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Research Article

THE KING IS DISAPPEARING: A STUDY OF SOCIO-ECOLOGICAL ASPECTS OF KING VULTURE OR RED-HEADED VULTURES *(SARCOGYPS CALVUS)* AT JORBEER, BIKANER

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ABSTRACT
King or red headed vulture *(Sarcogyps calvus)* is regular winter visitor and complete migratory vulture at Jorbeer, Bikaner. King vulture arrives from Nepal, Bangladesh, Thailand, China and Burma mostly in last week of October or November months. It departs from Jorbeer in First week of February. The population of red-headed vulture observed very low and maximum of 5 vultures recorded in 15 years of study period. The distribution of the species was recorded in 16 villages covering 1728 square/kilometer area between Latitude $27^0$50' North to $28^0$04' North and $73^0$04' East to $73^0$34' East Longitude as home range in Eastern, South-Eastern and South-West part of the Bikaner. Daily schedule of activities of red-headed vulture observed i.e. Feeding 2.87%, Resting 51.45%, Sunning 0.30%, Scratching 0.21%, Disturbance 0.16%, Fighting 0.15% and flight 45.15% of the total day activity. Effect of any disease and medication was not observed. No sick or dead King vulture recorded at Jorbeer. Feral dogs are real danger for vultures.

Keywords: *King Vulture, Population Decline, Socio-ecology, Daily Activity, Home Range*

INTRODUCTION
Declines in the populations of the Gyps vultures of the Indian subcontinent have been widely documented. Only a disease factor new to the host populations, or a genetic modification of a previously begin factor, can adequately explain the pattern of mortalities and population collapse of these species of Gyps vultures in the Indian subcontinent, Oriental white-backed vultures *(Gyps bengalensis)*, Long-billed vulture *(Gyps indicus)* and Slender-billed vulture *(Gyps tenuirostris)*, have declined by more than 98% since the early 1990s (Gilbert *et al.*, 2002; Prakash *et al.*, 2003; Green *et al.*, 2004).
Veterinary use of the non-steroidal anti-inflammatory drug diclofonac is the main and perhaps the only cause of the population delines (Green *et al.*, 2004; oaks *et al.*, 2004; Shultz *et al.*, 2004). Vulture is exposed to diclofenac when they feed from carcasses of livestock that die within a few days of treatment and contain residues of the drug (Oaks *et al.*, 2004).
King Vulture *(Sarcogyps calvus)* has suffered an extremely rapid population reduction in the recent past which is likely to continue into the near future, probably largely as a result of feeding on carcasses of animals treated with the veterinary drug diclofenac, perhaps in combination with other causes. For this reason it is classified as Critically Endangered. Historical reports indicate that it was widespread and generally abundant, but it has undergone a population and range decline in recent decades. Recent information indicates that in India the King vulture started undergoing a rapid decline (41% per year) in about 1999, and declined by 91% between the early 1990s and 2003 (Cuthbert et al., 2006). Declines in the Indian subcontinent have followed widely reported and well-researched declines in Gyps vultures owing to mortality ingestion of the non-steroidal anti-inflammatory drug (NSAID) diclofenac, used to treat livestock, and it is hypothesised that this same drug has been responsible for the observed trends in Red-headed vulture. The manufactures and importation of veterinary diclofenac was banned in India in May 2006 with bans in Nepal and Pakistan in the same year. Although the large number of manufacturers and availability of meloxicam is encouraging, the wide range of untested NSAIDs and continued availability of diclafenac is major source of concern. But the 2006 diclofenac ban is being followed by illegally selling forms of diclofenac manufactured for human use for veterinary purposes.
King vulture (*Sarcogyps Calvus*) visits from Nepal, Bangladesh, Thailand, China and Burma. Sevens pecies have been recorded at Jorbeer (Khatri, 2013a) i.e. Long billed Vulture *(Gyps indicus)*, White

Backed Vulture *(Gyps bengalensis)*, Eurasian Griffon vulture *(Gyps fulvus)*, Himalayan Griffon vultures *(Gyps himalayensis)*, King vulture *(Sarcogyps calvus)*, Cinereous vulture *(Ageypius monachus)* and Egyptian vulture *(Neophron percnopterus)* as nine species of vultures found in Indian subcontinent (Ali and Ripley 1983).
Neither of research study had explained the ecology of King vultures. This paper reflects discriptions, status, daily activity pattern and distribution of King Vultures during winter migration.

MATERIAL AND METHODS

Study Site

The geographical location of study area Jorbeer is 28'3^0 North latitude and 73'5^0 East longitudes at the height of 234.84 MSL. Jorbeer situated South-East to Bikaner at a distance of 12 Km. from city behind NRCC (National Research Centre on Camel). It is municipal dumping stand as about 20-35 carcasses dumped per day. The Bikaner district of Rajasthan is situated in the Western part of the "Thar" desert. The extreme desertic conditions are the main features of area where temperature reaches 49.50^{0}C high and minimum -1^{0}C to -2^{0}C and low rainfall less than 100 mm. The vegetation of the region is thorny and scanty.

Methods

The population of King Vultures was recorded from October 2001 to March 2015. Counts were made by using binocular. King vulture is solitory bird and difficult to locate at study site. The observations have made 7.00 - 18.00 hrs, in regular intervals. The daily activity pattern were observed comprises of seven parameters. The distribution of King Vultures have been calculated at Jorbeer and 40-80 Km. around the Jorbeer area in Bikaner district and collected information through questionnaires from local people of nabouring villages.

RESULTS AND DISCUSSION

The disappearance of vultures from Asia is linked to a suite of factors: notably the demise of wild ungulates, the intensification of agriculture, increased sophistication of waste disposal techniques, direct persecution and disease. However, rapid declines since the turn of the 21st century are believed to have been driven by the pharmaceutical NSAID diclofenac used to treat livestock, which has proven highly toxic to vultures, causing mortality from renal failure that results in visceral gout. (Cuthbert et al., 2006)

Descriptions of King Vulture

Adult Perched

Adult King vulture is mainly black with bare pinkish or reddish head and use and broad bill white patches at the base of neck and upper thighs and reddish leg and feet. In flight, has grayish with white bases to secondaries which shaw as broad panel.

Juvenile Perched

Above brown dark brown under parts and wing coverts and paler brown under parts with buff shaft streaking head is partly covered with white down. It has pinkish colouration to head and is pinkish legs and feet, white patch on upper thighs and whitish under tail coverts.

Colour of Bare Parts

Iris yellow, red brown or crimson. Bill dark brown, yellowish at base of lower mandible use and bare skin of head and neck deep yellowish red wattles redder. Bare skin on either side of crop and inside thighs duller yellowish red legs fleshy to dull red (Figure 1(a) & (b)).

Habitat

Jungles, forests, Woodlands, dump areas

Conservation Status
Rare, Critically Endangered

Figure 1(a): Showing adult King Vulture (*Sarcogyps calvus*) sitting on tree top at Jorbeer

Figure 1(b): Showing adult King Vulture (*Sarcogyps calvus*) sitting on tree top with Griffon vulture, Egyption Vulture and Steppe eagle at Jorbeer

Socio-ecology of King Vulture
Population
The population of King Vulture has observed low at Jorbeer. The maximum of 4 King vulture in year 2000-2001, 5 vultures in 2001-2002, 3 vultures in 2002-2003, 2 vultures in 2003-2004, 3 vultures in

2004-2005, 2 vultures in 2005-2006, 4 vultures in 2006-2007, 5 vultures in 2007-2008, 3 vultures in 2008-2009, 2 vultures in 2009-2010 and 4 King vultures in year 2010-2011, were recorded (Khatri 2013a). After year 2010 no single King vulture observed at Jorbeer **(Table 1).**

Table 1: Population of king vulture (*sarcogyps calvus*) of year (2000-2015)

Months	YEAR 2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
OCT	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
NOV	4	-	5	1	-	3	-	-	2	-	-	-	-	-	-
DEC	4	4	2	1	2	3	2	2	5	3	-	-	-		-
JAN	2	2	-	3	2	3	2	4	5	2	4	-	-	-	-
FEB	-	4	-	3	-	-	-	4	-	-	4	-	-	-	-
MAR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Home Range

King vulture is distributed in 16 villages covering 1728 square/kilometer area between latitude $27^0$50' North to $28^0$04' North and $73^0$04' East to $73^0$34' East Longitude as home range. It is distributed in Eastern, South-Eastern and the South-West part of the Bikaner (Khatri 2013b) (Figure 2).

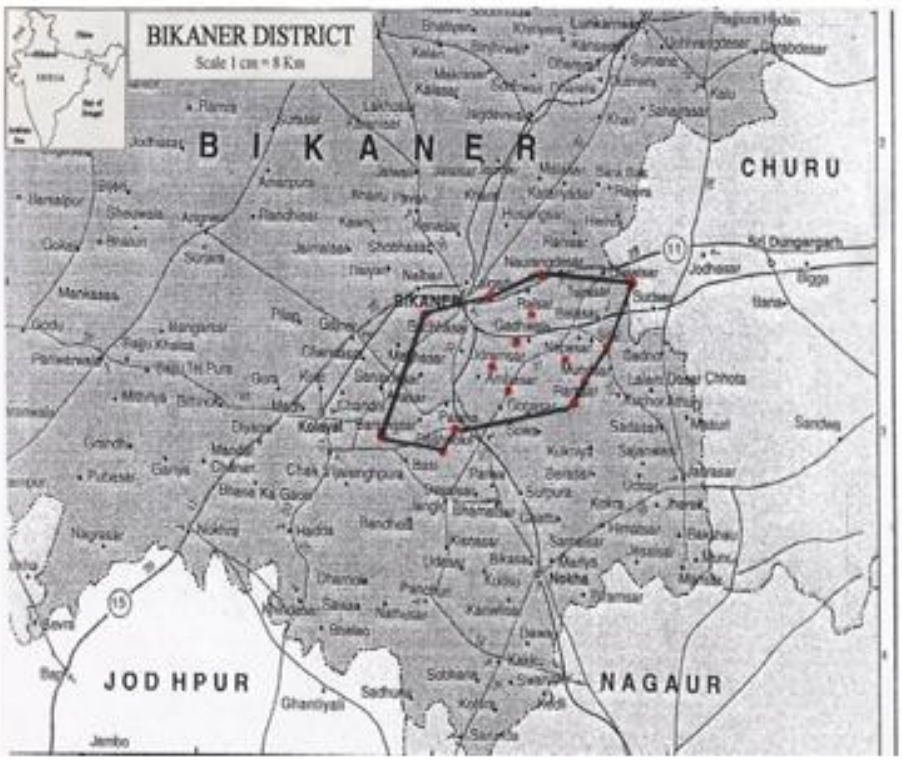

Figure 2: Map Showing Home Range of King Vulture (*Sarcogyps Calvus*) staying at Bikaner District during winter migration (2000-2015)

Daily Schedule of Activity

Spectacular daily activities of King Vultures comprise feeding, scratching, sunning, resting, reaction to disturbance, flight and fight. It spends maximum time in resting and flight. The daily activities were observed from 7.00 hours in the morning upto 18.00 hours till evening (Figure 3).

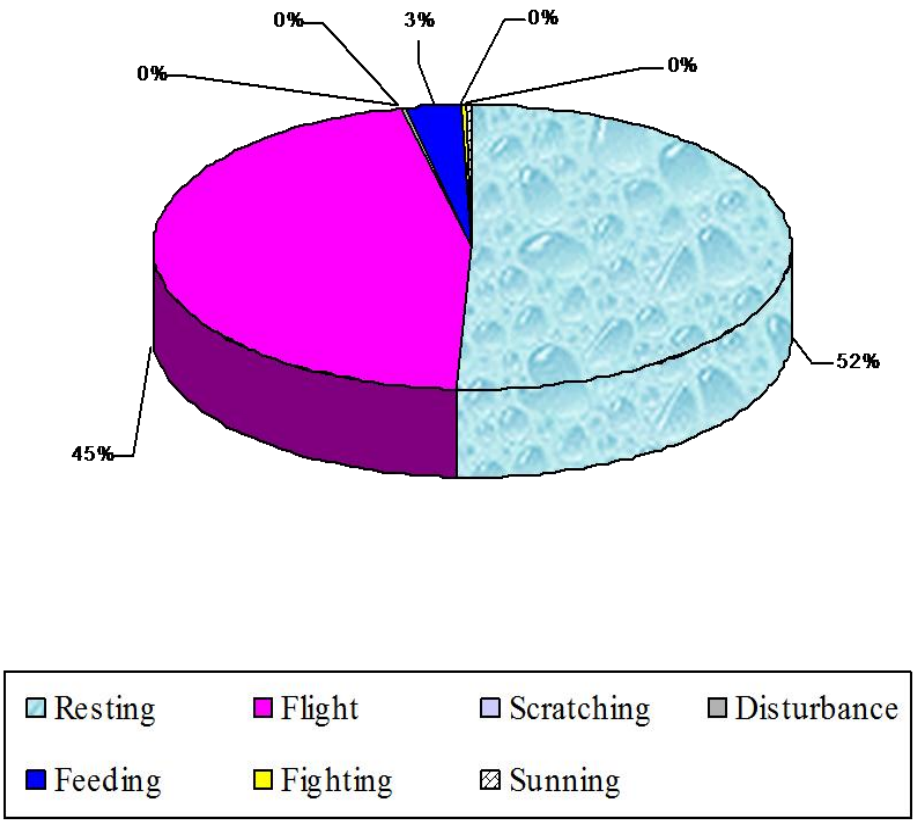

Figure 3: King vulture (*Sarcogyps calvus*) showing daily activities (resting, sunning, scratching, disturbance, feeding, fighting and flight) (in minutes)

i. Feeding

Feeding comprises 2.87% of the total day activities. It was seen feeding alone like a King. It feeds between 10.00 hours to 1.00 hours and feeding continues upto 19 minutes in intervals. It was seen sitting lonely at the edge of dumping stand. There were very few interactions observed with other vultures during feeding.

ii. Resting -

It spends maximum time in resting. Resting comprises 51.45% of the total day activity. It generally rest alone over the trees. Maximum resting was observed during morning. King vulture also rests in the evening between 15.00 hours to 18.00 hours.

iii. Sunning -

Sunning comprises 0.30% of the total day activities. It continues for 1-2 minutes. Sunning has done to warm the body parts. It spreads wings and keep its back towards sun.

iv. Scratching -

It comprises 0.21% of the total day activities. Scratching was done by beak probably to remove the pests.

v. Disturbance -

It was seen to get disturbed by dog bark, sound of vehicles and human approach to feeding site. Disturbance comprises of 0.16% of the total day actities. It reacts to disturbance by flying away from the site.

vi. Fighting -

King vulture rarely fights, few interactions were observed. Such an interaction comprises 0.15% of the total day activities. During feeding it dominates other vultures. It was never seen fighting with other vultures. King vulture was always observed sitting at isolated place.

vii. Flight -
It comprises 45.15% of the total day activities Maximum flight was observed from 12.00 hours to 16.00 hours flights were also seen intermittently in morning hours. King vulture is an active vulture compare to other vultures species. it takes small flights and observed playing with small birds i.e. crows, eagles etc. during fly King vultures changes its place frequently.

RESULTS AND DISCUSSION
There were substantial declines in the counts of King Vulture or red-headed vultures during the period from 1990 to year 2003. The population of red-headed vultures in 2003 was estimated to be 9% of that in the early 1990 (Cuthbert *et al.*, 2006). The annual rates of population decline observed for red-headed vultures (44%) during 2000-2003 were intermediate between those found for *Gyps bengalensis* and *Gyps indicus*/*tenuirortris* over the same period (48 and 22% per year, respectively; Green *et al.*, 2004). When analyses equivalent to those carried out. Therefore Egyptian and red-headed vultures were carried out on road transect data on Gyps vultures in India for 1991-2003 (Prakash *et al.*, 2003; Gree *et al.*, 2004).
The disappearance of vultures from Asia is linked to a suite of factors: notably the demise of wild ungulates (Anon 2003), the intensification of agriculture, increased sophistication of waste disposal techniques, direct persecution and disease. However, rapid declines since the turn of 21st Century are believed to have been driven by the pharmaceutical NSAID diclofenac used to treat livestock, which has proven highly toxic to vultures, causing mortality from renal failure that results in visral gout (Cuthbert *et al.*, 2006). the indication that population of red-headed vultures showed only slight trends throughout the 1990s in supported by regular counts of nesting pairs of this species remained stable whereas both oriental white-backed and long-billed vultures were decline rapidly over the same period (Prakash 1999).
Red-headed vultures are restricted to the Indian sub-continent and South-east Asia and, because of their territorial behavior have always been less abundant than Gyps vultures (Del-Hoyo *et al.*, 1994). Historical records indicate that red-headded vultures were previously widespread and abundant. According to present status for the species, and as a consequence the observed declines suggest that red-headed vultures should be placed in to the IUCN Red list category of critically endangered, due to the criteria of Birdlife International (2005a).

Recommendations
The King vulture is disappearing slowly, so there is an urgent need for better survival of population of these scavanging birds. Identify the location and number of remaining individuals and identify action required to prevent extinction. Captive breeding centers should be supported and encouraged. Effects of different NSAID to be analyzed and additional safe alternative drugs must provide to ensure the long term survival of the affected this species.

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