preferred by the locals and their livestock would be treated with farm yard manure (all these will be done in May 2011) and sowed immediately after the first rains (May last week or June first week), protecting the plots for four to five months from June to October 2011 with the help of one person from the village, and after October allow the villagers to utilize and share the grass resources.

B. Assist communities in putting in place some of the earlier grassland management practices in the pilot area. Beginning with the smaller area it would be demonstrated to the community that is possible to revive earlier existent grassland management practices, revisiting some of these as required to fit in with current scenario. Grassland Development Committees (Charagah Vikas Samitis) will be set under the jurisdiction of the Panchayat (constitutionally mandated body for local self governance). The idea being to convince the community that is they can manage ten

hectare plots as healthy grasslands, they can also similarly manage the much larger area thereby conserving GIB habitat and thereby reviving GIB population across the landscape.

C. Gradually initiate discussions with the community to explore possibilities of declaring the area as Community Reserve under the WLPA 1972 (1991). This would have to be done cautiously taking great care to assure local communities that such a move would in no way threaten local use of and access to the grasslands and its produce. Ensure that the forest department too while being on-board appreciates the need for such an approach as any move otherwise would completely undermine the fledgling conservation effort.

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