Status of Critically Endangered Vultures in Dang Deukhuri Foothill Forests and West Rapti Wetlands

Bishnu Prasad Shrestha[1] and Bishnu Prasad Devkota[2]
Corresponding author : Bishnu Prasad Shrestha
Email : bishnu_stha@yahoo.com

Abstract

Vultures play a highly important ecological role through the rapid consumption of animal carcasses. Of 22 vulture species in the world, eight species are found in Nepal. The study was carried out in Dang Deukhuri valley with objectives of assessing present population status of critically endangered vultures and conservation threats to these vultures. To study population status, direct survey and repeated absolute count methods were used; population size estimated through Jacknife technique; nest occupancy determined by nest census method. Similarly, interview/household surveys were conducted to assess the present food availability and livestock condition; conservation threats to vultures. The range of absolute population size of the critically endangered vultures; Gyps bengalensis, Gyps tenuirostris and Sarcogyps calvus were found 44, 21 and 18 respectively in Dang Deukhuri valley. The major threat to vultures is diclofenac contamination of livestock carcasses and other threats are habitat destruction, disturbance & hunting, lack of awareness, food shortage, poisoning and pesticide use in the area.

Key words**:** *Critically endangered vultures,Status, Conservation threats*

Introduction

Nepal's rich biodiversity is a reflection of unique physiographic position as well as its altitudinal and climatic variations. In Nepal, more than 863 species of birds are found (MoFSC, 2009) including 133 nationally threatened species, of which four species are vultures. Vultures play an important ecological role through rapid consumption of animal carcasses. They also have an important cultural role in consumption of human dead bodies in the form of sky burials within Nepal and Tibet. Vultures are the primary consumers of carrion in Asia and Africa (Mundy *et al.* 1992). Twenty two species of vultures are found in world. Nine species of vultures have been recorded from South Asia, of which eight are resident and one migratory. Nepal supports six resident vulture species white-rumped vulture (WRV) *Gyps bengalensis*, slender-billed vulture (SBV) *Gyps tenuirostris*, Egyptian vulture *Neophron percnopterus*, red-headed vulture (RHV) *Sarcogyps calvus*, Himalayan

[1] Assistant Forest Officer, District Forest Office, Salyan, email:bishnu_stha@yahoo.com
[2] Lecturer, Kathmandu Forestry College, Kathmandu

griffon vulture *Gyps himalayensis*, and Lammergeier (*Gypaetus barbatus*), one winter visitor (Cinereous vulture *Aegypius monachus*) and one passage migrant (Eurasian griffon vulture *Gyps fulvus)*. The long-billed vulture *Gyps indicus* is not found in Nepal (MoFSC, 2009).

Within Nepal, India and Pakistan vulture populations have undergone dramatic declines in numbers since the mid 1990s, with declines in excess of 97% for three resident species (white-rumped, slender-billed and long-billed vulture). In India, numbers of white-rumped vultures have declined by 99.9% from 1992 to 2007 (Prakash *et al.* 2007). Monitoring of vultures in Nepal indicates declines of a similar magnitude with a >90% decrease in numbers up to 2001 (Baral *et al.* 2004). Extensive research undertaken within India, Pakistan and Nepal has established that the non steroidal anti inflammatory drug (NSAID) diclofenac is the main, and perhaps the only, cause of the population declines (Green *et al.* 2004; Shultz *et al.* 2004). Vultures are exposed to diclofenac when they feed from carcasses of livestock that have died within a few days of treatment and contain toxic residues of the drug. Diclofenac is used for a variety of painful and inflammatory conditions in both veterinary and human medicine. It is clear that vultures cannot survive as long as diclofenac use continues. The major cause of vultures' mass mortality is diclofenac contamination of livestock carcasses (Swan et al. 2006). The loss of a major scavenger from the ecosystem will affect the balance between populations of other scavenging species and/or result in increase in putrefying carcasses. In the absence of other carcass disposal mechanisms (burial, burning, mechanical processing), the decline in vultures has resulted in an increase in the number of putrefying animal carcasses in rural areas. Populations of feral dogs, the main scavenging species in the absence of vultures, have increased. Increase of rabies incidence, reported frequently in the newspapers, in Nepal may be an outcome of the increased number of feral dogs (Anderson *et al.* 2005).

Dang Deukhuri Foothill Forests and West Rapti Wetlands support the globally threatened bird species i.e. *Gyps bengalensis, Gyps tenuirostris, Sarcogyps calvus, Cinereous vulture and Leptoptilos javanicus*, Sino-Himalayan subtropical forest biome species, Indo-Malayan Tropical Dry Zone biome species, Indo-Gangetic Plain biome species (Baral and Inskipp, 2005). *Gyps bengalensis, Gyps tenuirostris* and *Sarcogyps calvus* are critically endangered listed in IUCN (MoFSC, 2009). The study was carried out with the objectives of assessing the present population status of critically endangered vultures and conservation threats to these vultures.

Materials and methods

Data collection mainly consisted of review of secondary data, preliminary survey, direct survey, nest count and interview with concern personnel.

Preliminary survey: First of all, the whole study area was visited and potential habitats of vultures were identified by preliminary survey. Local people, bird watcher and biologist were consulted in this record. Three vulture colonies viz. Lalmatiya, Gadhawa and Bijauri were identified.

Direct survey: Direct survey included counting of individuals by direct observation with binoculars and unaided eye. Observation was made in all habitats of critically endangered vultures in the study site (Lalmatiya, Gadhawa and Bijauri). At each habitat, **absolute count** was carried out early in the morning 6-10 A.M. and evening 4-6.30 P.M. as the birds are found to be active in the morning and evening hours. To minimize double counting, the counts were made at the same time at all sites. The count was repeated for at least three times in each site.

Jacknife Techniques (cited by Baral and Gautam, 2007) was used to estimate the population size (N). The method used the difference between the highest count n_{max} and the second highest count n_{max-1} to calculate N, the total estimated number; $N = 2\ n_{max} - n_{max-1}$

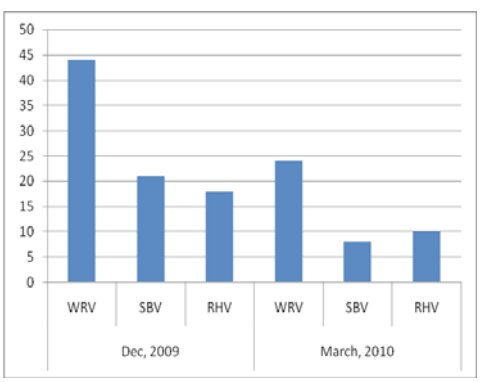
Nest census: Total nests were counted in order to study nest occupancy. Following Postupalsky (1974), an active nest (nest in which eggs have been laid) and occupied nests (nest in which an egg need not have been laid, but a minimum of nest building must have taken place) were identified and nesting trees were tagged for future reference. The name of the tree and geographic position of nests were recorded.

Interview: Semi Structured Interview (SSI) was organized among local people, District Forest Office Staff, journalists, community forest user group members, wildlife biologist and related wildlife technicians working in the concerned field to find out the conservation threats to vultures. Household survey was also conducted with local people to assess the present trend of livestock husbandry and food availability for vulture.

Data analysis: Collected data was analyzed both qualitatively and quantitatively; using simple statistical tools. Microsoft Excel and SPSS (Statistical Package for Social Science) software were used for data analysis and interpretation.

Results and discussion

Population size



Three vulture colonies i.e. Lalmatiya, Gadhawa and Bijauri were found in Dang Deukhuri valley. During the study period, the range of absolute population of the critically endangered vultures was found maximum in December 2009; WRV, SBV and RHV were 44, 21 and 18 respectively (Figure-1). Similarly, WRV, SBV and RHV were found 24, 8 and 10 respectively in March 2010 (Figure-1). All colonies were equally important in terms of critically endangered and other vulture populations.

Figure-1: *Population size of critically endangered vultures*

During the study period, Bijauri held the highest number of critically endangered vultures among three colonies (Table-1).

WRV was found maximum of 25 in Dec, 2009 in Bijauri followed by Lalmatiya (13) and Gadhawa (6) (Table-1). In March 2010, WRV was found 10, 9 & 5 in Bijauri, Lalmatiya and Gadhawa respectively (Table-1). Similarly, SBV was found maximum of 9 in Dec, 2009 in Bijauri followed by Lalmatiya (7) and Gadhawa (5). In March 2010, SBV was found 3, 3 & 2 in Bijauri, Lalmatiya and Gadhawa respectively (Table-1). Likewise, RHV was found maximum of 9 in Dec, 2009 in Bijauri followed by Lalmatiya (6) and Gadhawa (3). In March 2010, RHV was found 4, 4 & 2 in Bijauri, Lalmatiya and Gadhawa respectively (Table-1).

Table 1: Population size of critically endangered vulture in different colonies

S. N.	Colony	December, 2009			March, 2010		
		Gyps bengalensis	*Gyps tenuirostris*	*Sarcogyps calvus*	*Gyps bengalensis*	*Gyps tenuirostris*	*Sarcogyps calvus*
1	Lalmatiya	13	7	6	9	3	4
2	Gadhawa	6	5	3	5	2	2
3	Bijauri	25	9	9	10	3	4
Total		44	21	18	24	8	10

Other four species of vultures i.e. Egyptian vulture *Neophron percnopterus*, Himalayan griffon vulture *Gyps himalayensis*, Cinereous vulture *Aegypius monachus* and Eurasian griffon vulture *Gyps fulvus* were found during the study in Dang Deukhuri valley. The maximum number of 33 Egyptian vultures was recorded in December, 2009. They used to perch on trees and cultivated land. *Gyps himalensis, Aegypius monachus* and *Gyps fulvus* were found in good number.

Nest status and nesting trees

A total of 27 nesting trees were recorded in Dang Deukhuri valley during the study period. Only five species of trees were used for nesting: most occupied nests were observed on Saj tree (*Terminalia tomentosa*). Other species are Sal (*Shorea robusta*), Simal (*Bombax ceiba*), Kabro (*Ficus lacor*) and Bar (*Ficus bengalensis*). The highest number of nests was on Saj tree followed by Sal.

Food availability and livestock condition

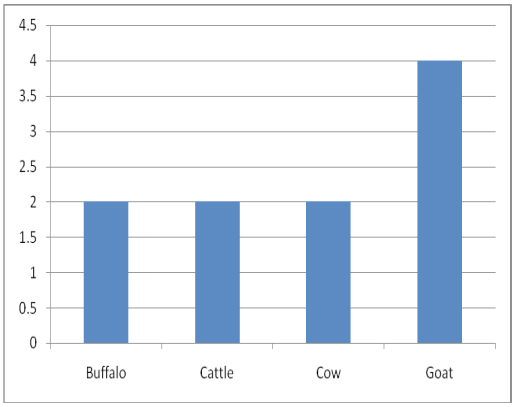


Figure-2: *Livestock Number*

Sufficient number of carcasses was not found during the study period. Food shortage is likely to be a challenge for vulture conservation in Nepal. Livestock rearing pattern is very different than that of previous days. Large size animals like Buffalo and Cattle are not found in sufficient numbers. Numbers of these animals are in decreasing trend in all sites due to attraction to other business, lack of grazing land but goat farming is now increasing in trend due to immediate profit. Average number of buffalo, cattle and cow was found 2 per household but goat was found 4 per household (figure-2). Kalika and Jhulke Community Forest User Groups (CFUGs) have started to conserve the vultures by establishing vulture restaurant.

Existing and long term threats to vultures

Diclofenac contamination: The major cause of vultures' mass mortality is diclofenac contamination of livestock carcasses. The government of Nepal banned veterinary diclofenac in June 2006. Replacement of diclofenac with vulture-safe meloxicam has been started only in the vicinity of vulture colonies in Dang Deukhuri valley. However, vultures travel far away for food, so the threat of diclofenac has not been removed completely. Thus, there is still great threat to vultures due to diclofenac contamination.

Habitat destruction: Habitat destruction is also other cause of vulture decline. Most of the national forest is handed over to community for its protection, management and utilization by making operational plan. Most CFUGs cut the large sized trees like Sal, Saj and Simal for immediate revenue and income. In all colonies, vultures exclusively build nests on Saj, Sal and Simal; and these are removed for various purposes, which has limited nesting habitats for vultures. Kalika and Jhulke CFUG have started to conserve the vultures by establishing vulture restaurant and banning the nesting tree to cut but there is not sufficient effort to conserve vultures at all colonies.

Disturbance and hunting: Disturbance and hunting is another threat to vultures. In some places, children killed vultures and collected eggs. It is not a serious problem at present, but could be in the future. Local people kill the vultures for medicinal purposes and they believed that vulture eggs make human bones stronger and vultures' bones are used to plaster and mend broken bones of livestock and human. Many vulture colonies are in those villages which are growing fast.

Food shortage: Food shortage is likely to be a challenge for vulture conservation soon. Now, people have started consuming beef in many rural areas of Nepal. The consumption of beef may seriously undermine the food supply to vultures. In the past, farmers used to leave carcasses in open fields for vulture to feed on them. For sanitation purposes, the carcasses that are left in open fields now are safely dumped in the offing. Similarly, livestock number is decreasing in trend due to attraction on other business, lack of grazing land.

Lack of awareness: Lack of awareness of local community is another threat to vultures. Local people do not pay attention towards vulture conservation due to lack of knowledge about vulture importance and their role in ecosystem. Children kill vultures for fun. There is a misconception about vulture so that they try to get rid of vultures from their lands if vultures build nests there.

Conclusion

Population size of critically endangered vultures; WRV, SBV and RHV were found 44, 21 and 18 respectively in Dang Deukhuri valley. Except Lammergeier, all other vultures found in Nepal are recorded in Dang Deukhuri valley. Vulture colonies are Lalmatiya, Gadhawa and Bijauri of Dang Deukhuri valley. This valley still has a good number of vultures. A total of 27 nesting trees were found. Large size tree species were used for nesting and roosting. Availability of carcasses was not so sufficient in the field area. Livestock rearing pattern is changing and livestock number is decreasing in trend due to attraction to other business, lack of grazing land. Diclofenac contamination, habitat destruction, disturbance & hunting, lack of awareness, food shortage, and poisoning and pesticide use are serious and potential threats to vultures.

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