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Threats to vultures of Uttar Pradesh: A review

Narsingh Mani *, Jyoti Antil and Amita Kanaujia

Biodiversity and Wildlife Conservation Lab, Department of Zoology, University of Lucknow, Lucknow, Uttar Pradesh, India, 226007

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Abstract

Vultures play an important ecological role, maintain a healthy ecosystem, and limit the spread of disease to both people and other animals. India has nine different vulture species. Four are critically endangered, one is endangered, three are near threatened, and one is of least concern. Vulture numbers have sharply decreased in India. Uttar Pradesh has eight species of vulture. Uttar Pradesh comes under the tropical moist deciduous type of vegetation which can be further divided into the following forest types Sal forest, mixed forest, teak plantation, and savannah grasslands. An extensive literature survey was conducted to determine the threats of vultures. The study focuses on different types of threats to vultures in Uttar Pradesh. Some threats are noticed as the use of Diclofenac, shortage of food, habitat loss, infectious diseases, environmental toxins, poisoning of carcasses, electrocution, road accidents, and train accidents. Some suggested measures for vulture conservation are using diclofenac-free carcasses, increasing awareness about vultures, habitat protection, rehabilitation, breeding sites, and roosting sites.

Keywords: Vultures; Feeding; Threats; Habitat; Diclofenac; Uttar Pradesh

1. Introduction

Vultures are an important component of our ecosystem performing the role of scavengers that consume dead and decaying animal carcasses, thereby keeping the environment clean and healthy. Vultures, being obligatory scavengers, contribute significantly to the economy and ecology by consuming carrion and so controlling pests and disease. By reducing the period of rotting matter exposure, they significantly reduce the rate at which infectious diseases spread (Ogada et al., 2012b). Uttar Pradesh can be divided into three distinct hypsographical regions; the Terai eco-zone of Uttar Pradesh recorded the highest number of vultures in summer, winter, and monsoon seasons and six species (Egyptian Vulture, Himalayan Griffon, Red-headed Vulture, Indian Vulture, Slender-billed Vulture, and White-rumped Vulture). However, the Gangetic and Semi-arid eco-zones had only Egyptian Vultures, and the Bundelkhand -Vindhyan region had Indian Vultures (Jha, 2015). Vultures are highly intolerant to the NSAID Diclofenac, which they are exposed to through the carcasses of recently treated livestock. Diclofenac is known to kill Gyps Vultures, White-backed vultures, Indian vultures, Slender-billed vultures, Himalayan griffon, and Griffon vultures (Oaks *et al*., 2004; Swan *et al.*, 2006a; Das *et al*., 2011) and possibly other species, Egyptian vultures, Red-headed vultures, and Bearded vultures also (Cuthbert *et al.,* 2007; Acharya *et al*., 2010). Large birds, including vultures, are killed by collisions and electrocution on energy infrastructure. This threat increases if projected increases in energy installations, particularly renewables, are not supported by appropriate siting and bird-safe pole designs (Carrete et al. 2012). The vulture population in Uttar Pradesh, India is declining due to various factors such as reduced food supply, habitat destruction and degradation, and human disturbance around breeding colonies. The first two factors play a major role in this decline. The residential status of vultures of Uttar Pradesh is following-

* Corresponding author: Narsingh Mani.

1.1. Residential Species

- *Gyps indicus* (Long-billed vulture)
- *Gyps bengalensis* (White-backed vulture)
- *Gyps tenuirostris* (Slender-billed vulture)
- *Sarcogyps calvus* (King vulture)
- *Neophron percnopterus* (Egyptian vulture)

1.2. Non Residential Species

- *Aegypius monachus* (Cinereous vulture)
- *Gyps fulvus* (Griffon vulture)
- *Gyps himalayensis* (Himalayan Griffon vulture)

1.3. Study site

To search relevant literature, we used the keywords Vulture, Threats, and Feeding in the Uttar Pradesh. (Keywords) secondary data was collected. We examined annotated databases, such as newsletters, magazine articles, and research articles. Uttar Pradesh is bounded by Uttarakhand and Himachal Pradesh on the north-west, Haryana and Delhi on the west, Rajasthan on the south-west, Madhya Pradesh on the south, Chhattisgarh and Jharkhand on the south-east and Bihar on the east. Situated between 23°52'N and 31°28'N latitudes and 77°3' and 84°39'E longitudes, this is the fourth largest state in the country in terms of area, and the first in terms of population. Uttar Pradesh has five residential and three non-residential species of Vultures. Their habitats are Forest areas, scattered trees, rocky cliffs, monuments, open agriculture fields, and riversides used by different species of vultures for nesting and roosting. Indian Vultures were found using the ledges of rocky cliffs and the cornices of monuments. Egyptian Vultures were also seen roosting on high-tension line support frames and wireless towers and wandering in agriculture fields. The remaining vulture species use forest areas and scattered trees for roosting and nesting.

2. Result and Discussion

Figure 1 Train accident of vulture in Mohnapur railway crossing, in Laxmipur range of the Maharajganj

After examining the various research articles, newsletters and magazines different types of threats were found to vulture species. For the rapid decline of vultures in study areas of Uttar Pradesh, the main causes are low food availability, habitat loss, NSAID diclofenac, infectious disease, train and road accidents, and cutting of roosting and nesting trees. According to Ansari (2015), the majority of responders (78%) there had not been any abandoned carcasses in the preceding five years. There were no places to dispose of their deceased animals in the majority of the settlements. The majority of villagers were unaware of the reason behind the vultures' absence. The dead cattle carcasses were mostly being eaten by dogs and crows. The population of vultures in Uttar Pradesh was notably low, particularly for critically endangered species such as the Indian vulture, Red-headed vulture, Slender-billed vulture, and White-rumped vulture. Vultures are generally scavengers and old-world vultures have slow breeding rates and growth rates (Donazar & Ceballos, 1989). As vultures are highly sensitive to disturbance during their breeding season, efforts should be made to maintain disturbance-free zones around the nesting, roosting and feeding sites. It is recommended

to maintain a buffer zone of at least 500 meters between the source of disturbance and the surrounding areas (Margalida *et al*., 2010). Katerniaghat Wildlife Sanctuary faces immense anthropogenic threats from the resource dependent human populations residing both within and along the periphery of the Sanctuary (Khan, A. M., & Kumar, S. 2017).

The probability of extinction is mainly influenced by the frequency of natural disasters, survival rates, and the deceleration in population growth (Pavokovic & Susic, 2005). Due to habitat degradation and food scarcity, vulture populations have declined from their previous range (Pain *et al*., 2003). The Gyps vultures are in danger of going extinct because diclofenac is used on farm animals in India, Pakistan, and Nepal. As a result, following a 95% population decline in the past, only 60,000 vultures remain now. BNHS 2003 launched a campaign against the drug's use, the Indian government decided in 2006 to ban its production and distribution (Ganguly & Mukhopadhayay, 2013). The vulture population has been declining for several causes. However human persecution and diclofenac poisoning rank among the most common causes of vulture population decline (Ogada *et al*., 2012). Some threats described for vultures that is diclofenac contamination habitat loss, road and train accidents, infectious diseases, low food availability, and environmental contaminants. When vultures eat poison baits intended for other species or the carcasses of animals that have died from poisoning, it can result in unintentional poisoning. Elephants, buffalo, and other herbivores that consume crops can be killed with poisons (Botha *et al*., 2017).

Different types of threats to vultures of Uttar Pradesh

- NSAIDs Diclofenac Contamination
- Habitat loss
- Road and train accidents
- Infectious Diseases
- Low Food Availability
- Environmental Contaminants

2.1. NSAID Diclofenac Contamination

According to several studies (Taggart *et al*., 2007), diclofenac is the primary cause of the vulture population decline. After consuming the carcasses of deceased farm animals, vultures are exposed to diclofenac. In vultures, it results in renal failure and ultimately death (Oaks *et al*., 2004). Vultures travel great distances from their breeding grounds in quest of food. The majority of the carcasses they find are from domestic animals, such as cattle, goat and sheep. The inflammatory drug diclofenac is administered to domestic cows and buffalos in order to increase milk production. Even at low doses, diclofenac can be poisonous to vultures and result in renal failure. Visceral gout, a medication accumulation condition that crystallizes in the body's internal organs, is treated with diclofenac. According to estimates made by (Green *et al*., 2004), 0.8% of carcasses were treated with diclofenac, which resulted in a decrease in population. Veterinary use of clofenac, ketoprofen, and nimesulide medications that are known to be nephrotoxic to vultures, as well as to make the bans on the use of diclofenac more effective ((Prakash *et al*., 2024)), compared to diclofenac, which caused the catastrophic losses in Asian vulture populations began in the mid-1990s, tolfenamic acid used in veterinary medicine poses significantly less risk to wild vultures (Chandramohan *et al.,* 2022).

2.2. Habitat Loss

Habitat degradation, and electrocution, is major factors for vulture decline after diclofenac. Vulture nesting places are threatened by habitat deterioration caused by the removal of trees for agriculture, urbanization, and firewood. The safe roosting and breeding locations for vultures are also reduced by fire and grazing. Their breeding success is lowered and their death rate is raised as a result of loss of their nesting locations (Purohit and Saran, 2014). Roosting and nesting sites of vultures are being continuously destroyed at a rapid rate due to illicit felling for fuel wood and for making brick kilns in Suheldev Wildlife Sanctuary (Kushwaha, 2019). The Bundelkhand region's breeding locations are currently experiencing habitat loss due to anthropogenic activities including festivals, strange crackers, filming in historical landmarks, light and sound shows, and unregulated tourism, which disrupts the food chain (Yadav *et al*., 2017).

2.3. Road and Train Accidents

Mostly found near roadways are vultures nesting grounds, particularly for *Gyps bengalensis*. Vultures may eat on roadways, making them more likely to cause accidents, therefore human activity and traffic on the roads are concerning. One such accident occurred on 10th February 2010 in Mankapur, Gonda district about 100 km from Lucknow. Another such accident occurred on 17th February 2010 at around 11.30 am at an unmanned level crossing, about 500 meters from Mohnapur railway crossing, in the Laxmipur range of the Maharajganj forest area. 30 vultures lost their life (25 males & 5 females) (Kanaujia and Kushwaha, 2010). Another cause that has been established is the interference of other animals like monkeys with vultures and their nestlings (Thakur and Narang, 2012). According to Khatri, they find

several bird carcasses on a railway line during a recent field study in Ranipur Wildlife Sanctuary (RWS), Chitrakoot, Uttar Pradesh, India. It led us to determine the species and potential causes of death from the decomposing body remains. Remarkably, DNA analysis using conserved mitochondrial genes, such as 16S rRNA and Cytochrome b (Cyt b), revealed that the carcass came from a Red-headed vulture (*Sarcogyps calvus*) that is Critically Endangered (Khatri *et al*., 2019).

2.4. Infectious Diseases

Another danger to vultures is infectious diseases. Post-mortem examinations of several vultures revealed visceral or renal gout (Oaks *et al*., 2004), and histopathological analysis of 28 carcasses of *Gyps bengalensis* and *Gyps indicus* collected from all over India provided evidence for the existence of the infectious disease (Cunningham *et al*., 2003). Additionally vulture also suffers from Neck drooping syndrome in which become dehydrated due to high temperatures, the increasing in temperature leads to neck drooping and ultimately death.

2.5. Low Food Availability

For many vulture species, the main dietary source is dead animals. Animal carcasses were once commonly disposed of by throwing them in the open, but this practice has all but disappeared nowadays, and it is now preferred to dump animal remains to stop the spread of disease. Thus, vultures are threatened by a continuing decrease in the amount of food accessible to them in the form of carcasses, which contributes to the vulture population collapse (Hussain, 2015). Nowadays number of cattle is decreasing and whenever cattle die their carcasses are dumped in the pit so food become unavailable for vultures. Because of a food shortage, the number of vultures at nesting, drinking, and dumping locations has decreased. Migratory species of vulture's visits in winter but their population also decreasing (Hall *et al*., 2012). Due to the unavailability of carcasses, migratory species may struggle to search potential dumping grounds for cattle carcasses where vultures can find an abundance of food. Most of the king vulture population along with White-rumped vulture and Long-billed vultures is declining, because of feeding on the carcasses of animals administered with the veterinary drug diclofenac. Dog barking, traffic noise, and human activity also occasionally interrupts feeding. Vultures nowadays are struggling for their food.

2.6. Environmental Contaminants

Environmental pollutants have been identified as a significant cause of death among raptor and vulture populations. Pesticides and insecticides pollute the environment, and their accumulation in water bodies poses a potential threat. In India, strychnine, a pesticide, has been found to be a significant cause of vulture mortality (Satheesan, 2000). To kill the scavenging predatory creatures, strychnine has been purposefully used to poison the carcasses. In several nations, the organochlorine, dichlorodiphenyl-trichloro ethane (DDT) was the cause of significant mortality rates and inadequate reproduction in avian scavengers (Muralidharan, *et al*., 2008 and Dhananjayan, *et al*., 2010).

3. Conclusion

The decline in vulture populations in India affects not only the birds themselves but also other animals and human health considering the role of vulture as efficient scavengers. Conservation measures cannot be implemented until the agents that caused the decline are already identified. Although a great deal of effort has been made in India to improve the vulture population's scenario, there are still a lot of untapped opportunities that require urgent attention. Surveys and monitoring of vultures in Uttar Pradesh, India should go on, and satellite tracking of their activities should be used to understand their behavior and develop conservation methods specific to individual species for efficient management. To get detailed baseline data on the parasitic, genetic, and molecular characteristics of these birds, further research is required. We should protect the habitat of vultures to ensure their survival in the future. In the study areas, some interventions are suggested for avoiding threats to vultures. We should use diclofenac-free carcasses, and reduce disturbances near their breeding and feeding sites. We can also establish vulture restaurants as safe feeding sites and take steps to keep dogs away from these areas.

Recommendations

Vultures have always been extremely important to humans, but unfortunately, human activities are threatening most vulture species and putting them on the verge of extinction as they struggle to adapt to a rapidly changing human-dominated environment.

During the nesting season, vultures are extremely sensitive to nearly any form of disruption. So, ensuring that there is no anthropogenic activity near their nesting site is important, especially during the breeding season i.e. winter.

- It is important that we establish a complete prohibition on the production, distribution, and use of diclofenac instead we can promote safe alternatives for cattle diseases.
- Awareness programs regarding the importance of vultures should be conducted for local villagers, forest departments, non-governmental organizations, and other stakeholders.
- Vulture restaurants are places where vultures are routinely given carcasses free of diclofenac, should be kept up wherever and whenever necessary.
- It is recommended that various government and non-government departments collaborate and coordinate in order to create an updated database on vulture species found in Uttar Pradesh, India. In priority conservation regions, this will make it easier to implement appropriate conservation programs.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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