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## Bundelkhand Region: A promising breeding area for vultures (*Gyps species*)

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### Abstract

Breeding habitat plays a vital role for the survival of individual bird. *Gyps* vulture breeds in colony. They are slow breeding birds; they mature at the age of five years and lay maximum one egg per year. The aim of this study was to locate the promising breeding sites of *Gyps* species of vultures in some of the areas of Uttar Pradesh and Madhya Pradesh which belong to Bundelkhand region. This region is prosperous with vulture's population and species diversity, due to availability of nesting trees, cliffs and Monument. The study was carried out from September 2015 to December 2016. The study revealed the presence of total 30 breeding sites from Bundelkhand region. Maximum number of breeding sites found in Shivpuri (8) followed by Panna Tiger Reserve (7), Tikamgarh (Orcha-5), Lalitpur (1), Madhav National Park (6), Karaira Sanctuary (1), Jhansi (2).

**Keywords:** Vultures, Bundelkhan region, *Gyps indicus*, Breeding sites

### 1. Introduction

Vultures have slow breeding rate [8]. It lays a single egg per breeding season and adapted the maturity at the age of 4-5 years. Vultures are similar in appearance so it is not easy to identify males and females on the basis of their morphological characteristics. Vultures are Monogamous i.e. they form close relationship through courtship and sexual activity for life. Studied area includes bundelkhand region which cover 14 districts of Uttar Pradesh and Madhya Pradesh. Breeding area consists mixed dry deciduous forest which is rich in Haldu, Semal, Tamarindus, Mahuua, Sheesam, Sal, Salai, Tendu. These trees are used for nests construction and also for roosting. Now days this county facing the problem of acute ecological degradation due to deforestation, drought leading to low productivity of the land. Over the last years in 2016 this region suffers from serious drought which has caused adverse effect on growth and regeneration of the vegetation. This could also affect breeding vultures. *Gyps indicus* is a colonial vulture nest almost exclusively on Monuments, cliffs and ruins, although in areas, where cliffs are absent, they have been recorded nesting in trees [11]. They select breeding sites on the basis of availability of long trees or cliffs. They insure that their breeding sites always at close proximity of water resources. They take bath after each meal to clear blood smudge on the bill and other body parts and to save themselves from various microbial diseases

The source of water in this area is Chambal Jamni and Betwa [8]. Vultures are shy bird so they avoid human disturbances, Predator availability and temperature, presence of predators at their breeding sites. Most of nests of *Gyps indicus* are in the monuments (Temples, Palaces, Cenotphs) of Orchha, like Laxmi temple, Jahagir Mahal, Raja Ram Mandir, Chaturbhuj Temple, and Badi Chhatris to protect their nestling from high wind and rain. The nests are built in such locations of the monuments and trees that are well protected and out of human reach. The nests are constructed along the water bodies.

The species is classified as Critically Endangered (IUCN Red List) because of a catastrophic decline of 90–98 % in the population of *Gyps species* [10, 12], due to diclofenac poisoning [3, 14]. In Present scenario breeding sites of Bundelkhand region facing the problems of habitat loss, anthropogenic activities such as unusual crackers, festivals, movies shooting in historical monuments, light and sounds programmes and uncontrolled tourism leads to the disturbance in the food chain. The aim of this study was to locate the promising breeding sites and type of habitat of *Gyps* vultures in Bundelkhand.

## 2. Materials and Methods

The study was carried out in Shivpuri, Tkamgarh (Orcha), Lalitpur (Devgarh), Madhav, Panna, Jhansi which is situated in Bundelkhand region India (Fig.1). Bundelkhand lies between 23° 35'-26° N and 78°-82° E. It is located South of the Yamuna river. The Bundelkhand region within these boundaries has an area of around 70,000 sq. km. The region is marked by extremes of temperature reaching 48°C during the summer months and dropping sometimes as low as 1°C in winter the temperature begins to rise in February and reaches its peak in May-June. The rainfall distribution pattern is irregular, which is approximately 90% caused by the monsoon falling from June to October. Average rainfall per year 800-900 mm but most of it is lost as run-off. Vultures found in the cliffs, monument and large trees and this region was well fed with rocky cliff, large trees, historical monument. The Bundelkhand Region was densely forested. With population explosion and thrust on developmental activities, ever increasing biotic interference resulted in shrinking of the forest areas and extreme qualitative loss to them [2]. Large part of Bundelkhand consists of *Southern and Northern Tropical dry deciduous forests*. These forests are-Tropical Riparian fringing forests, Deformed stages of Dry Deciduous forests, Ravine thorn forests, Kardhai (*Anogeissus pendula*) forests, Kardhai (*Anogeissus pendula*) scrub, Palas, (*Butea monosperma*) forests, Dry bamboo brakes, Salai (*Boswellia serrata*) forests, Babool (*Acacia nilotica*) forests, Dry Sagaun (*Tectona grandis*) forests, Senhur (*Euphorbia Nivulia*) scrubs.

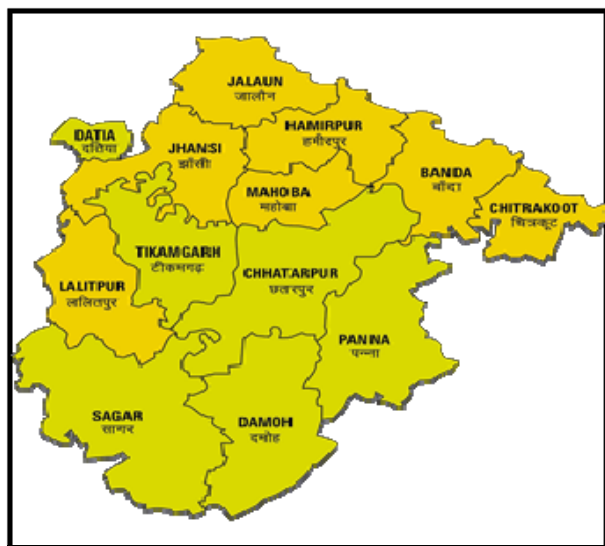


Fig 1: Map of study site (Bundelkhand region)

The study was carried out from September 2015 to December 2016. The data was collected to identify the possible vulture occurrence spots within the Bundelkhand region. Vultures were counted at nesting sites, roosting sites, near water body or any carcasses seen besides road in the morning and in the evening from a vehicle and on foot. Counting of nests was done by moving on foot alongside rows of long trees and cliffs in morning and evening. Indirect signs of vultures in particular such as white washes and molted feathers were searched to locate vulture breeding colonies. All observations were made using 70 D SLR Canon camera for photography & recording any present activity with the help of binoculars. All identifications of vultures were based on Ali & Ripley handbook [1].

## 3. Results and Discussion

Bundelkhand region is rich in vulture species diversity and has suitable breeding habitat for vultures. The study reveals the presence of total 30 breeding sites from Bundelkhand region (Table. 1). Maximum number of breeding sites found in Shivpuri (8) followed by Panna Tiger Reserve (7), Madhav National Park (6), Tikamgarh (Orcha-5), Jhansi (2), Lalitpur (1), Karaira (Fig.2 and 3). Overall population of vultures recorded during the study period is shown in fig.4.

**3.1 Shivpuri:** Out of thirty breeding sites 8 breeding sites observed in Shivpuri in which maximum 21 nests observed in Satkewara on Blukho Cliff due to no disturbance of local people in their breeding sites and good availability of feeding sites in this area (Fig. 5a and 5b). Breeding of Indian vulture on the steep rocky slopes also observed in the Nilgiri North Forest Division and Sathyamangalam Tiger Reserve [13]. Nest of vultures reported in Arjun, Peepal, Mahua, Semal.

**3.2 Orcha:** 20 Nests of Long billed vultures (*Gyps indicus*) are recorded on the cenotaphs, temples and forts, Madhya Pradesh. Maximum number of nest recorded in badi chatr, chaturbhuj temple, and only single nest found in jhangir Mahal (Fig. 6a). Waterbody recorded in Orcha is Betwa river (Fig.6b). In Orcha the frequent presence of people in the breeding areas alters the behaviour of adults, mainly during the second half of the nestling period [5, 8]. In Bejjur reserve, Telangana nesting and roosting sites of vultures identified on the basis of large white patches [12]. Vultures invest remarkable effort in their offspring. In fact, Neophron percnopterus are extremely cautious when they approach the nest, and tend not to enter if any disturbance is occurring in the surroundings. The average 307m distance from where human disturbance could alter the behavior of breeding birds is similar to those estimated for other large raptors. The frequent presence of people in the breeding areas alters the behaviour of adults, mainly during the second half of the nestling period. In 2015-16 a total of 8 vulture fledglings have been rescued with cooperative efforts [8]. Due to ignorance and unawareness the local visitors also injure the vultures just for fun by stone the vulture experts [9].

**3.3 Panna Tiger Reserve:** This area has 35 nests of Critically Endangered *Gyps indicus* *Gyps indicus*, *Neophron percnopterus*, *Sarcogyps calvus*. Maximum number of nests 15 nest found in sakro (Fig. 7a). Panna has rich species diversity due to more prey predator availability. Ken river is the source of water for vultures in Panna, Madhya Pradesh (Fig. 7b). In Panna tiger reserve total of 179 individuals (160 Indian vulture) and 8 nests of four vulture species were recorded [4]. Bundelkhand region cover most of the Indian vulture species [5].

In

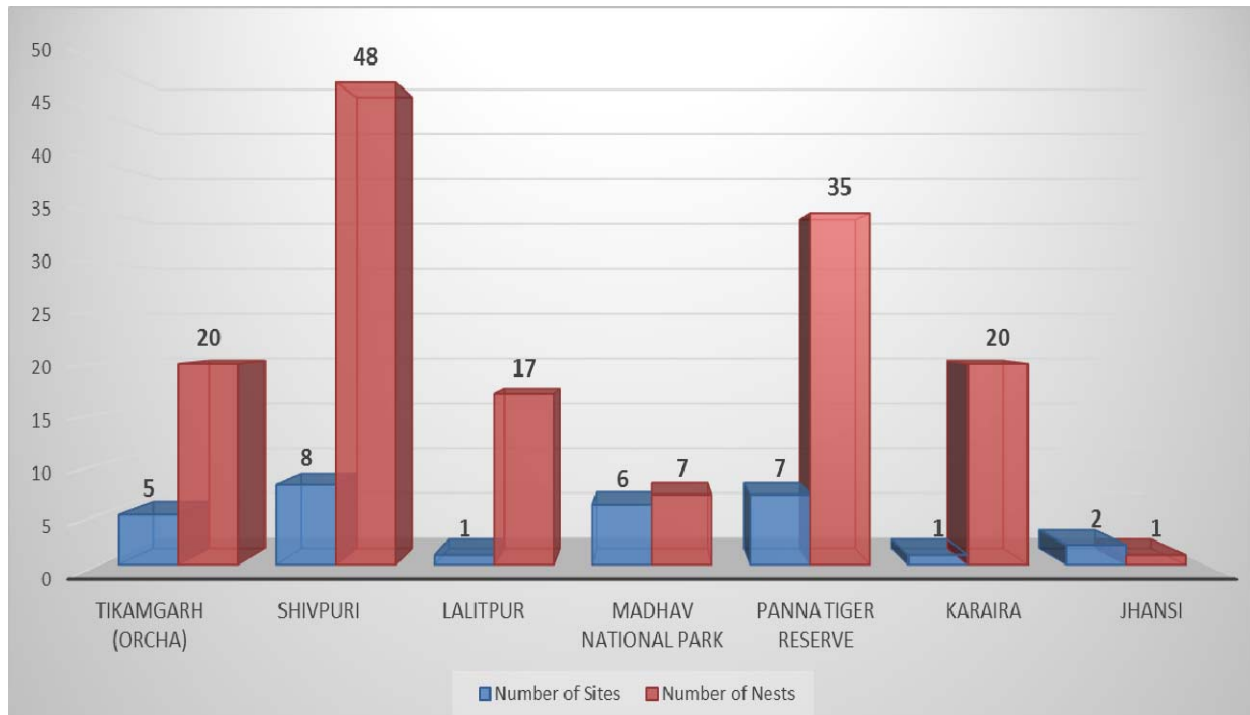
**3.4 Madhav National Park:** 7 Breeding sites of vulture in Chand Beat, Nogaja Beat, Aravan Beat, Raipur Pond, Theh Beat, Chapar Ghat were recorded. Out of 3 nests 1 nest was of *Sarcogyps calvus* observed in Amba Beat (South range-fig. 8a and 8b). Nest of the vultures found on the Trees like Tendu, Semal, Mahua, Sal, Salai, Saj, Arjun. Sindh River is the water source near breeding sites. The predator populations are high and provide a good supply of left-over prey for vultures [4, 6].

**3.5 In Lalitpur (Deogarh):** at present only single *Gyps* species (*Gyps indicus*) has been recorded. They make nest on the crack or platform of cliff, which protect the nest from fast air and rain. It makes nest away from human disturbance and

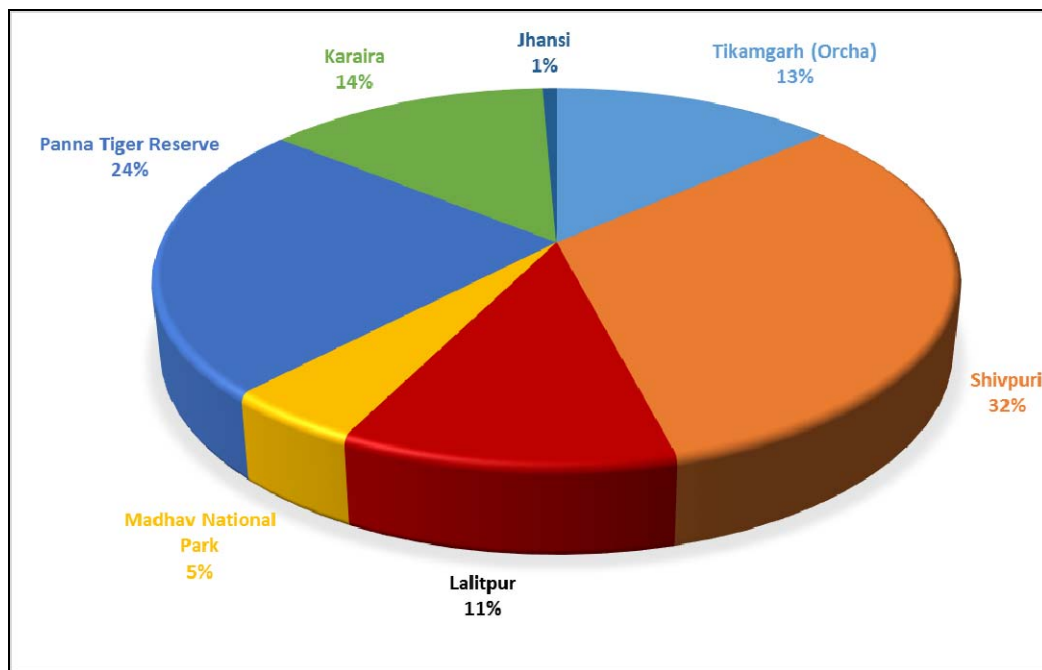
near the water body because the take bath after each meal. No nest observed in Seepri of Jhansi while one nest observed in Moath which is *Gyps indicus* species (fig. 9). In Karaira Sanctuary 20 nests observed with one breeding site.

**Table 1:** Overall scenario of vultures breeding sites in Bundelkhand Region

SN.	Area/ District	Name of Breeding Site	GPS coordinates of breeding site	Breeding Vultures' species	Total no of Vulture	No. of Nest	Total sites
1.	Tikamgarh (Orcha)	Laxmi temple	-	<i>Gyps indicus</i>	02	00	05
		Jahagir Mahal	N 25°21'03.00" E 78°38'39.4"	<i>Gyps indicus</i>	04	02	
		Raja Ram Mandir	-	<i>Gyps indicus</i>	01	00	
		Chaturbhuj Temple	N 25°20'59.7" E 78°38'23.7"	<i>Gyps indicus</i>	18	04	
		Chatri	N 25°20'39.3" E 78°38'18.6"	<i>Gyps indicus, Neophron percnopterus</i>	29	14	
2.	Shivpuri	Satanawara (Nayagaon)	N 25°38.428' E 077°45.576'	<i>Gyps indicus, Neophron percnopterus</i>	40	16	08
		Satkewara (Blukho cliff)	N 25°37.205' E 077°42.561'	<i>Gyps indicus, Neophron percnopterus,</i>	54	21	
		Kankar	N 25°32.959' E 077°41.123'	<i>Gyps indicus, Gyps fulvus</i>	46	-	
		Baran,	N 25°36.488' E 077°41.567'	<i>Gyps indicus Neophron percnopterus</i>	11	-	
		Karai bara	N25°37'12.08" E 77°42'33.68"	<i>Gyps indicus Neophron percnopterus</i>	24	11	
		Gopalpur	N 25°43.170' E 077°39.333'	<i>Neophron percnopterus</i>	03	00	
		Binega	N25°31'46.3" E77°41'46.7"	<i>Neophron percnopterus</i>	02	00	
		Jhirna	N25°34'59.7" E77°39'54.3"	<i>Sarcogyps calvus, Neophron percnopterus</i>	03	-	
3.	Lalitpur	Devgarh	-	<i>Gyps indicus</i>	34	17	01
4.	Madhav National Park	Aravan Beat	N 25°34'03.3" E 077°48'54.8"	<i>Sarcogyps calvus, Gyps bengalensis</i>	05	01	06
		Chand Beat	N 25°32'14.4" E 077°49'10.9"	<i>Sarcogyps calvus</i>	01	01	
		Theh Beat	N 25°31'09.4" E 077°49'20.0"	<i>Gyps indicus, Sarcogyps calvus Gyps bengalensis, Neophron percnopterus</i>	19	00	
		Chaper Ghat	N 25°30'14.8" E 077°47'49.7"	<i>Neophron percnopterus, Sarcogyps calvus</i>	03	01	
		Amba Beat	N25°27.580 E077°42567	<i>Gyps indicus</i>	06	03	
		Raipur Talab	25°35'22.5" 77°49'10.04"	<i>Gyps bengalensis</i>	02	01	
5.	Panna Tiger Reserve	Dhudhua Seha	N 24° 37'30.6" E079°58'20.1"	<i>Gyps indicus</i>	55	07	07
		Sakro	N 24°30'59.2" E 079°52'55.9"	<i>Gyps indicus, Sarcogyps calvus</i>	17	15	
		Devrdev	N 24°30'18.1" E 079°52'11.1"	<i>Gyps indicus</i>	02	02	
		Ghariya Ghat	N 24°28.350' E 079°52.727'	<i>Gyps indicus, Sarcogyps calvus, Gyps bengalensis</i>	09	06	
		Balaiya Seha	N 24°45'00.5" E 080°05'22.0"	<i>Sarcogyps calvus, White backed vulture</i>	03	-	
		Umra van	N 24°42'50.9" E 080°05'45.5"	-	-	-	
		Badhor Seha	N 24°40'23.4" E 080°03'41.6"	<i>Gyps indicus</i>	05	05	
6.	Karaira	Karaira Sanctuary	N 25°27.527' E 078°14'810"	<i>Gyps indicus, Gyps bengalensis, Gyps fulvus</i>	53	20	01
7.	Jhansi	Seepri	-	<i>Gyps indicus, Neophron percnopterus</i>	13	-	02
		Moath	-	<i>Gyps indicus, Neophron percnopterus</i>	7	1	

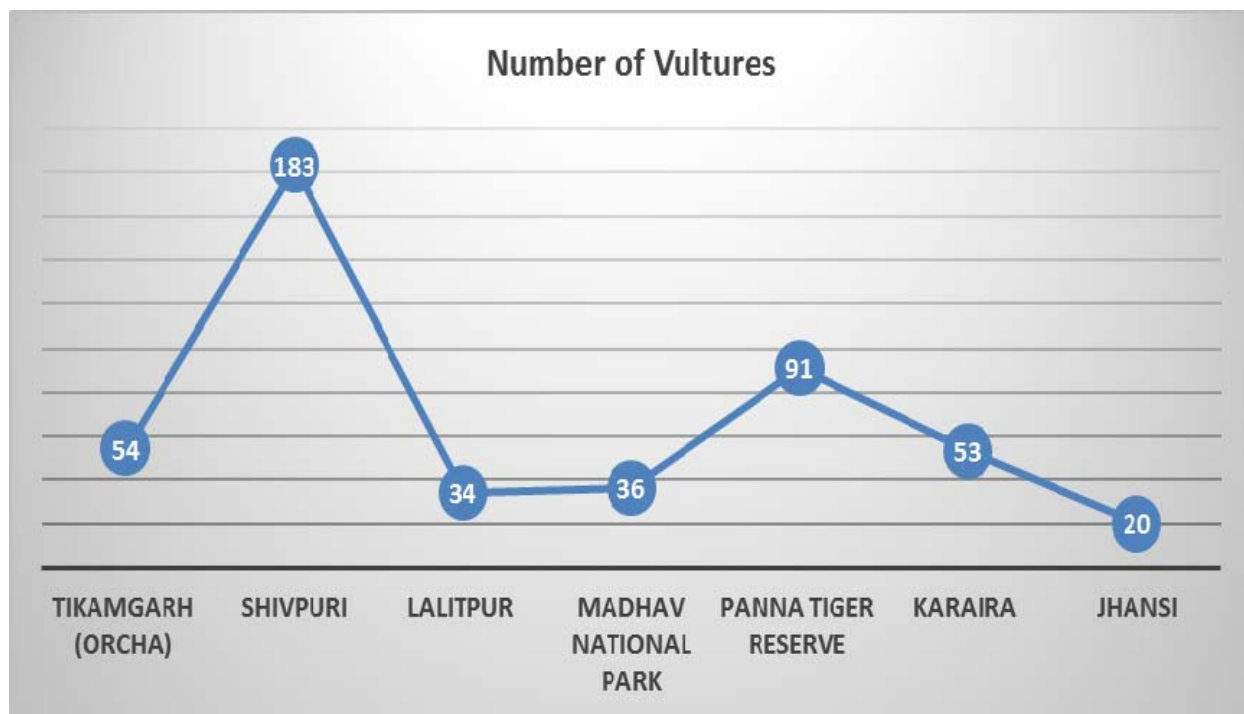


**Fig 2:** Total number of sites and nests in each study area of Bundelkhand region

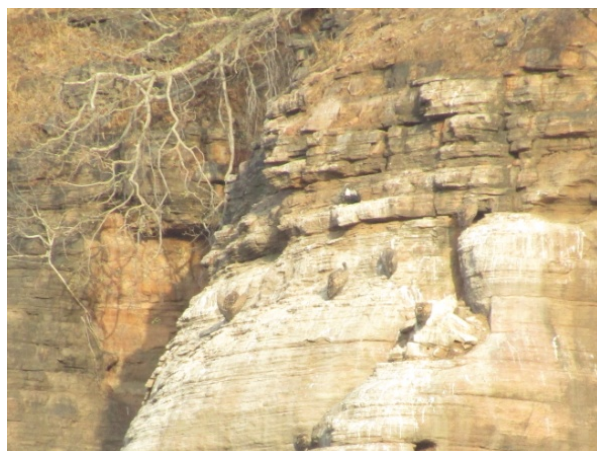


**Fig 3:** percentage wise distribution of nests in each study area of Bundelkhand region





**Fig 4:** Total number of vultures in each study area of Bundelkhand region



**Fig 5a:** Breeding Site (Blukho cliff) of Vulture in Shivpuri



**Fig 6a:** Breeding site of *Gyps indicus* in Orcha (Badi Chatri)



**Fig 5b:** Nest of *Neophron percnopterus* in Shivpuri



**Fig 6b:** Breeding site close to the River Betwa in Orcha





**Fig 7a:** Breeding Site Vultures with Nests in Panna



**Fig 8a:** *Neophron percnopterus* near Sindh River in Madhav National park



**Fig 7b:** Vultures near Waterbody (Ken River)



**Fig 8b:** Nest of *Sarcogyps calvus* in Madhav National Park



**Fig 9:** Nest of *Gyps indicus* in Panna and *Sarcogyps calvus* in Mador

#### 4. Conclusion

Vultures are the prime consumers and removal of a major scavenger as of the ecosystem will have an effect on the equilibrium stuck between populations of additional scavenging species and/or result in augment of crumbling carcasses causing eruption of contagious diseases. They select the breeding sites which are away from human disturbances so there is need to protect breeding colonies of vulture by converting them into protected areas. Bundelkhand region is a promising breeding area for vultures. Food availability and nesting place are in good status so this area became a vulture paradise with proper management and conservation effort.

The comprehensive study will in turn mark the way for conservational requirements including mass awareness as well as Co-ordination and understanding between various departments and Local Public.

Additional research work is suggested to create at least a baseline data for landscape, breeding aspects, pathological, genetic, molecular and microbial aspect of vultures. Volunteers who are ready to monitor the site should be appointed at each vulture colony, and inform the forest office and the organizations/NGOs working in that region, about any threat found. This way we can investigate the reason of death and any other threat.

## 5. Acknowledgement

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