

Status of vultures in India: A review

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Abstract

Vultures keep the ecosystem clean by feeding on carcasses of different sizes and hence prevent the spread of disease to other animals and humans. Nine species of vultures have been reported from India. Among them, four are critically endangered, one endangered, three near threatened and one least concern as per the IUCN status. In India, the population of vultures declined drastically since 1990s. This decline is mainly attributed to the usage of diclofenac to treat farm animals. The other threats include habitat loss, infectious diseases, environmental contaminants, low food availability and human interference. The nest site selection and breeding success of vultures primarily depend on interaction with humans and other animals. Some of the suggested measures for vulture conservation are: implementing ban on diclofenac, maintaining captive breeding centres and minimizing disturbance to vultures.

Keywords: *breeding success, conservation, decline, status, vultures.*

1. Introduction

Vultures play an important ecological role by scavenging on animal carcasses (Ali and Ripley, 1968). They live chiefly on carrion (Munday *et al.*, 1992) and tear meat from carcasses before it rots and prevent the spread of diseases which would affect other mammals, including humans, (Iqbal *et al.*, 2011). World over there are 23 species of vultures which have been classified into two categories, Old world vultures and New world vultures. Out of these, 16 species occur in Old World and seven species belong to New World (Ogada *et al.*, 2012). The similarities between the two groups are due to convergent evolution. The Old World vultures found in Africa, Asia, and Europe belonging to the family Accipitridae, find carcasses exclusively by sight. The New World vultures found in warm and temperate areas of the Americas belonging to family Cathartidae have a good sense of smell, unusual for raptors and are able to smell the dead they focus

upon from great heights, up to a mile away (Bird Life International, 2010).

Vultures have declined from many parts of their former ranges due to food shortage and loss of habitat (Pain *et al.*, 2003). However, since early 1990s there has been a catastrophic decline in three Gyps species in the Indian subcontinent, White-rumped vulture (*Gyps bengalensis*), Indian vulture (*Gyps indicus*) and Slender-billed vulture (*Gyps tenuirostris*) (Prakash 1999; Virani *et al.*, 2001; Prakash *et al.*, 2003) and all the three species were reclassified as 'Critically Endangered' (Bird Life International 2001). A variety of explanations and hypotheses have been proposed for the decline of vultures. These include reduction in food availability, poisoning, habitat loss, pesticide intoxication, calcium deficiency and infectious disease (Cunningham *et al.*, 2003; Chhangani *et al.*, 2004).

Out of 23 species of vultures in the world, nine are found in India (Ansari, 2015). These include Oriental white-backed or White-rumped vulture *Gyps bengalensis*; Slender-billed vulture *Gyps tenuirostris*; Long-billed or Indian vulture *Gyps indicus*; Egyptian vulture *Neophron percnopterus*; Red-headed or King vulture *Sarcogyps calvus*; Indian griffon vulture *Gyps fulvus*; Himalayan griffon *Gyps himalayensis*; Cinereous vulture *Aegypius monachus* and Bearded vulture or Lammergeier *Gypaetus barbatus* (Ali and Ripley, 1983; MoEF. 2006). Among these vultures, four are critically endangered, one endangered, three near threatened and one least concern as per the IUCN status (Table 1). Five species belonging to genus *Gyps*, viz. Indian white-backed vulture (*Gyps bengalensis*), Long-billed vulture (*Gyps indicus*) and Slender-billed vulture (*Gyps tenuirostris*) are residents, and the other two, the Eurasian griffon (*Gyps fulvus*) and Himalayan griffon (*Gyps himalayensis*) are wintering species (Prakash, 1999; Prakash *et al.*, 2003). In addition, the other four species viz. Lammergeier (*Gypaetus barbatus*), Egyptian vulture (*Neophron percnopterus*) and Red-headed vulture (*Sarcogyps calvus*) are resident while Cinereous vulture (*Aegypius monachus*) is a wintering species (Grimmett *et al.*, 2001).

2. Habitat preferences

All vulture species are present in almost all biogeographical zones of the Indian subcontinent with the exception of White-rumped vulture and Indian vulture which are absent in the Trans-Himalaya and the Andaman & Nicobar Islands (Ali & Ripley, 1983). Generally vulture populations are observed in the areas with permanent water bodies, livestock and wildlife population and presence of carcass dumping grounds (Channgani, 2010). They are also observed near safe nesting and roosting trees and cliffs particularly in protected and undisturbed areas (Channgani, 2005). Thorn forests attract the greatest number of vultures, followed by dry deciduous, moist deciduous and riverine forests (Samson, 2016). Egyptian Vultures could be seen in non-forested areas like semi-arid and gangetic eco-zones as they chose to feed on small animals, debris or rubbish dump, human and ungulate faeces, and vegetable matter (Prakash and Nanjappa 1988; Jha, 2015). Their presence in bone factory campus indicates that these vultures could feed on bony remains of old and dry carcasses collected for making fertilizers (Ansari, 2015). The rocky cliffs and hills provide a favourable nesting sites for vultures (Navaneethan *et al.*, 2015). Indian White-backed vulture prefers tall coconut trees and well foliated pine trees for nest building (Dave, 2011). The use of pine trees for nesting by Indian White backed vulture is justified as these trees have a very fine canopy with a number of forks for nest building (Thakur and Narang, 2012). A good population of Egyptian vulture, Long-billed vulture and Eurasian griffon vultures roost on rocks in gorges and valleys (Kumar *et al.*, 2014).

In India, the religious sentiments (non-beef eating habit), history of Gaushalas (cattle shelter where fodder and care is extended free of cost), village institutions like Gaucharas (village pastures), Orans (village forests), Nadis (village water bodies) and such other community lands owned by villages have been supporting vultures from decades. These areas become favourable for vultures as they provide suitable food, water and roosting sites to them (Chhangani, 2010).

3. Food and feeding

Vultures feed on carcass of dead animals and hence play an important role in clearing the environment. They scavenge entirely on the carrion. A flock of vultures can clean carcasses of dead bullock within 30 to 40 minutes. Thus the vultures help cleaning the vicinity from the dirt and danger of any epidemic break out due to the dead bodies of animals lying around (Purohit and Saran, 2013; Hussain, 2015). The stomach acid of vultures is corrosive which

allows them to digest infected carcasses safely (Thakur *et al.*, 2010). Amongst the different vulture species individuals of particular species play a crucial role during feeding and it has been observed that Cinereous vultures show their presence around the dead bodies of animals early in the morning because of the nearness of nesting sites with dumping areas. On the other hand, species of *Gyps* vultures exhibit their attendance at dumping site from 9:00 AM to 10:00 AM and the number of these individuals raises continuously till late afternoon (Purohit and Saran, 2013). Vultures have such weak bills that their food must be partly rotted before they can tear the flesh. Hence, they prefer to eat those carcasses which are usually two to three days older. This is because these carcasses become easy for the vultures to open.

In captivity, White rumped vulture has been observed to feed on the supplied carcass immediately while other vulture species (long billed and slender billed vulture) feed almost after a day (Lahkar *et al.*, 2010). Opening the carcasses is a tough job and mostly it is done by Cinereous and Red headed vultures because of their strong, slightly tilted and pointed bills allowing them to forage on tough muscles and skin (Purohit and Saran, 2013; Hussain, 2015; Lahkar *et al.*, 2010).

Though vultures mainly feed on carcasses but at the same time it has been observed that Egyptian vultures sometimes feed on scat of tiger possibly to collect hair for nest building (Navaneethan *et al.*, 2015). It has been found that two or three species of vultures can together feed on a single carcass (Ali and Ripley, 1983; Navaneethan *et al.*, 2015) along with other scavengers like large billed crow, jackal, wild pig and hawk eagle (Navaneethan *et al.*, 2015). Egyptian vulture is an opportunistic scavenger that uses a variety of food sources in its diet (Ali and Ripley, 1983; Samson *et al.*, 2016) and the range of food items include insects in dung, carrion, vegetable matter and sometimes small mammals (Prakash and Nanjappa, 1988). It has been reported that about 85% of the diet of bearded vulture (*Gypaetus barbatus*) is composed of bones. The high acid content of its stomach allows digestion of bones within 24 hours. In fact, this vulture species waits at the feeding site so that other species of vultures can take meat and expose bones of the dead. It takes bones into the air and break them by dropping on a rocky surface (Ferguson-Lees and Christie, 2001; Margalida, 2008). Although vultures feed mainly on dead animals but it is a matter of surprise to know that Himalayan griffon takes needles of pine (*Pinus roxburghii*), a vegetative matter that may be taken to procure roughage to ease the process of digestion (Atkore and Dasgupta, 2006).

Table 1: IUCN status of vultures found in India (2016)

S.NO.	Species (Common name)	Species (Scientific name)	IUCN Status
1	White rumped vulture	<i>Gyps bengalensis</i>	Critically endangered
2	Slender billed vulture	<i>Gyps tenuirostris</i>	Critically endangered
3	Long billed vulture	<i>Gyps indicus</i>	Critically endangered
4	Red headed vulture	<i>Sarcogyps calvus</i>	Critically endangered
5	Egyptian vulture	<i>Neophron percnopterus</i>	Endangered
6	Himalayan vulture	<i>Gyps himalayensis</i>	Near threatened
7	Cinereous vulture	<i>Aegypius monachus</i>	Near threatened
8	Bearded vulture	<i>Gypaetus barbatus</i>	Near threatened
9	Indian griffon	<i>Gyps fulvus</i>	Least concern

4. Nesting and breeding

Vultures are colonial breeders and the commonly used trees for nest buildings include *Bombax ceiba*, *Cocos nucifera*, *Boswellia serrata*, *Anogeissus latifolia* and others (Grossman *et al.*, 1965; Kanaujia *et al.*, 2011). However, bearded vulture and slender billed vulture is a solitary breeder and nests away from their conspecifics and other vulture species (Snow and Perrins, 1998). Indian white backed vulture prefers pine trees (*Pinus roxburghii*) for their nesting due to their fine canopy and number of forks for nesting (Thakur and Narang, 2012). Vulture nest is a platform of sticks lined with green leaves (Kanaujia *et al.*, 2011). The addition of green leaves is to advertise nest occupancy (Advertisement theory) or to keep the parasites away from nests (Nest protection theory). Vultures show fidelity to their nests and use the same nest again and again because nest building in their case (when compared to large raptors in terms of the number of items brought to the nest) is highly energy consuming (Ayoama *et al.*, 1988). They are monogamous scavenging birds (Mundy *et al.*, 1992) with almost no sexual dimorphism (Xirouchakis *et al.*, 2006). However, extra-pair copulation has been found in Egyptian vultures where female bird sometimes associates with other male birds which provide an extra help in raising the brood (Tella, 1993 and Donazar *et al.*, 1994). Nest building is the earliest and primary step in the process of their breeding and they build nests on large trees, cliffs and old monuments (Grossman *et al.*, 1965). The rocky cliffs are a potent breeding and roosting habitat for Indian vultures. Most of the nests (90%) of Indian vultures

are located at an altitude of more than 900m. The nests are sheltered by rock ledges and hence are not exposed to over-heating and rain (Venkithachalam and Senthilnathan, 2015).

The breeding colonies of vultures are mostly near rivers, canals, ponds or even dams (Kanaujia and Kushwaha, 2013). The dependence of vulture species on water body may be for maintaining humidity for hatching of the egg. Most vulture species of India lay one egg per year, except Egyptian vulture, which may lay two to three eggs a year (Kanaujia *et al.*, 2013). Egg laying and incubation period varies from species to species, for example, in case of white rumped vulture eggs are mainly laid in January (Hume, 1896) while Egyptian vulture breeds in spring months (Ali and Ripley, 1983). Similarly, the incubation period for Egyptian vulture is 42 days (Ali and Ripley, 1983) while in case of white rumped vulture egg hatches in 30-35 days (Sharma, 1970). After hatching one adult bird (male/female) always remains present on the nest to protect its chick from predators. The adult bird allows only its partner in the nest. They protect the juveniles from sunlight and predators by spreading their wings over them. The juveniles remain in the nest for about three to five months after hatching. The altricial chicks and juveniles of vultures keep moving at the cliff, near the nesting site and remain at one place for hours together. They take few months to learn flying after which they move out in search of food. The whole process of breeding is complete in about 7 to 8 months (Kanaujia *et al.*, 2013). The breeding success is governed by the most important factor of food availability (Martin *et al.*, 1987; Subramanya and Naveein, 2006; Kanaujia *et al.*, 2011).

5. Threats

Vulture populations have declined from their former range due to shortage of food and destruction of their habitat (Pain *et al.*, 2003). Their population was about 40 million in India in 1980s, the reduction noted at Keoladeo National park by BNHS in late 1990s was alarming. The Gyps vultures are in danger of extinction due to use of diclofenac in farm animals in India, Pakistan and Nepal. Because of this, 95% population of vultures has previously declined and just 60,000 of vultures have remained. In contrast to use of diclofenac, BNHS in 2003 launched a campaign and Indian government in 2006 decided to forbid the manufacture, marketing and use of diclofenac (Ganguly and Mukhopadhyay, 2013). There are various reasons for the decline of vultures. However, persecution by humans and poisoning by diclofenac appear in the list of almost all decreasing population of vultures (Ogada *et al.*, 2012). The threats are briefly discussed below:

5.1 Diclofenac contamination

The main cause for the decline of vulture population is a non-steroid anti-inflammatory drug (NSAID), diclofenac (Green *et al.*, 2004; Shultz *et al.*, 2004 and Oaks *et al.*, 2006). Vultures are exposed to diclofenac after feeding on carcass of dead farm animals. It causes kidney failure in vultures and hence death (Oaks *et al.*, 2006). In Assam 99% of mortality of Oriental, White backed, slender billed and long billed vultures occurred due to diclofenac (Hussain, 2015).

5.2 Habitat loss

The vulture populations are declining day by day due to habitat loss, food unavailability and electrocution. Cutting down trees for agriculture, urbanization and firewood purposes, a cause of habitat degradation, is a threat to the nesting sites of vultures. Fire and grazing also decrease the safe roosting and nesting sites of vultures. The decrease in safer nesting sites in turn decreases their breeding success and increases the death rate (Purohit and Saran, 2013).

5.3 Interference due to traffic and other animals

The breeding sites of vultures especially *Gyps bengalensis* are mostly located around the roads. Human activities and traffic on the roads is a cause of concern as vultures may feed on roads making them prone to accidents. Another cause which has been established is the interference of other animals like monkeys with vultures and their nestlings (Thakur and Narang, 2012).

5.4 Infectious diseases

Infectious diseases are another threat to vultures. Evidence favouring infectious disease hypothesis emerged from post-mortem and histo-pathological studies of 28 carcasses of *Gyps bengalensis* and *Gyps indicus* gathered from across India (Cunningham *et al.*, 2001). Post-mortem study of many vultures displayed visceral or renal gout (Oaks *et al.*, 2006).

5.5 Low Food Availability

Dead animals are the primary source of food to different vulture species. Earlier the practice of throwing carcasses of animals in open was a dominant form of disposal but now such practice has almost vanished and dumping of the animal carcasses is preferred to prevent any disease spread. Hence a gradual decrease of available food in the form of carcasses poses a threat to vultures and

hence a cause of vulture population crash (Hussain, 2015).

5.6 Environmental Contaminants

It has been seen that environmental contaminants cause heavy mortality in raptor and vulture populations. Insecticides and pesticides contaminate the environment and their accumulation within the water bodies in turn serves as a potential contamination source. This may cause heavy losses to these birds due to bio-magnification (Hussain, 2015).

6. Recommendations

There are various threats to vultures in India and if these threats continue unabated, they will have serious implications for vultures and potentially for other wildlife and human health as well. So the following measures are suggested for vulture conservation in India:

- 1) The ecologists, ornithologists and wildlife biologists associated with vulture research should conduct regular surveys for monitoring population and reproductive biology of vultures in different habitats and potential areas of India.
- 2) Ban on manufacture, marketing and use of diclofenac should be implemented in letter and spirit.
- 3) Vulture restaurants (the areas where diclofenac free carcass are regularly provided to vultures) should be maintained wherever and whenever required.
- 4) Vultures are very sensitive to almost every kind of disturbance during their breeding season. Therefore, steps should be taken to develop an anthropogenic free area around the nesting sites of vultures at least during the breeding season.
- 5) Awareness programmes regarding importance of vultures should be conducted.
- 6) Egg destruction should be minimized by using nets below the nests wherever required.
- 7) Various government and non-government departments should cooperate and coordinate with each other for developing updated database on vulture species in India. This will facilitate launching of relevant conservation schemes in priority conservation areas.
- 8) Ex situ conservation through captive breeding centres as established in Haryana and West Bengal should be encouraged in other states as well for reintroduction into natural habitats.
- 9) Financial assistance from different government and non-government funding agencies should be given to organizations and researchers in lesser studied vulture potential areas for evaluating the conservation status of these bird species.

7. Conclusion

Vulture decline in India has a serious impact not only for the species themselves but also for other wildlife and human health as well. Conservation steps cannot be taken until the causal agents for the decline are identified. A considerable amount of work on the status of vultures has been done in India but there are still many potential areas which need to be addressed on priority basis. Survey and monitoring of vultures in India should continue and their behaviour should be studied through satellite-tracking so that the species specific effective conservation strategies are launched for effective management. Further research is needed to obtain detailed baseline data regarding parasitic, genetic and molecular aspects of these birds.

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