

A survey of White-rumped Vultures *Gyps bengalensis* in Gujarat State, India

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Summary

During this study, ten districts of Gujarat State, India, were surveyed to collect information on the abundance and activity patterns of White-rumped Vultures (WRV) *Gyps bengalensis*. In total, 212 WRVs were recorded during 46 sightings. The highest number was documented in Kachchh district (119), followed by Ahmedabad (32), Mehsana (28), Banaskantha (10), Anand (9), Nadiad (8) and Rajpipla (3) districts, and one each were recorded in the Surendranagar, Dang and Vadodara districts. The high population in Kachchh district could be attributed to the vultures' preference of arid zone habitats, limited human activity, sufficient food and suitable perching/roosting/nesting sites. During the field survey, 73.1% of the vultures were found soaring, 13.7% were perching on trees and/or the ground, while 13.2% were observed feeding on carcasses. The present study suggests that regular monitoring of the vulture population, determination of diet, creation of awareness amongst the local people, initiation of genetic and pathological studies, implementation of supplementary feeding programmes, a complete ban on the use of the veterinary drug 'Diclofenac', establishment of vulture care and rescue centers, and incentives for local people involved in the conservation of their local vulture population, should immediately be implemented to save the remnant population of vultures from imminent extinction. To safeguard the existing vulture populations, the illegal cutting and lopping of nesting tree species must be halted, a captive breeding programme must be established, and systematic, in-depth and long-term monitoring programmes must be initiated.

Introduction

Asian, African and European vultures are recognized as Old World vultures, belonging to the family Accipitridae (subfamily Aegypiinae), of the order Falconiformes. There are 16 species of Old World vultures, which are found in Europe, Africa and Asia (The Peregrine Fund 2004a). The White-rumped

Vulture (WRV) *Gyps bengalensis* occurs in Pakistan, India, Bangladesh, Nepal, Bhutan, Myanmar, Thailand, Malaysia, Laos, Cambodia, southern Vietnam and Yunan, and southern China. It has also been recorded in southern Afghanistan and Iran, where its status is currently unknown (BirdLife International 2003). The WRV is one of 923 avian species

that breeds in the Indian Subcontinent (Ali 1995, 1996, Grimmett et al. 1999, Kazmierczak 2000).

Of nine species of vultures found in the Indian Subcontinent (Ali & Ripley 1983), six species are regularly sighted in Gujarat (Ali 1996). Owing to its geo-climatic conditions which favour cattle-rearing, and the non-beef-eating culture of the people, Gujarat appeared to be one of the major strongholds of vultures in the country (GEER 2005b). Until recently the population of WRVs in India was also high because of the unnatural food supply created largely by primitive methods of carcass and slaughterhouse waste disposal (Grubh 1989). According to Khacher (1996), its population has however recently declined rapidly, partly due to habitat loss, reduction in the availability of food and the felling of large trees.

The recent decline (95%) in the vulture population in the Indian subcontinent is one of the most rapid declines ever recorded in any bird species (Green & Hirons 1991, Prakash 1999, The Peregrine Fund 2004b), due to the widespread use of the veterinary drug 'Diclofenac' (Oaks et al. 2004), which has been the major cause of the rapid decline of the vulture population across the subcontinent (Shultz et al. 2004) and adjacent countries, including Pakistan, Nepal and Bangladesh (Oaks et al. 2004). Due to such factors, the IUCN (2000) has listed this species as "Critically

Endangered" (CR) (Hilton-Taylor 2000, BirdLife International 2003, IUCN 2003), which is the highest category of endangerment, indicating the high risk of global extinction in the wild in the near future.

This paper is an outcome of a systematic field survey of this species in ten districts of Gujarat State, India, from April 2001 to May 2004.

Methods

Identification, distribution pattern, population survey and activity pattern

A systematic field study was carried out for four consecutive years (April 2001 to May 2004) in ten districts of Gujarat State, India, mainly during the day-time by vehicle. For this, forested patches, open scrub areas, dry deciduous forests, riverine patches, rural areas, villages, gardens and parks in and around urban areas, and possible perching, roosting and nesting sites, were surveyed thoroughly (GEER 2005b), while the interior habitats of forested patches were surveyed by walking. During the vehicular surveys, the speed limit of the vehicle was maintained at 30-40 km/h. There were four observers in the vehicle. Use was made of sets of 8x40X binoculars. The number of vultures seen along the roads and at carcasses was also recorded. During the survey, we focused on determining the abundance of the species, as well as their activity (soaring,

feeding, perching).

The entire exercise was successfully completed mainly due to easy identification of the species, their gregarious behaviour, identification of permanent nesting or feeding grounds known to locals people, the correct timing of surveys (mainly during morning and evening hours) and the availability of published literature (books and identification brochures) (GEER 2005a). The following information was collected for each vulture observed during the survey: number of birds, perching site (tree and/or ground), flight (soaring), feeding (on carcass), distribution pattern, population survey (number of sightings,

number of individuals), and diurnal pattern (soaring, feeding, perching). Extensive use was made of local knowledge, so that all potential vulture areas could be surveyed.

Data analysis

The gathered data were analyzed separately for each district. The ratio of the number of sightings of vultures to the number of individuals was determined. Besides this, the average group size of individuals of vultures was also calculated for each district. All the data were plotted on a map of Gujarat State to show the distribution of the species across the State in the surveyed districts.

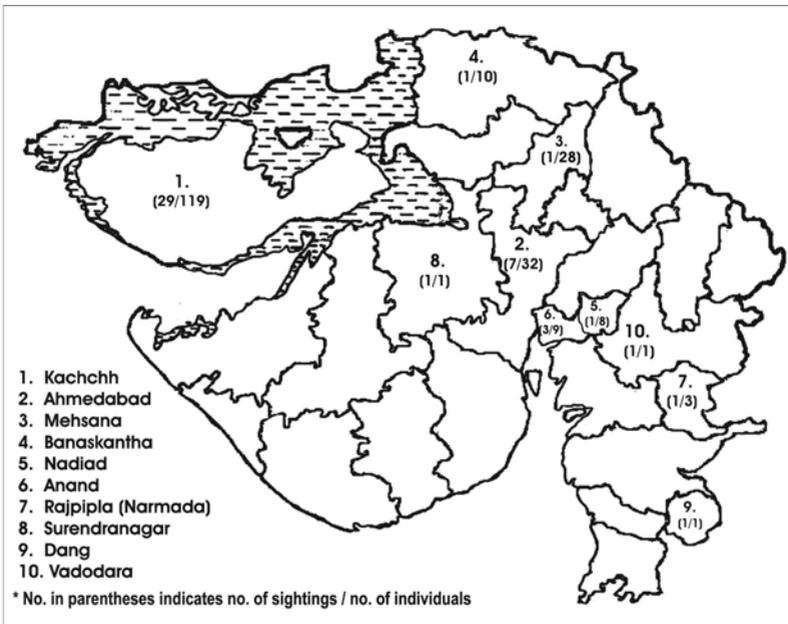


Figure 1. Location of surveyed districts of Gujarat State, India.

Results

In total, 212 individual WRVs were recorded during the field survey. The pattern of distribution of WRVs in the different districts is illustrated in Figure 1.

Holistic scenario

In total, there were 46 sightings of 212 individual WRVs in ten districts (see Appendix I). The total recorded population exhibits the ratio of 1:4.6 with respect to the number of sightings (x) and the number of individuals (y) (Table 1). Of the total recorded population, the

maximum number of individuals (119) was sighted in Kachchh district (x=29). Kachchh district was found to support the highest population of WRV with a ratio of 1:4.1 (x:y), and an average group size of 129±6.3 individuals, followed by Ahmedabad (x=7, y=32, x:y=1:4.6, z=7±6.2), Mehsana (x=1, y=28, x:y=1:3, z=28±0.0), Banskantha (x=1, y=10, x:y=1:1, z=10±0.0), Anand (x=3, y=9, x:y=1:3, z=9±6.4), Nadiad (x=1, y=8, x:y=1:8, z=8±0.0), Rajpipla (x=1, y=3, x:y=1:3, z=3±0.0), and Surendranagar, Dang and Vadodara districts (x=1, y=1, x:y=1:1, z=1±0.0) each (Table 1).

Table 1. Group size and activity patterns of White-rumped Vultures in various districts of Gujarat State, India.

Sr. No.	District	No.			Ratio		Activity		
		x	y	z	x : y		1	2	3
1	Kachchh	29	119	119±6.3	1:4.1	4.1	5	114	0
2	Ahmedabad	7	32	32±6.2	1:4.6	4.6	21	11	0
3	Mehsana	1	28	28±0.00	1:3	28	0	0	28
4	Banaskantha	1	10	10±0.00	1:1	10	0	10	0
5	Anand	3	9	9±6.4	1:3	3	3	6	0
6	Nadiad	1	8	8±0.00	1:8	8	0	8	0
7	Rajpipla	1	3	3±0.00	1:3	3	0	3	0
8	Surendranagar	1	1	1±0.00	1:1	1	0	1	0
9	Dang	1	1	1±0.00	1:1	1	0	1	0
10	Vadodara	1	1	1±0.00	1:1	1	0	1	0
Total		46	212	212±6.0	1:4.6	4.6	29	155	28

x= Total no. of sightings, y= Total no. of individuals, z= Average group size of individuals; Activity: 1= Perching on tree and/or ground, 2= Soaring, 3= Feeding on carcass

Number of sightings

The maximum number of sightings (63.0%) of WRVs was recorded in Kachchh district, followed by Ahmedabad (15.2%) and Anand (6.5%) districts, while only 2.2% of the total sightings were documented from other surveyed districts (Figure 2).

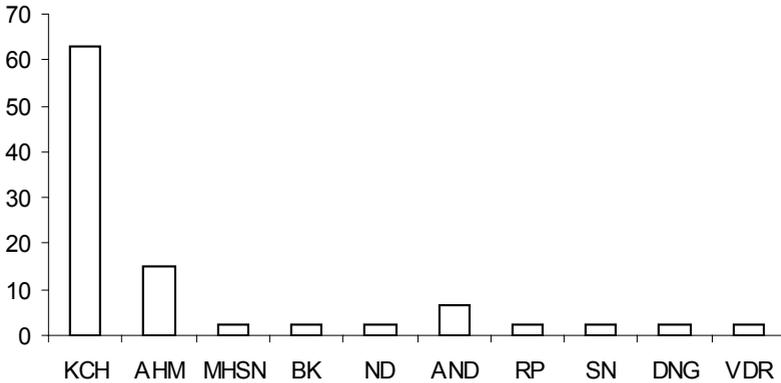


Figure 2. The proportion of White-rumped Vulture sightings in the different districts (kCH= Kachchh, AHM= Ahmedabad, MHSN= Mehsana, BK= Banaskantha, ND= Nadiad, AND= Anand, RP= Rajpipla, SN= Surendranagar, DNG= Dang, VDR= Vadodara).

Number of individuals

The largest number of WRVs was observed in Kachchh district (56.1%), followed by Ahmedabad (15.1%), Mehsana (13.2%), Banaskantha (4.7%), Anand (4.3%), Nadiad (3.8%) and Rajpipla (1.4%) districts, while only 0.5% of the individuals were recorded in Surendranagar, Dang and Vadodara districts (Figure 3).

Activity pattern

During the field survey, most of the observed WRVs (73.1%) were soaring,

with fewer seen perched on trees and/or the ground and feeding on carcasses (Figure 4).

Discussion

In spite of the vulture population crash in India, Gujarat State still seems to harbour a sizeable population (2647) of Gyps vultures (0.03 per km²), including 2135 WRVs (0.02 per km²) (GEER 2005b). The Kachchh district was found to be the key area for Gyps vultures, where a substantial population (910) of vultures was encountered (GEER 2005b). During

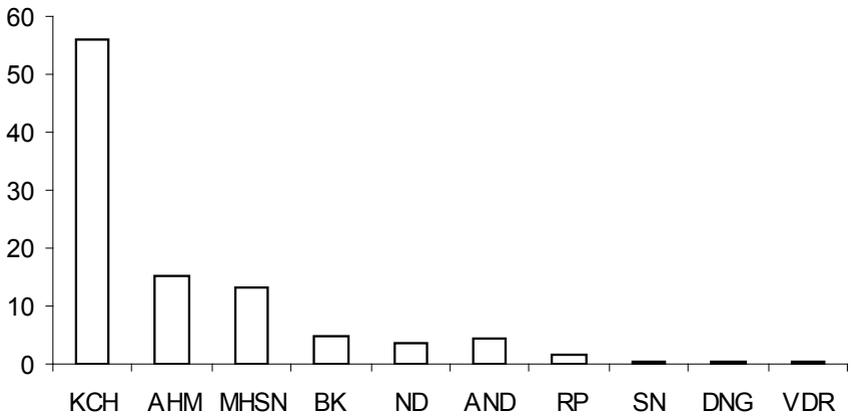


Figure 3. The proportion of White-rumped Vulture individuals in the different districts (KCH= Kachchh, AHM= Ahmedabad, MHSN= Mehsana, BK= Banskantha, ND= Nadiad, AND= Anand, RP= Rajpipla, SN= Surendranagar, DNG= Dang, VDR= Vadodara).

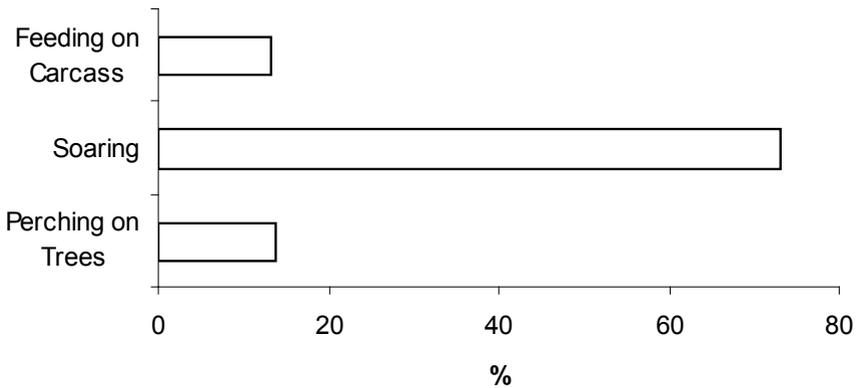


Figure 4. The activity pattern of WRVs

the present survey, nearly 56% of the WRVs were recorded in the Kachchh district. This could be due to the vast geographical area of the district, less human intervention owing to a low human density, the availability of perching, roosting and nesting sites (larger trees and rock-cliffs) in westernmost pockets like Nakhatrana, Lakhpat, Mundra and Mandvi talukas, the availability of dead livestock (attributable to the high cattle population in the grasslands of Abdasa, Banni and Naliya), and some scattered patches of larger trees e.g. *Acacia nilotica* and *Prosopis cineraria* in remote villages like Bhirandiyara, Khavda, Dhoravar, Rabviri, An dhau, Kaladungar and Kuran in northern part of Kachchh district, fringing the Great Rann of Kachchh (GRK).

Followed by Kachchh, Ahmedabad and Mehsana districts were found to support about 28% of the total recorded population of WRVs. This could be because of the openness of some habitats, such as agricultural fields, fallow lands and exposed mud-heaps in Ahmedabad district, especially in and around Nal Sarovar Bird Sanctuary of Sanand taluka, and the existence of some forested patches in the Mehsana district. Thus Kachchh, Ahmedabad and Mehsana districts support almost 84% of the recorded population of WRVs in the entire State.

Recommended conservation measures

Since Gujarat State probably harbours the largest population of WRVs in the country, in situ conservation efforts should perhaps be focused in this area (GEER 2005b). The population of WRVs has rapidly declined (95% crash) all over the Indian subcontinent due to two key factors: adult mortality and breeding failure as a result of vultures ingesting carcasses treated with the veterinary drug, Diclofenac (Oaks et al. 2004). However, recently the species have bred successfully in Kachchh district, Gujarat State, India (Soni et al. 2003). To save this species from imminent extinction, the following steps should be implemented:

1. Rapid Assessment Surveys (RAS) should be carried out in all potential areas of the State, in order to determine the following: breeding status, problems faced during the breeding season, availability of perching, roosting and/or nesting sites, and habitat preference.
2. Analysis of tissue samples and food contents from the gut of dead individuals to determine whether pesticides are responsible for mortalities.
3. Initiation of genetic studies to determine whether there is a decline in genetic diversity.

4. A residual stock of veterinary drug 'Diclofenac', which was widely used in treatment of livestock for the past many years all over the country, needs to be phased out immediately on an urgent basis.
5. The use of an alternative drug 'Meloxicam' should be promoted to replace Diclofenac.
6. Besides the only one captive breeding center in northern India at Pinjore (BBC 2007), similar captive breeding centres at state/regional level should also be established.
7. Vulture care and rescue centers should be established.
8. An incentive scheme should be implemented in order to reward people who protect vultures and their nests and to reward people who suffer economic losses due to vultures' nesting and roosting in their farms and orchards (GEER 2005b).
9. Creation of awareness among local people to carry out the planting of native tree species, e.g. *Acacia nilotica* and *Prosopis cineraria*, to provide more preferable substrates for perching and nesting of vultures (Soni et al. 2003).
10. Conservation of plantations to safeguard the existing nesting and roosting sites (Soni et al. 2003).
11. A systematic and in-depth should be carried out in all potential habitats to determine the species' breeding performance (Soni et al. 2003).
12. The long-term monitoring programme should be carried out to explore other areas of the State, where the status of the species is "Data deficient".

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Appendix I. Sightings of White-rumped Vultures in Gujarat State, India.

Sr. No.	Date	District	Place	No.	Activity
1	20/04/01	Banaskantha	Firozपुरa	10	2
2	25/12/01	Surendranagar	Sayla, near Chotila	1	2
3	18/01/02	Kachchh	Dhunai Reserve Forest, near Mandvi	1	2
4	18/02/02	Kachchh	Lala Bustard Sanctuary	8	2
5	19/02/02	Kachchh	Vengaber, near Naliya	1	2
6	20/02/02	Kachchh	Tera Pond, near Naliya	5	2
7	21/02/02	Kachchh	Kalitalav, near Naliya	5	2
8	30/01/02	Kachchh	Naliya - Jakhau road	4	2
9	31/01/02	Kachchh	Ramvada, near Sanghipuram, Lakhpat	2	2
10	16/03/02	Kachchh	Dinar Mota, near Khavda	2	2
11	16/03/02	Kachchh	Kaladungar, near Khavda	3	2
12	17/03/02	Kachchh	Kuwarbet, near Khavda	11	2
13	18/03/02	Kachchh	Kuran, Khavda, near Khavda	2	2
14	18/03/02	Kachchh	Kuwarbet, near Khavda	1	2
15	19/03/02	Kachchh	Kuwarbet, near Khavda	5	2
16	27/05/02	Kachchh	Rapar	1	2
17	27/05/02	Kachchh	Nandasar, near Rapar	1	2
18	31/05/02	Mehsana	Visnagar	28	3
19	06/10/02	Kachchh	Bhirandiyara Grass Plot, near Khavda	1	2
20	20/10/02	Kachchh	Kaniyabe, near Bhuj	9	2
21	25/11/02	Kachchh	Bhirandiyara – Khavda road	1	2
22	27/11/02	Kachchh	Kuwarbet, near Khavda	1	2
23	02/11/02	Kachchh	Kuwarbet, near Khavda	1	2
24	03/12/02	Kachchh	Khavda - Kuwarbet road	23	18 (2) + 5 (1)
25	06/01/03	Kachchh	Khavda	5	2
26	09/01/03	Kachchh	Khavda	2	2
27	13/01/03	Nadiad	Kapdvanj – Dakor road	8	2
28	15/01/03	Rajpipla	Rajpipla Urban Area	3	2
29	19/01/03	Kachchh	Kuwarbet, near Khavda	9	2
30	21/02/03	Kachchh	Naliya	1	2
31	24/03/03	Kachchh	Beru, near Nakhatrana	11	2
32	28/03/03	Kachchh	Kuwarbet, near Khavda	1	2

33	28/03/03	Kachchh	Kuwarbet, near Khavda	1	2
34	30/03/03	Kachchh	Khavda - Kuwarbet road	1	2
35	07/06/03	Dang	Saputara	1	2
36	17/10/03	Ahmedabad	Kayla, Nalsarovar	1	2
37	04/12/03	Vadodara	Vaghodia road	1	2
38	08/12/03	Anand	Piplav, near Sojitra	3	1
39	23/12/03	Anand	Kanewal, Valli	1	2
40	16/01/04	Ahmedabad	Shahpur, Nalsarovar	21	10 (2) + 11 (1)
41	16/01/04	Ahmedabad	Shahpur, Nalsarovar	1	2
42	26/01/04	Ahmedabad	Shahpur, Nalsarovar	1	2
43	26/01/04	Ahmedabad	Kayla, Nalsarovar	1	2
44	27/02/04	Ahmedabad	Shahpur, Nalsarovar	5	2
45	21/04/04	Ahmedabad	Shahpur, Nalsarovar	2	2
46	31/05/04	Anand	Kanewal, Valli	5	2
Total				212	

Activity: 1= Perching on tree and/or ground, 2= Soaring, 3= Feeding on carcass

