

Review Article

Distribution, Population trend and Threats of three critically endangered Gyps vulture in Indian subcontinent: a review

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Abstract: The Indian subcontinent hosts three critically endangered Gyps vultures, namely; *Gyps bengalensis*, *Gyps indicus*, and *Gyps tenuirostris*. In the present review, we analyzed all previously published articles on geographic distribution, population trends, and vultures threats related to these three Gyps vultures. In our analysis, we found that, these three species are reported mostly from India, Nepal, and Bangladesh. These species are under a lot of environmental pressure, such as poisoning, habitat destruction, and food shortages. These mentioned environmental factors are causing shrinkage in their distribution range as well as a decrease of individual numbers in the last few decades. Their population is currently declining, with varying rate in different countries indicating that the three species of resident Gyps vultures in the Indian Subcontinent are still in great peril and require continuous conservation and appropriate management action plans are needed to return the population to a stable trend and save this species from extinction.

Keywords: Vulture, Critically endangered, Distribution, Conservation.

I. Introduction

Vultures are the large birds of prey and obligate scavengers with naked or sparsely feathered head and relatively sturdy beaks for tearing flesh (Brown and Amadon, 1968). Vultures have a great ecological significance as vultures play a vital role in keeping our environment clean by feeding on decaying carcasses of animals as the acidic condition in the stomach of vulture can kill many pathogenic micro-organism, thereby, reducing the risk of spreading of diseases (Houston and Cooper, 1975). Vulture also has social and cultural significance as numerous human societies throughout history, including present-day Parsee and Buddhists communities utilize offering of dead to vultures as the most appropriate way for paying final respect to dear ones after their death (Subramanian, 2008). Vultures are represented taxonomically by two distinct groups; Old World and New World vultures (Sibley and Ahlquist, 1990). The *Gyps* vultures are a genus of old world vulture under family Accipitridea of Accipitriformes (Campbell, 2015). There are eight species in the genus *Gyps* out of which only five *Gyps* species are found in Indian Sun-continent, namely, *Gypsbengalensis*, *Gyps indicus*, *Gyps tenuirostris*, *Gyps himalayensis* and *Gyps fulvus*. *Gyps* species are communal feeders and colonial nesters,

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feeding among other vulture species. They often roost as close as possible to dumps or slaughterhouses, build their nests in tall trees or on cliff ledges, and line their nests with wool, skin, dung, and rubbish (Ferguson-Lees and Christie, 2001). Densities of *Gyps* vultures are usually high in areas with suitable breeding habitat and abundant carrion.

Recently, a population crash has been observed in three Gyps Vultures i.e. White-rumped Vulture (WRV), Long-billed Vulture (LBV), and Slender-billed Vulture (SBV), throughout the Indian subcontinent. These three species are now listed as critically endangered species in IUCN Red List (BirdLife International, 2000). This dramatic fall in the vulture population has led to many issues like inefficient carcass disposal, and gradual rotting of carcasses in open areas which is the main reason for the increase of secondary scavengers like feral dogs, rats, etc (Markandya et al., 2008). The increase in secondary scavengers poses a threat to human health because they are likely to act as potential disease transmitters and reservoirs of disease-causing microorganisms (Saran and Purohit, 2012; Sudarshan *et al.*, 2007).

Therefore, this review article is an attempt to understand the current distribution pattern, population trend, and threats of these three *Gyps* vultures found in the Indian sub-continent, from available publication till the present time in order to ascertain whether further appropriate conservation action is required anymore. Furthermore, the finding of the review will facilitate conservation and management action planning in the Indian subcontinent.

Spatial Distribution of three critically endangered *Gyps* vultures of the Indian subcontinent

Gyps vultures are found throughout warmer parts of the Old World (Africa, Asia, Europe, and surrounding islands). In the Indian subcontinent, *Gyps* vultures occur in Nepal, Pakistan, India, Bangladesh, Bhutan, and Myanmar (Birdlife International, 2001).

In India *Gyps* vultures are widely distributed throughout the country. *Gyps bengalensis* (WRV) are generally found in the Indus valley and along the Himalayas to Assam valley and the southern parts of the Assam hills (Ramussen and Anderton, 2005) and from Himachal Pradesh, India (Thakur and Narang, 2012).

Gyps tenuirostris (SBV) is found in the northern Gangetic plain, west to at least Himachal Pradesh and Haryana, southern West Bengal (and possibly northern Orissa), and east through the Assam plains (Birdlife International 2001).

In Pakistan, the WRV vulture has been reported in Sind province (Gilbert et al. 2003). Similarly, a confirmed active *Gyps indicus* (LBV) nest was recorded in the Thar Parkar district of Sind Province, Pakistan (Gilbert et al. 2004).

In Nepal, WRV and SBV have been reported from Inurva, Koshi province and WRV has been observed in the Rupandehi district near Lumbini (Choudhary, 2003), Royal Bardia National Park (Giriet al. 2003), Royal Suklaphanta Wildlife Reserve (GC and Giri 2003), and Royal Chitwan National Park (GC and Giri 2003). (Ghimire, 2000). Nests of the three *Gyps* vulture have been discovered in Nepal's Nawalparasi district. Nests were discovered in colonies in Bardghat, Chisapani, Badera, Sunwal, Hadahiya, and Basahiya (Subedi, 2008). In Bhutan, WRV has been reported in Phuntsholing, Samdrup, Jongkhar, near Deothang, and the Teesta valley (Bishop, 1999., Inskipp and Inskipp. 1993). In Bangladesh these *Gyps* species have uneven distribution, where species like WRV are distributed throughout the area while LBV was reported from the Northern and Southern & semi-desert area (Kabir, 2012). WRV has been reported from seven divisions of Bangladesh namely Dhaka, Chittagong, Rajshahi, Rangpur, Khulna, and Barisal (Khan, 2011). In Sundarban Forest *Gyps* vultures were reported from Chandpai Range, Sarankhola Range, Nalianala (Khulna) Range, and Burigoalini (Satkhira) Range (Sarker, 1986).

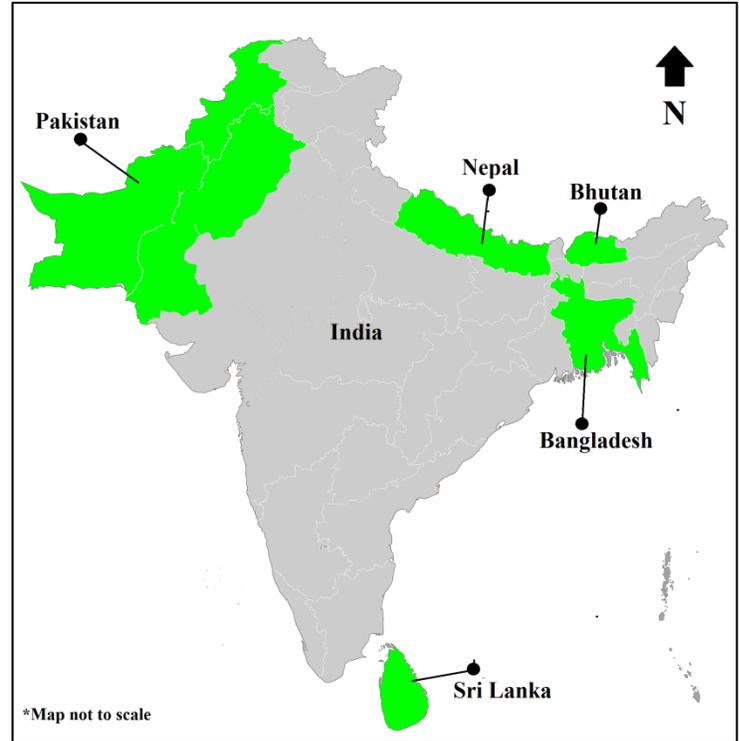


Figure 1 Map showing India and its Subcontinent

Population Trends of the critically endangered *Gyps* vultures of the Indian subcontinent

Gyps vultures in South Asia are considered among the most common large raptors in the world. In the mid-1980s, religious and cultural practices ensured a plentiful food supply of livestock carcasses (Houston, 1985). In India, *Gyps* vulture populations were so high that they were considered a hazard to aircraft (Grubh et al., 1990). However, during the 1990s, the population of resident *Gyps* vultures on the Indian subcontinent collapsed. This was initially reported in the media in 1996-97, and the Bombay Natural History Society (BNHS) later documented it while monitoring raptor numbers in Keoladeo National Park in Bharatpur, Rajasthan (Prakash 1999).

In the late Nineties, Veterinary usage of non-steroidal anti-inflammatory medicines (NSAIDs) such as diclofenac and ketoprofen on animals that these vultures consume was found to be hazardous to *Gyps* vultures (Das et al. 2011). Approximately 97 percent of India's three main species of *Gyps* vulture are estimated to have

perished today (Swan *et al.* 2006). According to Asad Rahmani, a former director at the Bombay Natural History Society (BNHS), the vulture die-off represents the fastest decline of any species in the world. According to recent surveys, all three species in India, Pakistan, and Nepal are declining at an average annual rate of 50%. (Markandya, 2008).

LBV has a global population of nearly 45,000 individuals, with approx 30,000 mature individuals. The global WRV population ranges from 3,500 to 15,000 individuals. As their current population trend decreases, the number of mature individuals falls between 2500 and 9999. SBV is estimated to have a population of between 1,500 and 3,750 individuals. Its current population trend is declining, with a mature population of around 1000-2499 individuals (Birdlife international, 2021).

In India, there are currently about 100,000 vultures left, compared to 40 million in the 1980s. When compared to counts in 2005 and 2007, the 2010 vulture survey in Gujarat found 793 WRV and 265 LBV, indicating a significant decline in the WRV population (Tatu *et al.*, 2012). In Rajasthan, a total of 1,086 LBV and 325 WRV were recorded (Chhangani, 2009). In Himachal Pradesh, small patches of WRV were distributed in Bilaspur, Chamba, Hamirpur, and Kangra (Thakur and Narang, 2012).

In Nepal, the population of *Gyps* vulture has declined (Acharya *et al.*, 2009). The estimated decline for LBV between 1992 and 2003 was 99.7 percent, and for SBV, it was 97.4 percent (Prakash *et al.*, Forthcoming). The population of SBV is less than 1000 pairs, and the current annual rate of decline in Nepal is estimated to be around 40%, with a rate of decline within a decade estimated to be 90 to 95%, similar to the WRV and LBV (Nepal country report, 2006).

In Bhutan, flocks of up to 50 WRV were found roosting in plantation woodlands, with small numbers occasionally seen soaring (Bishop, 1999), and around 100 birds were observed in the mid-1990s (Inskipp and Inskipp 1993).

The population of WRV in Bangladesh is estimated approx. to be around 816 individuals (Khan, 2013). According to a Bangladesh country report, 2006, the WRV is threatened and LBV is now rare in Bangladesh.

The population status of *Gyps* vulture in the subcontinent varies from species to species, while few species are stable some are least concerned. On the other hand, *Gyps* species like SBV, LBV, and WRV have declined sharply and are given the status of CR (critically endangered) by IUCN since these species have suffered an extremely rapid population decline in the last 15 years. With average decline rates (2000-2007) of 43.9% and 16.1% for WRV and LBV/SBV, respectively. This indicates that the three species of resident *Gyps* vultures in the Indian Sub-continent are in great peril (Prakash *et al.*, 2007).

Threats to three critically endangered *Gyps* vultures of the Indian Subcontinent

The scavenging lifestyle of *Gyps* vultures and the depletion of their traditional food sources have apparently contributed to their increased dependency on habitats heavily impacted by human activities which leads to their health hazard. Many *Gyps* vulture populations have become increasingly reliant on domesticated animals, particularly cattle, contributing to their catastrophic decline in Pakistan and India (Johnson, 2006).

The diversity of vulture in India and its subcontinent is declining, and the most credible general explanations for this decline appear to be as follows: Diclofenac and ketoprofen are NSAIDs, (Non-steroidal anti-inflammatory drugs), which have been identified as lethal veterinary drugs. The presence of residue in ungulate carcasses shows that quantities are high enough to cause vulture mortalities. It induces visceral gout, which results in severe swelling, inflammation, kidney failure, and death in vultures that consume drug-contaminated carcasses (Naidoo *et al.* 2009). This anti-inflammatory drug has done enough damage to *Gyps* vulture population than any other factor. After safety testing of NSAID, Meloxicam has been established as an effective and vulture-safe alternative to diclofenac (Swan *et al.*, 2006b). Although, in India and many parts of Southeast Asia, veterinary use of diclofenac is prohibited. However, due to the high cost of Meloxicam, diclofenac in human formulations is still used illegally to treat livestock (Kumar 2006; Singh 2008). The recent available information indicates that the elimination of diclofenac (which is the gravest of all the threats) from the vultures' food supply is still incomplete, so further efforts are required to fully implement the ban (Prakash *et al.*, 2012).

Apart from that, habitat destruction for agricultural purposes and urbanization, etc. are the major threats to their nesting places, as these raptors prefer to roost and nest in tall trees. Uncontrolled mining has also destroyed many of the cliffs and rocks that were once suited for breeding and roosting. As a result, intra- and inter-species competition for nesting sites increases (Saran and Purohit, 2014).

The unavailability of food is also a major cause of the current crisis. It was most likely caused by the loss of large wild ungulate populations and better management of dead cattle, thereby reducing food availability (Clements *et al.* 2013). Carcasses are the vultures' main source of food. The practice of dumping carcasses in the open used to be common, but it has nearly vanished now. Food supplies appear to have become too unpredictable for these scavengers to breed often. As a result, a gradual reduction in available food in the form of the carcass (Hussain, 2015) and increased competition from feral dogs also plays a major role in food shortage.

Another anthropogenic factor such as electrocution is also one of the leading causes of vulture death; when vultures perform a sudden flight to avoid danger, they often collide with a nearby power line and die (Saran and Purohit, 2012). Vultures are often poisoned unintentionally, local inhabitants place poisoned dead cattle in the open to limit the populations of wild predators and stray dogs in order to safeguard their livestock from them (Wildlife Trust of India, 2009). Also, pesticides and other agrochemicals may reach the cattle and ultimately cause vultures to decline locally (Cheke, 1972). Additionally, vultures are also persecuted and exploited for their body parts for the preparation of traditional medicine (Hussain, 2015).

Therefore, the aforementioned threats can be taken as the major threats to the raptor population in the Indian subcontinent. Besides, food scarcity and unintentional poisoning also appear to be some of the probable reasons for Gyps decline in the Indian subcontinent. However, other variables like persecution and pollution cannot also be ruled out as reasons for the decline of these *Gyps* populations (Pain et al., 2003).

II. Conclusion and recommendation

The three aforementioned critically endangered Gyps vultures are mostly distributed across the Indian subcontinent. They are usually found in the region most likely due to suitable climatic factors, favorable temperature, and anthropogenic activities like management of dead cattle carcasses, sky burial by Parsees and Tibetans, providing food and shelter, thereby providing a better chance to live and reproduce. India and Pakistan cover a major population of these raptors followed by countries like Nepal, Bangladesh Myanmar, etc.

The three CR Gyps vultures are listed as critically endangered by IUCN because of the extreme population decline due to feeding on carcasses of animals treated with the veterinary drug diclofenac (BirdLife International, 2000). These three species have been found to be sedentary in terms of migration pattern and are confined to mainly this part of the world (The IUCN Red List of Threatened Species, 2016), causing more intra-specific competition for food and habitat between *Gyps* vulture (Bosè and Sarrazin, 2007). It seems to be the reason that the effect of Diclofenac (NSAIDs) on these vultures came out to be more fatal. Therefore, NSAIDs like Meloxicam which are proven safe and proper alternatives should be encouraged.

Apart from the effect of diclofenac in the past, according to Chhangani and Mohnot (2004) recent decline in the *Gyps* vulture population in this part of the world is mainly due to loss of habitat followed by poisoning, increasing population of feral dogs, human population pressure, predation, inter-and intra-specific competition, etc. The disturbance in their breeding process by various natural or human causes and their low reproduction rate as they mature at the age of five and lays a maximum of one egg per year making it very difficult for them to survive and reproduce seems to be some of the reasons behind the population decline of these raptors.

Moreover, illegal logging should be checked in vulture-reported areas because they rely on high trees for roosting and nesting. Initiatives like Vulture Restaurant should also be encouraged in urban as well as remote areas to help them against food shortages. Furthermore, a detailed study on the biogeography and ecology of these vultures should be conducted so that effective measures can be taken at a regional or national level for their conservation and population growth.

Vultures have been of great significance to mankind from time immemorial, but sadly, species are facing the threat of extinction, mostly due to anthropogenic factors, as they find it difficult to adapt to a rapidly changing man-made ecosystem. Though the population decline of this vulture has been slowed in the recent past, also there are reports of constant or increase in populations in a few places as a result of various rehabilitation programs that have been implemented by governments and NGOs like SAVE Vultures, Action Plan for Vulture Conservation in India, Vulture Conservation Action Plan for Nepal and Bangladesh, etc. for their conservation. However, the current population trend of the three Gyps vultures mentioned above is decreasing as there is a continuing decline of mature individuals from their area of occupancy (The IUCN Red List of Threatened Species, 2017). In spite of all the effort and conservation action so far, the populations of WRV, LBV, and SBV in the Indian subcontinent are very low (GOI, 2006). With upcoming government conservation policies, action plans, serious concern, and interest shown by dedicated researchers towards these declining species, chances are that we will have more detailed information on these raptors from all countries of the Indian subcontinent in the near future. Therefore, it is our duty to make serious efforts to conserve and protect the breeding and feeding habitats of these vultures, so that they can freely soar in the open sky once again like earlier.

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