Environment and Ecology 38 (4) : 919—926, October—December 2020
ISSN 0970-0420

Successful Breeding Rate and Population Status of Indian Vulture (*Gyps indicus*) at Kailashpuri, Udaipur District, Rajasthan

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10 August 2020, Accepted 15 Received September 2020, Published on 10 October 2020

ABSTRACT

Vultures are the most beneficial scavengers and they provide an ecological, economic and cultural value. All the vulture species consume carcasses of the small and large mammals, but mostly on the carcasses of domestic animals. This study has been conducted from July 2017 to June 2019. In the first year we recorded five nests out of which only three nests were successful. In the second year we recorded five nests out of which only one nest was successful. It was observed that the death of baby vultures were influenced by factors like- shortage of food, direct exposure to sunlight, human disturbance, high temperature in summers and precarious nest site on the bare rocky cliff of Aravalli hills. We did not observe Indian vultures at the feeding sites. However, Egyptian vultures, house crows, jungle crows, cattle egrets, black-headed white ibis and dogs were found scavenging carcasses at the feeding site. The population of the Indian vulture continues to decline. This decline is due to disturbance at nesting sites, anthropogenic activities, mining of Aravalli hills, construction of road and railway tracks, and cutting of trees. We recorded five species of vulture during the study – (1) Egyptian vulture (*Neophron percnopterous*), (2) Indian vulture (*Gyps indicus*), (3) White-rumped vulture (*Gyps bengalensis*) are resident species, while (4) Himalayan vulture (*Gyps himalayensis*) and (5) Eurasian griffon vulture (*Gyps fulvus*) are winter migrates in the Udaipur region.

Keywords: Microhabitat, Breeding, Carcass, Indian vulture, Aravalli.

INTRODUCTION

Vultures are known for their key role in the ecosystem.They are largely influenced by environment changes and as a result they act as excellent signal of bio-indicator of ecosystem health. They feed on animal carcass and play prime role in environment cleaning (Mundey et al. 1992). Vultures mostly live on carrion and eat meat from carcasses before it rots. Thus they prevent the spreading of disease which can affect other living organisms including human (Iqbal et al. 2011). Totalnine species of vultures founds in India out of them five were categorized under the genus *Gyps* (Prakash 1999). Out of the five species which belong to genus *Gyps*, three vultures are res-

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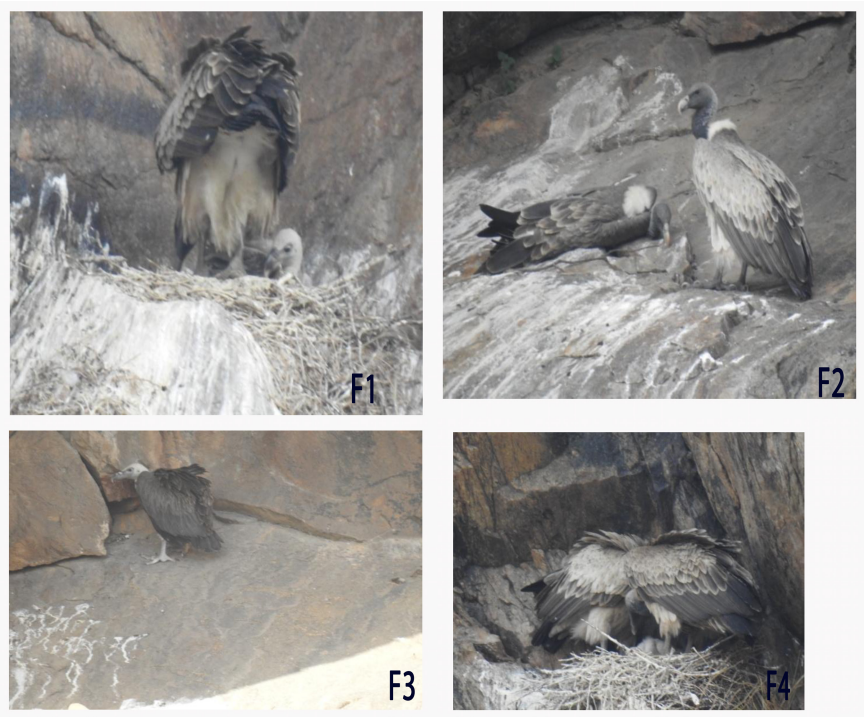

Fig. 1. Indian vulture with juvenile in the sleeping. **Fig. 2.** Indian vulure and juvenile. **Fig. 3.** Indian vulture juvenile left the nest (fledgling stage). **Fig. 4.** Indian vultures both adult and juvenile in nest.

ident and two species are winter migratory. Out of nine vultures species ; white rumped vulture (*Gyps bengalensis*), long-billed vulture (*Gyps indicus*), Slender-billed vulture (*Gyps tenuirostris*) are native while Eurasian griffon (*Gyps fulvus*) and Himalayan griffon (*Gyps himalayensis*) are winter migratory (Prakash et al. 2003).

The abundance of vulture depends upon availability of food supply in form of dead ungulates and other vertebrates in rural areas, towns and cities. In large region of India, Hindu beliefs prohibit the killing of cows and consumption of its meat. Dead cows and feral animals are left in open area of village or the carcass is disposed off at dumping sites around villages and cites (Prakash et al. 2003). The vulture population in Indian subcontinent has rapidly declined since the 1990s. The Veterinary medicine use of non-steroidal anti-inflammatory drug (NSAID), diclofenac in domestic animals is the major and perhaps the only reason of vulture population declined (Green et al. 2004. Oaks et al. 2004, Shultz et al. 2004). Vultures contact with toxic levels of diclofenac when they eatcarcasses of animals which contain remnant part of the drug (Oaks et al. 2004). Vultures which ingest enough amount of meat from such livestock's die due to the effect of diclofenac that induces kidney failure (Green et al. 2004).

In this paper, we report the result of survey, which involved monitoring of Indian vulture population in southern Rajasthan from July 2017 to August 2019. To study the breeding success of Indian vulture, nests were counted and then segregated as - active nests, unoccupied nests. The general breeding behaviors were also recorded.

Results were analyzed for –

(1) Success rate of breeding and the current population trend of the vultures in the study area.

Fig. 5. Inactive/ unoccupied Indian vulture nest. Fig. 6. Indian vulture nest near the rock and honey bee colonies. **Fig. 7.** Indian vulture neck dropping behavior. **Fig. 8.** Indian vulture juvenile sleeping in Sun.

(2) The threats to the vulture populations, their nesting behavior and thus determine the population status.

The Indian vulture (*Gyps indicus*) is a resident Gyps species in India. Indian vulture mostly nests and breeds in colonies on rock cliffs and ruins. Where rock cliffs are absent, vultures nest constructs upon the trees in Kolayat Tehsil of Bikaner, Rajasthan (Rasmussen and Anderton 2005, Khatri 2015). Breeding sites were observed in Kalashpuri, Udaipur district, Rajasthan, India. The breeding season for Indian vulture is from October to May/ June (Naoroji 2007). and despite being a priority species for conservation, relatively little is known about their breeding biology and nesting ecology (Naoroji 2007).

The breeding success of Indian vulture depends upon of their breeding biology, breeding habitat, site of nest, availability of food and also breeding potential. There is incredible difference in nest building by vulture species and within species, variation in nest characteristic and size can be noticeable. Nest construction behavior and ability varies from individuals to individuals (Collias and Collias 1984).

Objective of study

The current study is designed with the general aim of assessing breeding success, population status in selective breeding site and assessment of threat of vulture species in southern Rajasthan. Study is mainly focused on Indian vulture.

Study area

Site is located near Eklingji temple Kailashpuri, Udaipur district, Rajasthan, (24°45.39''N 73°43.062'E). During study we had seen large number of domestic animal carcass around selective microhabitat, Ghoshala (Cow shelter home). Domestic livestock was also present around the study area, which perhaps was the food source. Southern Rajasthan has a tropical deciduous forest which comprises of dry teak bearing forests. Major flora of the region are Amli (*Tamarindus indica*), Kher (*Acacia senegal*), Desi babool (*Acacia nilotica*) Khair (*Acacia catechu*), Churel (*Holoptelea integrifolia*), Khakhro (*Butea monosperma*) Jamun (*Syzygium cumini*), Gonda (*Cordia dichotoma*), Aam (*Mangifera indica*) Boradi (*Zizyphus nummularia*), Neem (*Azadirachta indica*)

Table 1. Breeding successful rate of July 2017 to June 2018 and July 2018 to August 2019.

Nest ID	July 2017– June 2018 Breeding Status	Special remark	July 2018 – Aujust 2019 Breeding status	Special remark
Nest 1	Successful breeding	Chick started to fly	Inactive nest	Both adults were alive in colonies, sometime attempt matting
Nest 2	Successful breeding	Chick started to fly	Active nest, successful breeding	Development successfully done, Chicks were able to fly
Nest 3	Successful breeding	Chick start to fly	Active nest, death at juvenile stage	Development failed, no succ-essful breeding was observed
Nest 4	Death at juvenile stage	Incubation was succ-essful, but chick died in May 2018	Inactive nest	Both adults lived in old nest
Nest 5	Failed development at incubation stage	Failed to develop at in cubation period in January 2018	Both adult were not seen in the breeding colonies	Both adult were not seen in the breeding colonies

and Kikar (*Pithecellobium dulce*).

MATERIALS AND METHODS

Surveys were repeated after 15 days for two year between July-2017 to August-2019. The vulture populations were counted by road transects method and roosting time. The breeding success were observed by nests census and on the support of –

(a) Active nests/ occupied nests and

(b) Inactive nests/ unoccupied nests.

Rajasthan has traditionally been the holder of good domestic animal population since the village economy partly depends on domestic animal, after agriculture. Mostly survey of the nesting and breeding sites of Indian vulture were observed at selective microhabitat in the southern Rajasthan. This was to determine the following :

- Success breeding rate,
- The current population status in selective sites,
- Total nest count,
- Observed active nest number.

The study was supported by repeated direct observation, using binoculars Nikon 8X40, and photography, videography done by Nikon Coolpix P900, Canon D-60 camera, sigma 150-500 lens for two years regular monitoring of selective microhabitat.

For the two years (July 2017- August 2019) survey were conducted after every 15 days interval for continuous observation of site. During the study we visited the breeding colonies for 52 times. During these visits time observation were done in the mornings from 7.00am to 10.00am and were recorded in the evenings between 4.00pm to 6.00pm. A total of 260 hours were spent during the study in order to record the observations.

RESULTS AND DISCUSSION

The nests that contained egg or an adult in an incubating position was considered active / occupied nest. The nest with no eggs or inactive was considered inactive/ unoccupied nest. Successful nesting was considered as nest which, was active nest and had an egg till the fledgling stage. In some nests, juvenile were died, while in some active nests after successful lying of eggs no further development occurred. Data were analyzed by using following parameters-

Fig. 9. Indian vulture adult protecting juvenile from the sunlight. **Fig. 10.** Indian vulture adult during incubation. **Fig. 11.** Indian vulture in egg incubation position. **Fig. 12.** Deserted nest of Indian vulture. **Fig. 13.** water body near breeding sites of Indian vulture. **Fig. 14.** water body near breeding sites of Indian vulture.

•Nests that contained an egg,
• Nets with an adult or two in an incubating position with no eggs,

• Nests unoccupied by vulture as considered inactive nest,

• Successful nests, the nesting considered from egg laying to fledgling stage.

In the first year July 2017– June 2018 successful breeding rate was recorded as 60%. Of the five nest three nest successfully developed chick and were able to fly while, two nests failed to successfully develop the chick.

In the second year July 2018- August 2019 successful breeding rate was recorded as 20% only. One nest successfully developed the chick and it was able to fly, the other four nests failed to develop in the mentioned period. High temperatures during the summer season may be responsible for death of the juvenile. Temperature increase and direct exposure of sunlight on the nest colonies after 10am to 6/7pm sunlight vary from season to seasons. These nesting sites were located on rock and there was absence of green trees or any other cover.

The water bodies also play a significant role in breeding, especially nestling in the summers (March-June). During the period of study no Indian

Fig. 15. Indian vulture adults with fledgling juvenile. **Fig. 16.** Cow carcass consumed by feral dogs, jungle and house crows. **Fig. 17.** Monkey movement seen near breeding habitat of Indian vulture**. Fig.18.** Indian grey mongoose movement near breeding colonies of Indian vulture.

vulture was observed on carcasses. The carcasses were consumed by Egyptian vultures, house crows, jungle crows, cattle egrets, Black headed white and feral dogs.

Table 1 shows the status of Indian vulture success breeding rate. During the study we recorded total 12 adults of Indian vulture. Other species of vulture- Egyptian vulture (20), White rumped vulture (4), Himalayan vulture (9) and Eurasian griffon vulture (5) individuals were recorded. Himalayan vulture and Eurasian griffon are winter migratory while remaining species are resident.

Threats to the vultures population were due to spread of agricultural, destruction of habitat and mining of rocks. At times movement of the monkey was also observed near the breeding sites which, too was a threat. Breeding rates also declining due to disturbance in their food chain due to anthropogenic disturbance like cutting of trees and using of feeding sites for construction and road development (Kushwaha and Kanaujia 2009).

The two-year study depicts the decline of nesting habitat and anthropogenic impact on breeding habitat of vulture in southern Rajasthan. Atthe study period 5 species of vultures reported in study area- Indian vulture, Himalayan vulture, Egyptian, Eurasian griffon vulture and white-backed vulture. In Udaipur, the *Gyps* vultures were limited in numbers, no breeding site were reported of white-rumped, Himalayan griffon and Eurasian griffon vulture. A vulture provides good parental cares, from the times of egg laying to the first flight of juvenile. Out of the two parents at least one parent is always in the nest (Chhangani 2004).

CONCLUSION

The population of the vulture in Udaipur district was very less, especially the critically endangered species (Indian vulture, white-rumped vulture).

Vulture species generally feed upon dead vertebrates. Vultures are sensitive to disturbance. During the breeding periods there should be an effort to restrict human, monkey and other animal's movements

Fig. 19. An over view of Indian vulture breeding microhabitat, Kalishpuri Udaipur, Rajasthan.

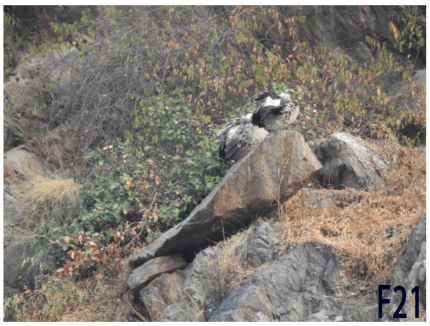

Fig. 20. Active nests of Indian vulture. **Fig. 21.** Indian vultures pair sitting away from deserted nest.

in nesting area. The objective of this study was to record the population status and successful breeding rate in Kalashpuri area of Udaipur district. In this microhabitat the various types of human activities was observed like Aravalli rock mining, construction of road, cutting of trees and grazing of animals. Human disturbance, interaction leads to destruction of the breeding habitat. The captive breeding program is required to be immediately introduced in Rajasthan to save vultures species, from local extinction. We conclude that more nesting colonies of vulture occur in southern Rajasthan and these need to be observed, protected and conserved on priority basis as a part of these areas.

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