



THE STATUS OF VULTURES IN BANDHAVGARH TIGER RESERVE, MADHYA PRADESH, CENTRAL INDIA

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Abstract: The study on the status of vultures in Bandhavgarh Tiger Reserve (BTR), central India was carried out from January 2011 to March 2013 in different seasons using opportunistic sightings. In total, 265 observations were made in which 1,366 individuals belonging to four species were recorded. Among these, Long-billed Vulture *Gyps indicus* were more frequently sighted followed by White-backed Vulture *Gyps africanus*, Red-headed Vulture or Asian King Vulture *Sarcogyps calvus* and Egyptian Vulture *Neophron percnopterus*. During the study period, 27 vulture nests were identified, of these 25 nests belonged to Long-billed Vulture and two nests were that of White-backed Vulture. No attempts were made to examine the nesting site characteristics and the breeding status of vulture in BTR. Vultures were largely observed feeding on carnivore kills such as chital, sambar, nilgai, wild pig, domestic cattle and common langur. On a few occasions vultures were seen feeding on the dumped cattle carcasses near villages. The study reveals that vulture population in BTR was mainly dependent on large carnivore kills. Regular monitoring of vulture nest sites in the study area is recommended to assess their breeding success. Since we observed the vultures feeding on dumped livestock carcasses near villages, use of Diclofenac in the villages around the park should be monitored as it has caused a large-scale mortality in vultures in different regions of the country.

Keywords: Bandhavgarh Tiger Reserve, Diclofenac, monitoring, nests, status of vultures.

Few bird species in the world have seen a more rapid decline than that of *Gyps* vultures in Southern Asia (Kushwaha 2009). *Gyps* vultures in the Indian subcontinent and South-East Asia have declined catastrophically during the last decade, and the current populations of various species of vulture are estimated to be less than 5% of the original (Prakash et al. 2003). In total there are 23 species of vultures in the world, of which nine species have been recorded from the Indian sub-continent, and five belongs to the genus *Gyps* (Prakash 1999). The major reason for the decline appears to be the use of the veterinary drug Diclofenac for treating cattle (Oaks et al. 2004; Prakash et al. 2005; Swan et al. 2006). Vultures have also declined in many parts of their former distribution ranges owing to food shortages and loss of habitat (Pain et al. 2003). Not much literature is available on the ecological aspects of these birds, crucially important in the ecosystem as efficient



Gyps indicus
Long-billed Vulture

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX
						CRITICALLY ENDANGERED		



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scavengers (Arun et al. 2004). A few observations and status studies have been carried out on vulture species across various parts of India (Grubh 1974; Prakesh 1999; Majumder et al. 2009; Umapathy et al. 2009; Ramesh et al. 2011; Stotrabhashyam et al. 2015). This paper describes the study of vultures in Bandhavgarh Tiger Reserve, Madhya Pradesh.

Study area

Bandhavgarh Tiger Reserve (BTR) (23°30'–23°47'N & 80°11'–80°47'E) lies on the extreme northeastern border of Madhya Pradesh State, central India, and the northern flanks of the eastern Satpura Mountain range. BTR comprises two conservation units, the

National Park (448.842km²) and the Panpatha Wildlife Sanctuary (245.842km²) (Fig. 1). The altitude of the Park varies between 410–811 m. The terrain is made up of rocky hills rising sharply from the swampy and densely forested valleys in the lowland. The vegetation of BTR falls under five categories (Champion & Seth 1968): moist peninsular low level sal (*Shorea robusta*) forest, northern dry mixed deciduous forest, dry deciduous scrub, dry grassland and west Gangetic moist mixed deciduous forest. Agriculture land is represented by irrigation and rain-fed lands in Bandhavgarh, the main crops include wheat, corn flour, mustard and vegetables. Bamboo forest distribution occurs mainly in the national park and also occurs in Panpatha WS. Due to strict

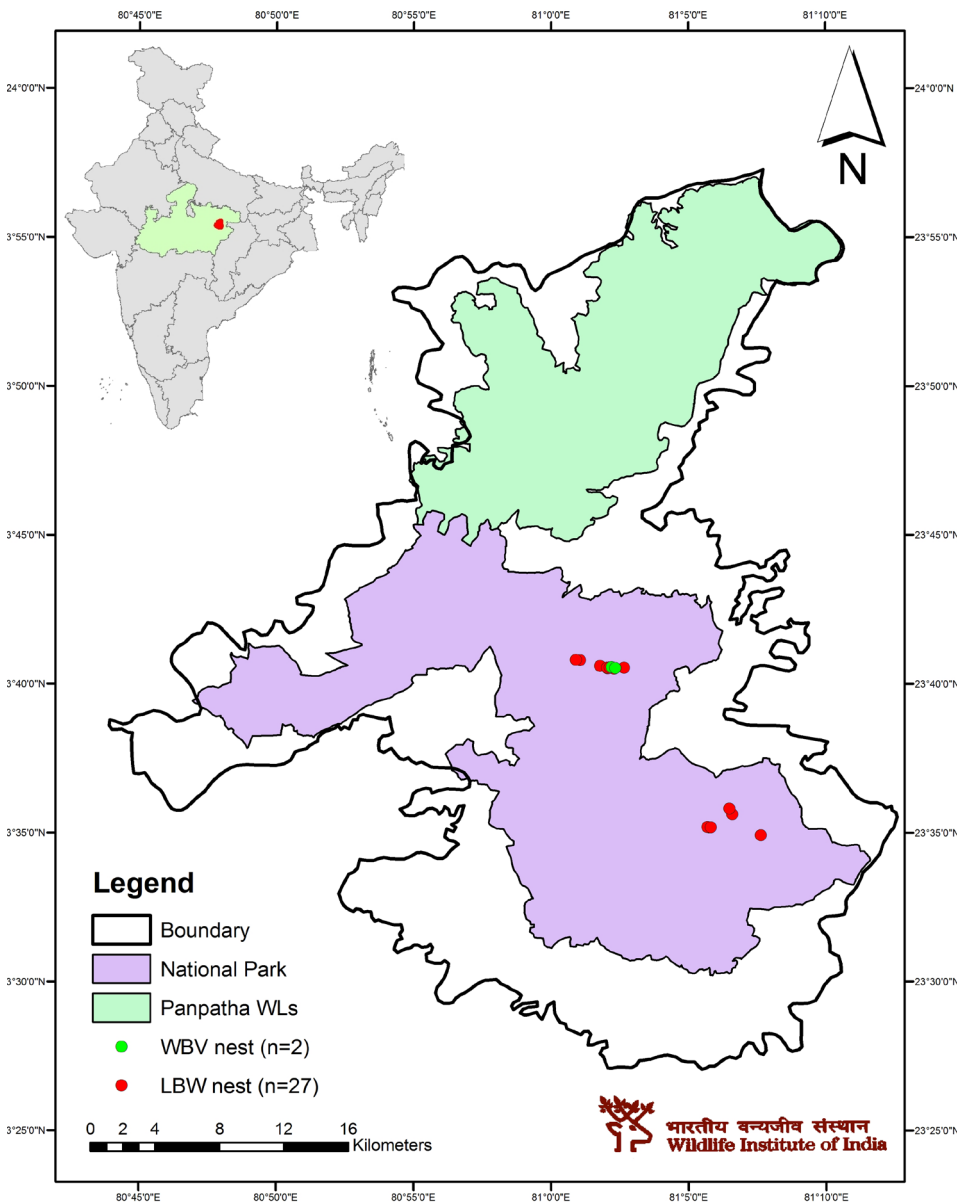


Figure 1. Bandhavgarh Tiger Reserve, showing the location of Long-billed Vulture and White-backed Vulture nest sites.

protection measures and ban in forestry operations, the natural regeneration of bamboo occurs in all areas (Gopal 1989).

METHODS

Opportunistic sightings of vultures were recorded in the national park area of the tiger reserve from January 2011 to March 2013, while radio-tracking the reintroduced gaur throughout the year in all seasons, winter (November–February), summer (March–June and monsoon (July–October). On each sighting of vulture(s), the following data were recorded - flock size, activity and the major habitat type within a 15m radius. Vulture nesting sites were recorded opportunistically in the entire study area. The observations were made with the help of a pair of Bushnell binoculars (8x42) and the identifications were made with the aid of the standard field guide and book (Kazmierczak et al. 2000).

RESULTS

A total of 265 observations were made in which 1,366 individuals belonging to four species were recorded. Among these Long-billed Vultures *Gyps indicus* (LBV) (Images 1,2) were more frequently sighted (n=779) followed by White-backed Vulture *Gyps africanus* (WBV) (n=378), Red-headed Vulture or Asian King Vulture

Sarcogyps calvus (KV) (n=152), and Egyptian Vulture *Neophron percnopterus* (EV) (Image 3) (n=57) (Table 1). The biggest flock size that was observed was 47 individuals, which were LBV followed by WBV, KV and EV of 34, 14 and 2 individuals, respectively (Image 4). The associations among different vultures species were recorded in BTR (Table 2). On many occasions, KV and LBV were seen roosting on live *Albizia procera* and *Shorea robusta* trees and EV were seen on *Butea monosperma* trees twice. Vultures were usually observed in sal forest (29%) followed by mixed forest (21.6%), grassland (19.2%), riverine forest (11.8%), agriculture land (8.6%), rocky cliff (6.1%), and bamboo forest (3.7%).

During the study period, 27 vulture nests were observed in the National Park area, of these 25 nests were of the Long-billed Vulture, and were found in the rocky cliffs of Bandhavgarh fort (n=19), Bhandani Hill (n= 5) of Tala Range. One nest was seen on a live Sal tree (*Shorea robusta*) in Kallwah Range. Two nests of White-backed Vulture were also recorded on the rocky cliffs of Bandhavgarh fort (Fig. 1 and Table 3).

No attempts were made to examine the nesting site characteristics and the breeding status of vulture in BTR. Vultures were observed feeding on carnivore kills such as Chital *Axis axis* (n=33), Sambar *Rusa unicolor* (n=11), Nilgai *Boselaphus tragocamelus* (n=2), Wild Pig

Table 1. Number of individuals, number of flocks and maximum flock size recorded for the four species of vultures in Bandhavgarh National Park (2011–2013).

Species	Number of Individuals	Number of flocks	Maximum flock size	Different classes of flock sizes				
				1	2–5	6–10	11–20	>21
White-backed Vulture	378	42	34	2	20	8	6	6
King Vulture	152	95	14	44	49	1	1	-
Egyptian Vulture	57	30	2	17	13	-	-	-
Long-billed Vulture	779	95	47	9	38	22	19	7



Images 1–2. Long-billed Vulture *Gyps indicus*

Table 2. Associations among different species of vultures observed in Bandhavgarh National Park (2011–2013).

	Species associations	Number of observation(s)
1	King Vulture - Long-billed Vulture	32
2	King Vulture - Long-billed Vulture - Egyptian Vulture	3
3	King Vulture - White-backed Vulture	7
4	King Vulture - White-backed Vulture - Egyptian Vulture	1
5	King Vulture - Egyptian Vulture	2
6	Long-billed Vulture - Egyptian Vulture	1
7	Long-billed Vulture - White-backed Vulture - King Vulture	7
8	Long-billed Vulture - White-backed Vulture	8

Sus scrofa (n=19), domestic cattle *Bos taurus* (n=21) and Common Langur *Semnopithecus entellus* (n=3). Once, an EV was observed feeding on a fresh tiger scat and it was probably for collecting undigested hair for lining their nest. Multiple vulture species associations were observed feeding on large carnivore kills. On a few occasions (n=9) vultures were seen feeding on the dumped cattle carcasses near villages (Image 5). The observations suggest that vultures in BTR feed mainly on large carnivore kills. Other scavengers like the Large-billed Crow *Corvus macrorhynchos* (n=3), Jackal *Canis aureus* (n=5), Wild Pig *Sus scrofa* (n=7) and Changeable Hawk Eagle (*Nisaetus cirrhatus*) (n=2) were associated along with vulture species while feeding on carcasses. Two adult vultures, one LBV and one EV were found dead in the study area and their cause of death was unknown.

DISCUSSION

The vulture population, especially the *Gyps* species across the Indian subcontinent has declined drastically since the 1990's (Gilbert et al. 2002; Prakesh et al. 2003; Green et al. 2004). In Pench Tiger Reserve, central India, Mudumalai Tiger Reserve, and in the Western Ghats, the population of *Gyps* species has shown signs of recovery (Majumder et al. 2009; Ramesh et al. 2011). However, the population of *Gyps* species in Andhra Pradesh has shown a declining trend (Umapathy et al. 2009).

The present study reveals that vultures in BTR were mainly dependent on large carnivore kills. Similar observations were also reported from other studies in India by Majumder et al. (2009), Ramesh et al. (2011) and in Africa by Hunter et al. (2007) and Houston (2009). Feeding on a single carcass by two or three species of vultures together, as recorded during this study, has also been reported in other parts of India by Ali & Ripley (1998), Majumder et al. (2009) and Ramesh et al. (2011).

Table 3. Nesting sites of Long-billed Vulture and White-backed Vulture in Bandhavgarh Tiger Reserve (2011–2013).

	Rocky cliff	Bhandani hill	Sal tree	Total nests
Long-billed Vulture	19	5	1	25
White-backed Vulture	2	--	--	2
Total number of nests	21	5	1	27

**Image 3. Egyptian Vulture *Neophron percnopterus*****Image 4. Long-billed Vulture flock****Image 5. Long-billed Vultures feeding on carcass**

The rocky cliffs around Bandhavgarh Fort and Bhandani Hills provide favorable nesting sites for vultures. It is recommended that regular monitoring of vulture nest sites in the study area to assess the breeding success is crucial. Since we observed the vultures feeding on dumped carcass near villages, use of Diclofenac in the villages around the park should be monitored as it has caused a large-scale mortality in vultures in different regions of the country.

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