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Vulture Bulletin (गिद्ध सन्देश) is produced annually from Bird Conservation Nepal as a major newsletter on vulture conservation, usually comes in both language English and Nepali. It aims to inform issues, initiatives and recent advances of vulture conservation in Nepal to members, researchers, policy makers and all well wishers of BCN. This publication has been made possible with funding from Royal Society for the Protection of Birds, UK.

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Captive Released White-rumped Vultures Flying Far and Wide

Ankit Bilash Joshi and Ishwari Prasad Chaudhary

Since 2017, 31 captive-reared and captive-bred White-rumped Vultures *Gyps bengalensis* have been released from the Vulture Conservation and Breeding Centre, Chitwan to the wild in the Jatayu Restaurant area of Pithauli, Kawasoti. These birds were fitted all with GPS telemetry tags, which allows us to monitor the movements and survival of these Critically Endangered birds. By following them, along with 30 wild birds also fitted with GPS tags, and investigating the cause of mortality of any vultures that die, we can ensure that diclofenac and other non-steroidal anti-inflammatory drugs

(NSAIDs) no longer pose a threat. The good news so far is that, after more than two years, we have found no evidence that any tagged birds have succumbed to NSAID-poisoning. This is vitally important, as it enables us to confirm that the provisional Vulture Safe Zones are proving safe for vultures and will, in time, allow us to declare these areas as genuine VSZs – the first in the world, free of diclofenac and other harmful NSAIDs.

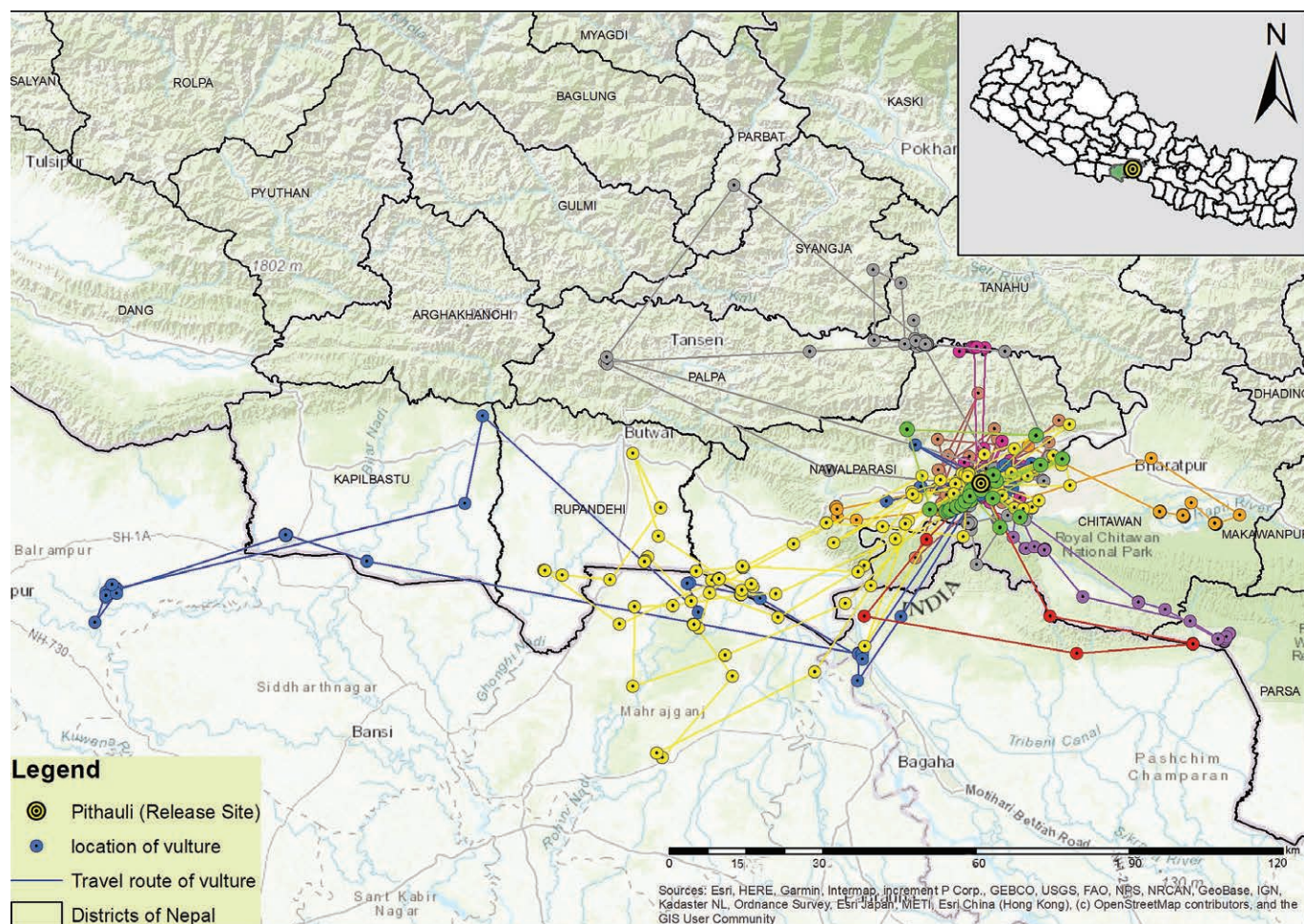
Wild birds tend to range widely, frequently up to 200 km from the feeding site at Pithauli, to which they only occasionally return to take

advantage of the food that is still provided twice a week. The record so far, however, is held by a bird that travelled about 1100 km from the release site, all the way to Jammu and Kashmir in India.

The released birds, on the other hand, have tended to remain far more local, only travelling a maximum of 6 km from the release and feeding site. However, as this year's particularly bad winter has come to an end, some of the vultures have begun to undertake movements not previously seen by released birds. Nine of the birds have been



Captive released birds making their nest in the wild by Ankit Bilash Joshi



Map showing the movements of nine released birds from 2 March 2020 to 15 April 2020

seen to take journeys of over 20 km, with the furthest-ranging bird travelling 193 km from the release site (see Map). They have covered an area of almost 17,000 sq. km, which is a very large area compared to that previously covered by the released birds. In comparison, the wild tagged birds, excluding the bird that travelled all the way to J&K, India have covered an area of roughly 24,500 sq. km.

Most of the wild tagged birds are now busy rearing their chicks. At the start of this breeding season, we found three pairs of

released vultures nest building and mating frequently. As this was their first breeding attempts, the nests were quite weak, and the birds did not complete their breeding activity; however, this was an important development in our conservation breeding and release programme, and it is hoped that the same pairs, and perhaps others, will nest again in the upcoming year. The photo below shows birds C6 and 13, released in 2019 and 2017 respectively, nest building in the vicinity of the release site.

Bird Conservation Nepal leads the release work with full support of the Department of National Parks and Wildlife Conservation, Chitwan National Park, National Trust for Nature Conservation and Community of Kawasoti, Nawalparasi. The Royal Society for the Protection of Birds (UK) provides much of the technical and financial support for the work along with technical expertise of the Zoological Society of London (UK) and International Centre for Birds of Prey (UK).



Captive released white rumped vulture with satellite tag and wing tag by Kewal Prasad Chaudhary

Distribution and Population Status of Vultures in Nepal

Deu Bahadur Rana*, Ankit Bilash Joshi, Ishwari Prasad Chaudhary, Hiru Lal Dangaura and Krishna Prasad Bhushal

Abstract

Old World vultures are members of the Accipitridae family (Hawks and allies) and are obligate scavengers. They feed on carrion, sometimes in large flocks, stripping carcasses of their flesh within a short time. Nepal is home to nine species of vultures, all of which were recorded during this study. This study on vulture distribution and their population status covered more than 80% area of the country. Himalayan Griffon was the most widely distributed vulture, occurring across a wide range. Eight out of nine species were found in the hill regions. The distribution of Critically Endangered vultures was widely distributed from west to the central part of the country. Numbers of vultures have gradually increased over recent years, which is corresponding with an integrated vulture conservation approach, such as the creation of Vulture Safe Zones. The Indian vulture, a Critically Endangered vagrant to Nepal was recorded regularly in two consecutive years since 2019.

Introduction

Raptors of the Accipitridae family tend to be avian top predators. However, vultures are natural scavengers (Bhushal 2018), and tend not to hunt by themselves, but feed on the

carcasses of dead animals, consuming them within a short interval of time. There is much symbolism surrounding the scavenging of vultures, which is associated with purification and rebirth, and their ability to fly high in the sky in search of food and a resting place

(Markandya et al., 2008). Vultures are social animals and often feed, fly and roost in large flocks. There are several names used for a group of vultures, such as a committee, venue or volt; in flight a flock of vultures is called a kettle and when feeding together



Vulture flock on roosting by Krishna Prasad Bhushal

at a carcass, a wake. Vultures have a wide distribution and are found in a wide range of habitats. Nepal is a home of nine species of old world vultures including six residents: White-rumped Vulture (WRV), Red-headed Vulture (RHV), Slender-billed Vulture (SBV), Egyptian Vulture (EV), Himalayan Griffon (HG) and Bearded vulture (BV); one vagrant Indian vulture (IV), one passage migrant Griffon Vulture (GV) and one winter visitor Cinereous Vulture (CV). Out of these nine species, four (WRV, RHV, SBV and IV) are categorized as Critically Endangered, EV as Endangered and BV, CV and HG as Near Threatened (IUCN, 2016).

WRV, IV, SBV in the Indian subcontinent underwent catastrophic declines in population size since the mid-1990s (Chaudhary *et al.*, 2012) caused by the use of the Non-steroidal Anti-Inflammatory Drug (NSAID) diclofenac, which was commonly used to treat domestic ungulates (Oaks *et al.*, 2004). Subsequently, the drug was banned for veterinary use across South Asia and, along with continued conservation efforts, has resulted in the partial recovery of vulture populations (Galligan *et al.* 2019). Although the prevalence of diclofenac in pharmacies has declined, especially in Nepal (Galligan *et al.*, in press), other vulture-toxic NSAIDs are becoming more common (Chaudhary *et al.*, 2019; Bhusal K, P., 2018). This study was undertaken to understand the distribution

and population status of all vulture species by opportunistic observation in the field from 2012 to early 2020 providing a baseline for future surveys, and encourage researchers, conservationist and stakeholders to take action for the conservation.

Methodology

Study Area

Vulture populations are widely distributed across Nepal, although they are more commonly found in the west of the country. Hence, most records come from the western regions. Records of vultures from 2012 to 2020 came mostly from opportunistic observations and exclude data from planned road transect surveys, number noted during colony monitoring and records of birds visiting Vulture Safe Feeding Sites. We eliminate the repeated count in the same locations. We noted the detail of age and number of the birds which were either soaring, roosting or feeding. Data was also extracted from social media posts for the remote districts where we were unable to reach.

Result

Distribution

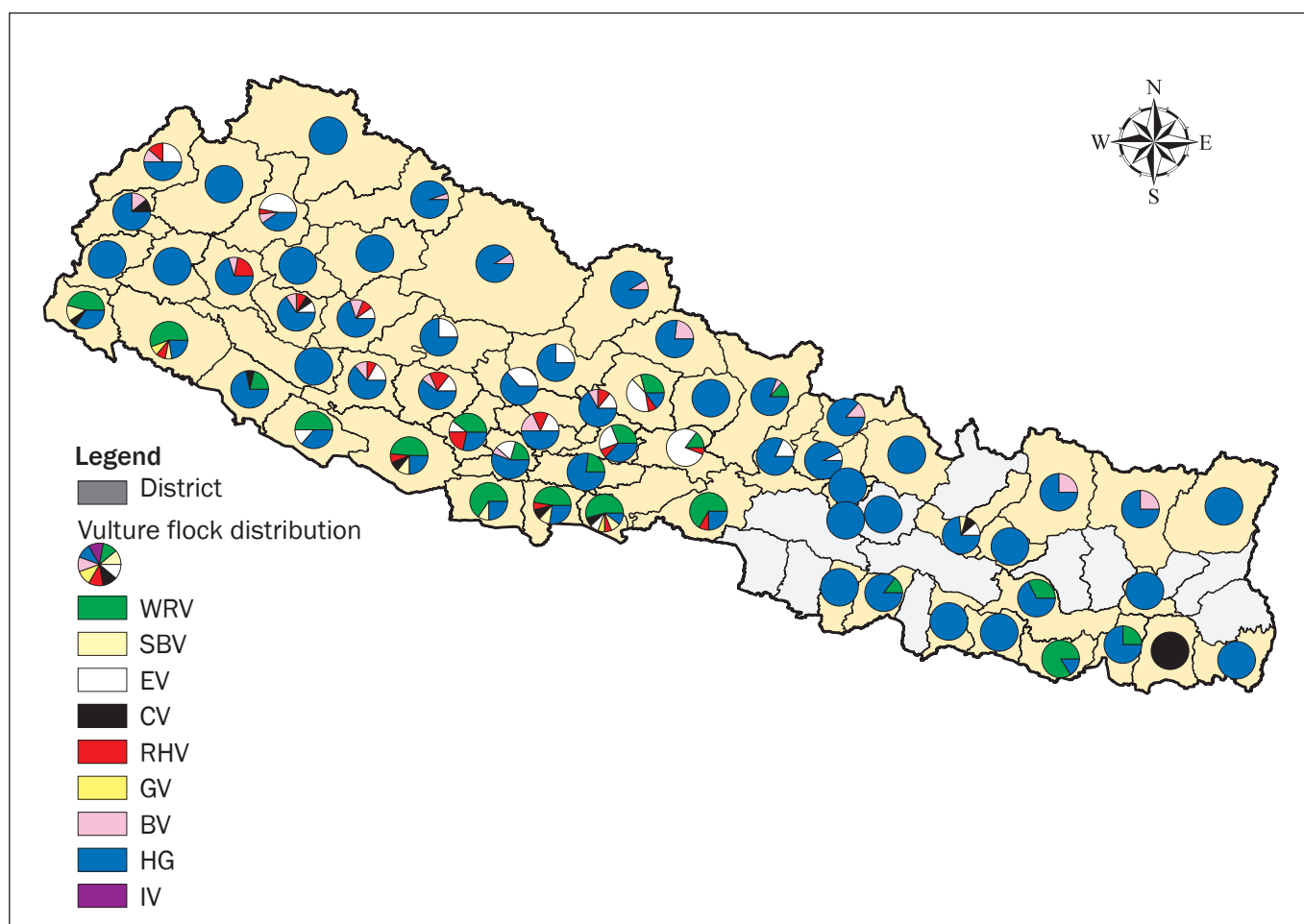
Vultures were recorded from 63 of the 75 districts (80%; Fig. 1) across the country, with

all nine species of vulture being observed. The Himalayan Griffon that breeds in the Mid-hills and Himalayan regions was the most commonly observed species and had the widest distribution, followed by Bearded Vulture, Egyptian Vulture and Red-headed Vulture. The White-rumped Vulture was the most common species found in the Terai plains, followed by Himalayan Griffon, which is winter altitudinal migrant, and Slender-billed Vulture (Fig. 1).

Nepal is divided into three geographical regions i.e. Himal, Hill and Terai. The largest numbers of both resident and migratory vultures were recorded in the hill regions, where all species forage. The main range of White-rumped and Slender-billed Vultures is in the Terai and Hill regions, and they are absent in the Himalayan region (Fig. 2).

Population Status

Observations of vultures were separated into different age classes, and the total number recorded of each species compared with the estimated population size taken from Inskipp *et al.* (2016; Table 1). The majority of Himalayan Griffons recorded were sub-adults as it is this age-class that mostly migrates to the Terai where they are encountered most frequently. White-rumped Vultures were the second most recorded species, predominantly of adults, which



Distribution of different species of vultures in Nepal

reflects the species' breeding status in the Terai and Hills regions; the population was more common in the western region of the country.



Vulture landing on carcass by Jyotendra Jyu Thakuri

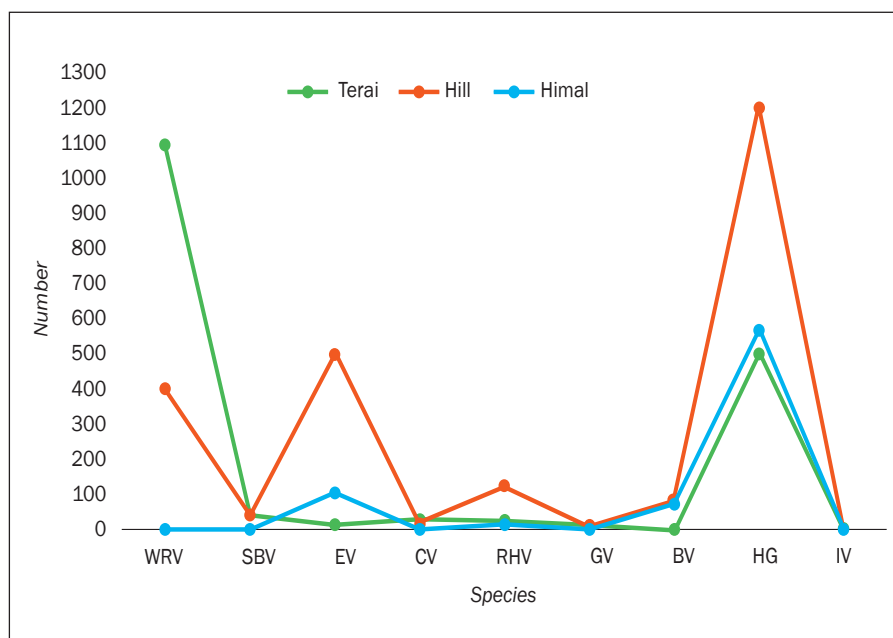


Figure 2 Counts of vultures in different geographical regions of Nepal

Table 1 Comparative vulture population with their age group

Species	Adult	Sub-Adult	Juvenile	Total	Estimated Population (Inskipp et. al 2016)
White-rumped Vulture	1107	371	19	1497	<2000
Slender-billed Vulture	71	9	3	83	50-75
Red-headed Vulture	145	17	5	167	200-400
Egyptian Vulture	492	120	9	621	300-1000
Bearded Vulture	132	27	3	162	<500
Himalayan Griffon	705	1541	25	2271	<10000
Cinereous Vulture	10	39	0	49	60-100
Griffon Vulture	3	22	0	25	-
Indian Vulture	2	2	0	4	-
Total	2667	2148	64	4879	

Status of resident vultures

Six of the nine vulture species recorded are resident to Nepal. HG had the highest number recorded across the nine years of the study period, with the highest counts in 2018 followed by 2020, although the latter only includes counts from the first winter period (up to April 2020). WRV was recorded from 20 districts with numbers varying between years. As the surveys were opportunistic, it is difficult to draw conclusions from this variation, although there is a suggestion of an upward trend in later years (Fig. 3).

Status of non-resident vultures

There are three non-resident vulture species in Nepal, CV and GV, which are annual migrants and the vagrant IV. Most of them were recorded during the winter season in different locations. Among these CV leads to the highest sighting population in 20 districts followed by GV in 10 districts and IV in two districts. Among them CV is dominated

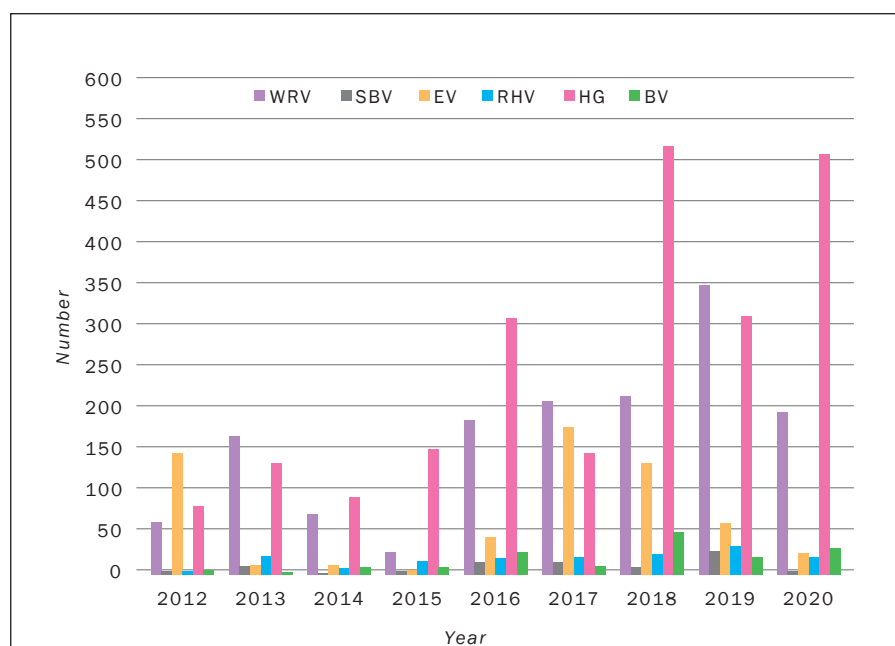


Figure 3 Number of resident vultures recorded in different years.

species recorded in total 49 with highest count 17 in 2019 followed by GV recorded 23 individuals with highest count four in 2014 and two IV were recorded in the last two year 2019 and 2020 only.

Discussion and Conclusion

The integrated approach to vulture conservation by creating Vulture Safe Zones has resulted in the partial recovery of both Critically Endangered resident vulture species, WRV and SBV, in Nepal (Galligan et al., 2019). Numbers of these species recorded in the present study also increased in the recent years, and the number of nests is also increasing gradually (Bhusal et. al., 2019, Rana et al., 2019). This study covered more than 90% of the range of both WRV and SBV, and 80% of the rest of the species. IV has previously been considered a vagrant to Nepal (Bhusal et. al., 2019), so it will be interesting to see if the recent records reflect the species becoming a more regular visitor. The study provided for the firsttime count data of all nine species of vultures in the country, which can be used as a baseline for further monitoring, and other conservation actions. Our study revealed that the amount of data amassed on the vulture population in Nepal has increased in recent years, and has helped to ascertain the species' population status in the country through the efforts of many enthusiastic conservationists. Further research and conservation action is required throughout the country to confirm our knowledge of the status and threats of vultures in Nepal.

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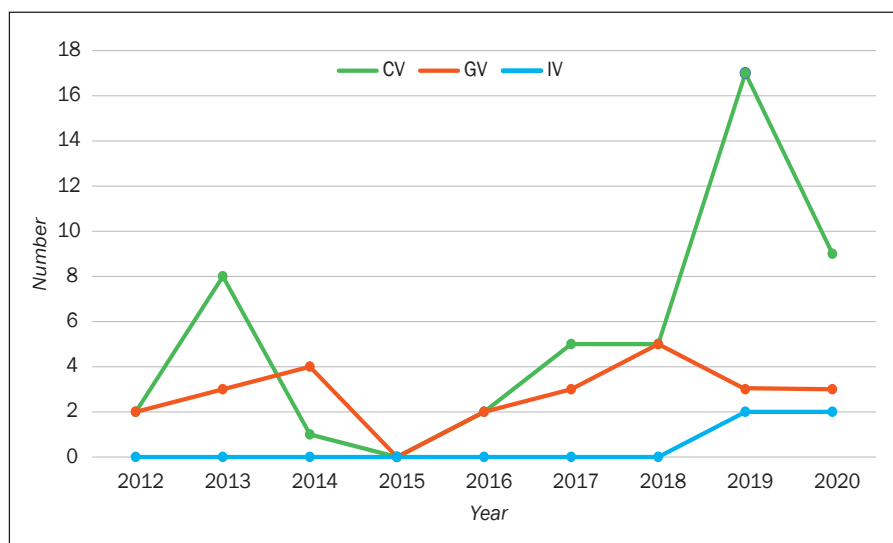


Figure 4 Number of non-resident vultures recorded in different years

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Spatial-temporal analysis of vulture related content in social media

Prashant Ghimire^{1,2*}, Rakshya Thakuri³, Aarati Basnet³, Nabin Pandey³, Bhuwan Singh Bist⁴, Basant Sharma^{1,5} and Krishna Prasad Bhusal⁶

Abstract

Nature-related contents on social media are increasing after the dramatic expansion of the internet around the world. If mined systematically, such contents could possess high value for assessment of species or habitat at a large scale. However, this aspect of data collection is rarely used. In this paper, we used facebook photographs of vultures captured in Nepal to study spatio-temporal variation in vulture related content. Total of 518 photographs were collected that includes photographs of all nine species found in Nepal among which Himalayn Griffon was the most widespread and Indian Vulture was the most restricted species. At least one species of vulture was photographed in 59 districts of Nepal of which most photographs were captured in Kaski (107) followed by Nawalparasi (62). Although social media data could be of high value, there are several challenges which could only be minimized by awareness of users. We recommend developing social media post guidelines for specific conservation related group through which species or habitat could be monitored over time.

Introduction

Human interaction on digital platform is exponentially increasing after the expansion of the internet making the world a global

village (Valcanis, 2011). Social media, whose users are growing dramatically, is one such digital platform that holds large amounts of information including nature-related content (Minin, 2015; Fink *et al.* 2020). Therefore, social

media can play a vital role in biodiversity conservation (Saito *et al.* 2015; Ghimire & Pandey, 2019). Although scientific surveys have gathered a wealth of data and shaped our understanding of species distribution, it



is somehow expensive and time-consuming. In such cases, publicly available information on an online platforms such as Facebook, Instagram, Twitter, Flickr, etc. could be boon for tracking species distribution. The study of such digital data to gather information on human-nature interactions is known as conservation culturomics (Ladle *et al.* 2016) which utilizes user-generated big data (Hampton *et al.* 2013) allowing large scale analysis of socio-environmental interactions (Ruths & Pfeffer, 2014). Such interactions have high value as current conservation practices are shifting to a people-centric approach (Kareiva & Marvier, 2012; Bennett, 2016)

Vultures are large size, conspicuous and culturally celebrated birds that have been revered as symbols of power and insight in South-Asia (Kushwaha, 2016). For this reason, they are also photographed by members of the public as being they may either be concerned or excited about their sightings. Some of these sightings are uploaded to social media often accompanied by their perspectives on species, which could be mined and analyzed (Daume, 2016).

Out of 23 species of vultures in the world, Nepal harbors nine species of which four are listed as critically endangered by IUCN (BirdLife International, 2017). Vultures being highly susceptible to a non-steroidal anti-inflammatory drug such as Diclofenac were seriously threatened throughout the region (Oaks *et al.*, 2004; Cuthbert *et al.*, 2006). To halt such rapid decline, the Government of Nepal restricted production, import and use of veterinary Diclofenac in 2006 and prepared a Vulture conservation action plan (2009-13) (Poudel and Bhusal, 2015). Although these initiatives have helped in the recovery of vultures (Galligan *et al.* 2019) continuous monitoring and conservation efforts are required to sustain a viable vulture population in Nepal. Most research carried out on the status, distribution and people's perception on vultures in Nepal using direct field surveys and questionnaire/interviews. However, the study of online available information is non-existent, therefore, through this study, we explored Facebook to understand the spatial and temporal distribution of vulture-related contents in Nepal.

Materials and Methods

We used Facebook as our data source. Facebook is often used to share pictures and status but not (necessarily) in real-time through which users interact (Minin *et al.* 2015). By March 31, 2019, Facebook reported having 1.56 billion daily users (Facebook, 2019) which portrays the scale of interaction. We reviewed publicly available Facebook photographs of vultures captured in Nepal and posted from January 2009 to March 2020. Therefore, information of 2020

includes only the first three months of the year.

We used "Vulture", name of each species and districts as keywords to search photographs of species on Facebook. We also surveyed major bird-related Facebook groups of Nepal eg. "Bird Conservation Nepal", "Birds of Nepal" etc. and personal profile of those whose posts were made publicly available. Information on the year of the post was collected using automatically generated time tags on Facebook. Photographs that were clear enough to identify species were taken into account. We avoided repeated photographs and used the original caption (Not shared one) as a source of information. We also avoided mixed-species flock for which count and identification for all were not possible. Captions were rated as negative if the caption had negative messages or sentiments; neutral if no keywords related to conservation was mentioned; positive, if conservation-related keywords were mentioned.

The number of friends of the surveyor and groups in which he/she is a member can still affect the outcome. Therefore, the surveyor entered major bird-related groups and added or liked pages of birdwatchers, photographers, local key persons and researchers related to the vulture. Moreover, not every photograph contained details of location, therefore available information via caption or through communication with photographers was carried out whenever possible. We cross-checked doubtful sighting using Grimm *et al.* (2011) and consulted with experts.

We used MS Excel for data management and Arc Gis 10.3.3 for map extraction. We reviewed photographs posted since 2009, therefore map showing 75 districts was used to avoid the geographical error. After federalization, Rukum was divided into west and east Rukum while Nawalparasi was divided into Parasi and Nawalpur.

Results

A total of 518 photographs were collected of which geographical location of 51 could not be triangulated. Photographs of at least one species of vultures were taken from 59 districts of Nepal of which Kaski (107) had the highest followed by Nawalparasi (62; Fig. 1). Photographs of eight species of vulture were recorded from Kaski district (except Indian Vulture) and Nawalparasi (except Bearded vulture). Photographs were obtained from Kanchanpur in the west to the Jhapa in the east although there were fewer photographs from the eastern part of Nepal. No photographs were obtained from 16 districts of eastern lowlands and mid-hills (fig. 1)

Photographs of Himalayan Griffon were posted from 50 districts of Nepal making it the most widespread species followed by White-rumped vulture (N= 21). Photographs of Indian vulture were obtained only from Nawalparasi district (i.e Vulture restaurant, Nawalpur) making it the most restricted species (Annex 1).

The number of photographs posted on Facebook have gradually increased since 2010 and reached a maximum in 2019 (n=99) (Fig.3). In the first three months of 2020, 73 photographs of vultures had already been posted suggesting a steep rise in vulture-related content in Facebook.

Photographs of all nine species of vultures recorded from Nepal were collected of which Himalayan Griffon (215) had maximum photographs followed by White-rumped vulture (88) while Indian vulture had a minimum photograph (n=4) as shown in figure 2.

A total of 93 posts were found to have positive sentiments and rest were neutral. Captions with negative sentiments were not recorded during the review. With the increase in the number of posts on vultures, positive sentiments increased from 2009 to 2020.

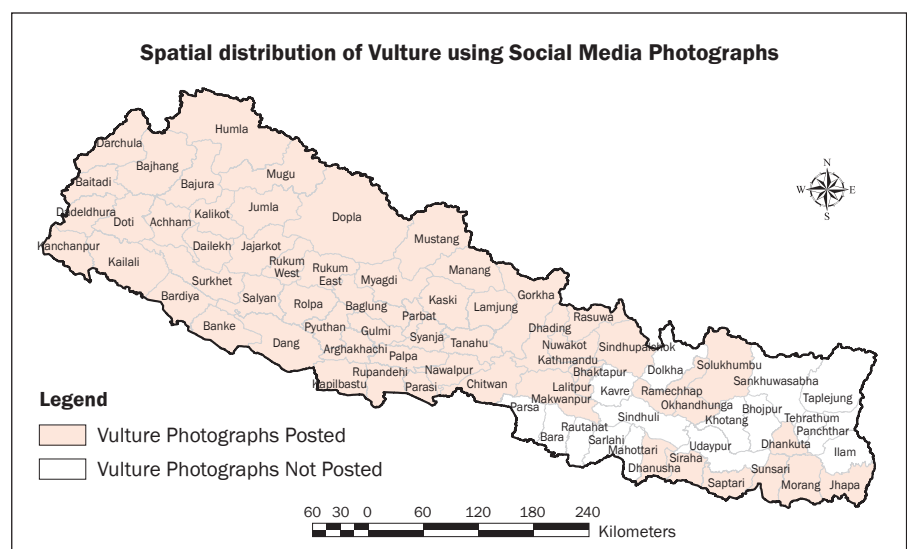


Figure 1: Spatial distribution of Vulture's photographs in Social media (Facebook)

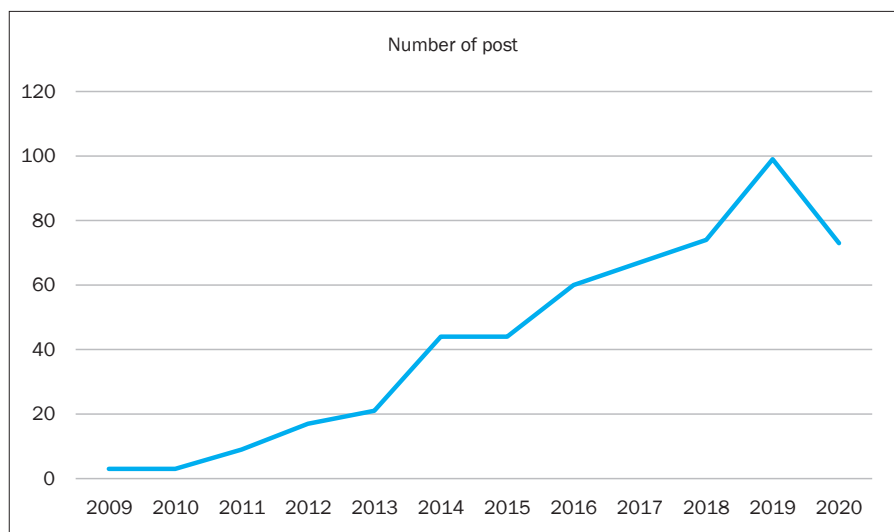


Figure 2: Trends of photographs of Vulture posted on Facebook

Discussion

The available content on vultures in Nepal suggests an increase in such digital content, and perhaps the success of ongoing conservation awareness programmes (Galligan et al. 2019). The number of Facebook users in Nepal grew from 625,800 in 2010 to 10,419,000, in January 2020, now accounting for around 36% of the entire population (Internet world stat, 2020). This expansion of the internet and increase in social media users can vividly explain the increase in content on vultures since 2009.

Himalayan griffon had the most photographs taken from the greatest number of districts of Nepal, reflecting the species' status as a resident breeding species at higher altitudes as well as a widely distributed winter visitor (from 75m to 6100 m) (Inskipp et

al. 2016). While Indian vulture had the least photographs which might be because of its vagrant nature with only two records from Nepal (Bhusal, et al. 2019).

The highest number of photographs were from Kaski district, which lies in the centre of the country, with a diverse climate and geography, ranging from the upper subtropical zone to the trans-Himalayan zone, providing suitable breeding habitat for resident vultures and foraging grounds for wintering populations. Additionally, a vulture safe feeding site and landfill site, which attract great numbers of vultures, is located at Ghachowk within Kaski district. Annual raptor surveys and weekly bird watching events are also organized in this district (Ghimire et al. 2019; Himalayan Nature, 2020), which increases awareness

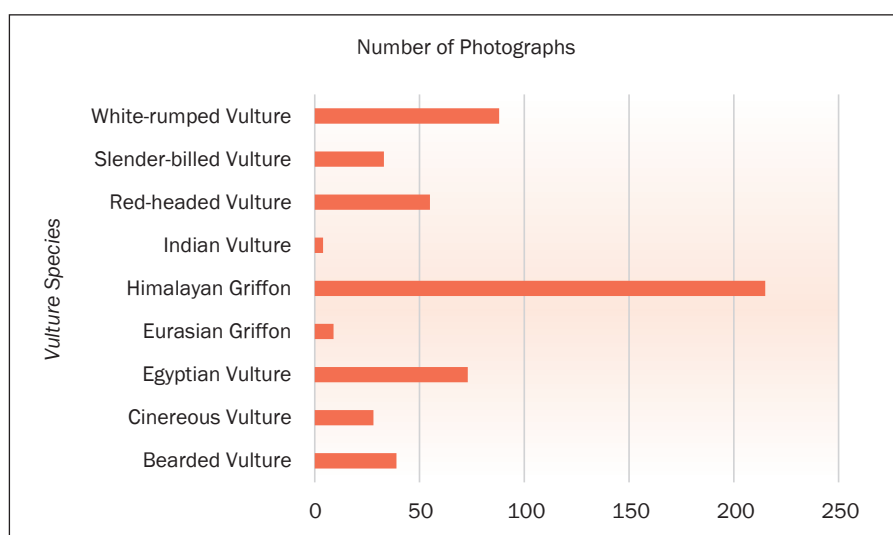


Figure 3: Species wise photographs obtained



Flock of Himalayan Griffon in Upper Mustang by Rajendra Gurung

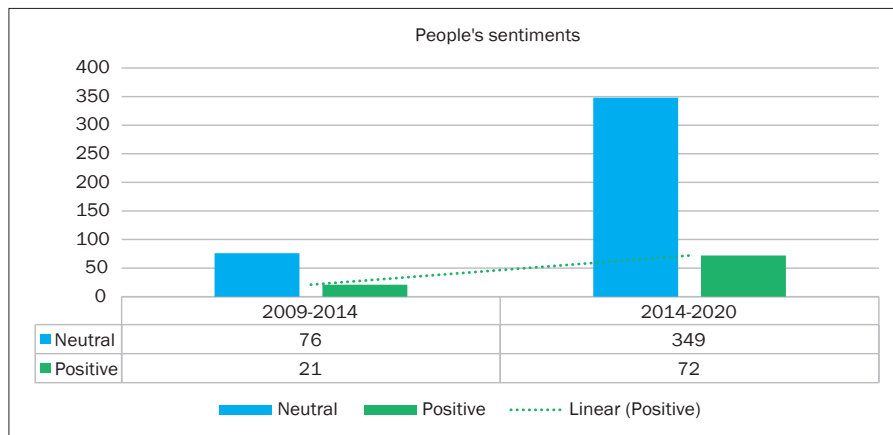


Figure 4: People's sentiments extracted using captions

and also content on social media. Likewise, Nawalparasi district, which recorded the second highest number of photographs, contains Nepal's first vulture restaurant and captive vulture release center, situated on the edge of Chitwan National Park, which attracts a large number of birdwatchers and photographers from around the world. Fewer photographs being collected from the eastern part of the country probably reflects the lower density of vulture in these regions (Chaudary et al. 2012; Inskipp et al. 2016), thus reducing the frequency of sighting and, hence, social media posts.

The majority of photographs were not captioned with any messages except species name and place of capture (these were rated neutral). This is because these photographs were mainly posted in bird watching groups where people are already familiar with vultures. All other photographs were captioned with a positive message, suggesting that the photographers had a positive attitude towards vultures. Interestingly, many people who weren't familiar with vultures (e.g. not being able to identify species) expressed concern about vulture declines in their locality. Similarly, a picture of the statue of Red-headed vulture built at Kafal Danda, Myagdi, was shared with a positive message. News content regarding vultures has been widely shared on Facebook,

which could be another reason for positive sentiments of people towards vultures.

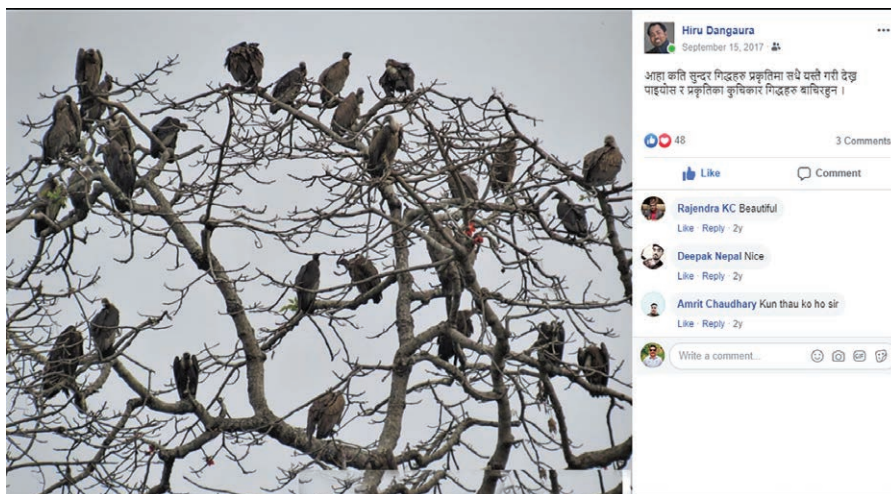
In the same way that this study has documented the temporal and spatial distribution of vultures, so there are other conspicuous species or habitats that attract people's attention which can be monitored using social media data. However, there are challenges such accuracy of location information, which for many posts may be incorrect or completely missing (Minin et al. 2015). To make social media content on species or overall biodiversity more reliable, awareness of users is imperative.

This will foster data collection on a large scale, thus supporting the conservation. Therefore, we suggest to develop social media guidelines, especially by groups (e.g. "Bird Conservation Nepal" "Bird of Nepal" "Voice of Nature") which could continuously provide reliable information. Finally, we see conservation culturomics as a potentially valuable field, especially in developing countries such as Nepal, where species monitoring programmes are often limited by funds.

Acknowledgement

This paper is dedicated to photographers who spend valuable time, effort and money to bring photographs to people's attention using Social media. Very grateful to Facebook for providing the platform to share the photos and views.

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Annex 1. Detail of species photo posted on Facebook districtwise

Himalayan Griffon		Eurasian Griffon	Bearded Vulture	White-rumped Vulture	Egyptian Vulture	Red-headed Vulture
Achham	Doti	Achham	Achham	Arghakhanchi	Arghakhanchi	Bajura
Arghakhanchi	Gorkha	Chitwan	Arghakhanchi	Baitadi	Baitadi	Chitwan
Baglung	Humla	Doti	Baitadi	Chitwan	Chitwan	Dadeldhura
Baitadi	Jajarkot	Kaski	Dadeldhura	Dang	Dailekh	Dang
Bajhang	Jhapa	Rupandehi	Dolpa	Darchula	Dang	Darchula
Bajura	Jumla	Sunsari	Gulmi	Gorkha	Darchula	Doti
Banke	Kailali	Nawalparasi	Kaski	Jajarkot	Dhading	Kanchanpur
Bardiya	Kalikot		Manang	Jumla	Gorkha	Kaski
Bhaktapur	Kanchanpur		Mugu	Kailali	Gulmi	Kathmandu
Dadeldhura	Kapilvastu	Cinereous Vulture	Mustang	Kalikot	Jajarkot	Nawalparasi
Dang	Kaski	Bardiya	Parbat	Kanchanpur	Kaski	Palpa
Darchula	Kathmandu	Chitwan	Rasuwa	Kapilvastu	Myagdi	Parbat
Dhading	Lalitpur	Kanchanpur		Kaski	Nawalparasi	Pyuthan
Dhankuta	Lamjung	Kapilvastu	Indian Vulture	Myagdi	Parbat	Surkhet
Dhanusha	Makwanpur	Kaski	Nawalparasi	Nawalparasi	Sunsari	Gorkha
Dolpa	Manang	Kathmandu		Palpa	Syanja	
Ramechhap	Morang	Mustang	Slender-billed Vulture	Rolpa		
Rukum	Mugu	Nawalparasi	Chitwan	Rupandehi		
Salyan	Mustang	Palpa	Dang	Saptari		
Saptari	Myagdi	Parbat	Kanchanpur	Sunsari		
Sindupalchowk	Nawalparasi	Gorkha	Kaski	Tanahun		
Siraha	Nuwakot		Nawalparasi			
Solukhumbu	Okhaldhunga		Rupandehi			
Sunsari	Palpa					
Surkhet	Rupandehi					

Food Access and Threats to Vultures in Chitwan Annapurna Landscape, Nepal

Vishubha Thapa¹, Jose Anadon², Pramod Kumar Jha³ and Kumar Sapkota¹

Abstract

Livestock carcasses are the main food source for vultures in Nepal. There is a global vulture crisis with several species at risk of extinction, mainly through poisoning. In addition, food availability is the subject of current conservation strategies and research. The objectives of our study were to explore food access for vultures, livestock rearing trends, carcass disposal practice and the distribution of vultures according to food availability. Line transect and questionnaire surveys were carried out in four districts viz. Nawalparashi, Palpa, Kaski and Manang, between 3 April, 2016 and 21 July, 2016. Questionnaire surveys found that 73% of respondents buried their livestock after death; 73% thought there was a decreasing number of vultures of which 65% indicated this was due to food scarcity. There were 40.61%, 59.59% and 71.36% fewer livestock compared to 10, 20 and 30 years earlier, respectively. Thus, burying livestock carcasses and the declining number of livestock could be limiting the amount of food available to vultures. A total of 113 vultures of five species were counted in districts containing Vulture Safe Feeding Sites (i.e. Nawalparashi and Kaski), with 61 counted in districts without Vulture Safe Feeding Sites (i.e. Palpa and Manang). Comparing the number of vultures from these two different sites using f-test ($F_{cal} = 7.759 > F_{tab}$) indicated significant difference in number of vultures with food availability. Findings of this study therefore, indicate a need of sufficient amount of food through vulture friendly carcass disposal mechanism to save the vultures.

Introduction

Vultures are nature's great scavengers, feeding almost exclusively on livestock carcasses (Donazar, 1993). The Indian subcontinent holds nine species of vultures, all of which are found in Nepal (Vulture Bulletin, 2015). Populations of vultures in South Asia declined by greater than 90% (Chaudhary et al., 2011). The main, if not sole, cause of these declines was unintentional poisoning by the Non-Steroidal Anti-Inflammatory Drug (NSAID) diclofenac, which was commonly used to treat livestock in the Indian subcontinent (DNPWC, 2009). As a result, the Governments of India, Nepal, Pakistan and Bangladesh all instigated bans on the veterinary



Buffalo carcass in the study area by Vishubha Thapa

use of diclofenac, which has resulted in a partial recovery of vulture populations in the region (Chaudhary et al. 2012, Prakash et al. 2012, Galligan et al. 2019). Vultures face other threats, such as climate change, pesticides/poisoning (Harris, 2013) and electrocution from powerlines (Chaudhary et al., 2019). Food shortages are thought to be responsible for the decline of vulture populations in South East Asia in the second half of the 20th Century (Pain et al., 2003). In Europe, modelling suggests that there could be a rapid decline in the number of vultures due to health regulations affecting the availability of food provided by domestic carcasses, unless vultures show greater plasticity in their dietary range (Margalida and Colomer, 2012). Nepal has one of the highest livestock densities in Asia (Inskipp and Baral, 2010), where nearly every rural household keeps domestic animals (Regmi, 1994). Domesticated ungulate carcasses are the principal food source of vultures in Asia (Chaudhary et al., 2011). Livestock management, i.e. species and stocking density, are expected to play a key role in determining vulture distribution (Tomas and Olea, 2015). This might indicate a functional relationship between food abundance and vulture numbers (Donázar and Fernández,

1990). Specific objectives of this study were to i) assess the trends in livestock numbers along an altitudinal gradient covering different socioecological systems, i.e. lowlands, midhills and highlands; ii) characterize and quantify the social practices surrounding carrion disposal; iii) investigate the perception of local communities of vulture conservation and population changes; and iv) assess the significance of vulture safe feeding sites (VSFS) on vulture populations.

Materials and Methods

Study area

Chitwan Annapurna Landscape (CHAL) is located in central Nepal, covering an area of 32,057 square kilometres with elevations ranging from 100 m to 8,091 m. The landscape includes all or part of 19 districts and is drained by six major perennial rivers and their tributaries of the broader Gandaki River System. CHAL experiences a range of climates from subtropical in the lowlands to alpine in the high mountains and cold and dry in the Trans-Himalayan region. Among 19 districts of CHAL, Nawalparashi (lowland), Palpa and Kaski (midland) and Manang (highland) were selected for the study.

Methods

Line transects and Questionnaire surveys were adopted during study.

Two Village Development Committee (VDC) from each of the four districts under study were sampled using a random sampling method. Questionnaire surveys were carried out in 15 randomly selected households in each VDC, hence there were a total of 30 questionnaires per district and 120 questionnaires from the whole study area. Respondents were asked how many livestock they presently owned, and also the number of livestock 10, 20 and 30 years previously. Other questions included an evaluation of trends in carcass disposal, respondents' views on the status of vulture, their thoughts on the causes for the change in numbers of vultures and their view on the importance of vultures.

Line transects ranging in length between 5km and 20km were walked in all study areas to gather information on the distribution of Vultures in CHAL. Time for the transect survey was allocated from 08:00 hours to 16:00 hours. Rainy and cloudy days were avoided.

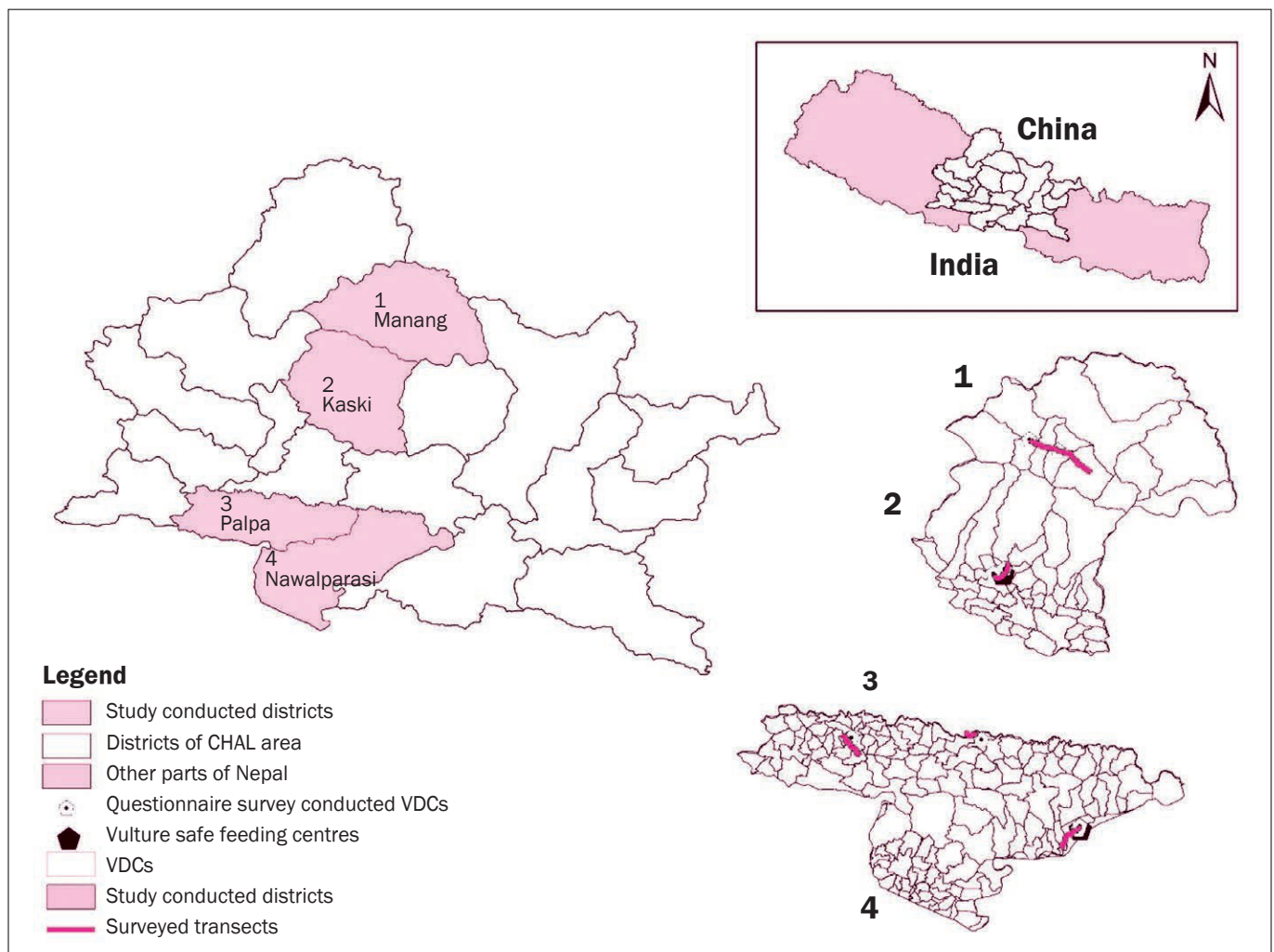


Figure 1: Map showing the study area

Table 1: Transect Characteristics

S.N.	Transect	Length (km)	Elevation (m)		District
			Minimum	Maximum	
1.	Kawasoti- Krishnasar forest	20	120	177	Nawalparasi
2.	Bejhad- Khairani forest	15	308	405	Palpa
3.	Dhungakhani- Batase danda	5	1069	1547	Palpa
4.	Ghachowk- Milanchowk	20	962	1118	Kaski
5.	Chamche- Gangapurna lake	20	2173	3550	Manang

Results

Status and Rearing Trends of Livestock

Respondents said that they had 40.61%, 59.59% and 71.36% fewer livestock currently compared to 10, 20 and 30 years before, respectively. The number of cow / ox declined by 63.67%, 78% and 85.90%, respectively. Cow/Ox is the main food access to vultures of Terai and mid Hills of the districts Nawalparashi, Palpa and Kaski. Similarly, the number of yak has declined by 25.50%, 61.22% and 73.05%, respectively. Yaks are the main food access for vultures in the trans-Himalayan region of Manang district (Figure 2).

Carcass Disposal Practice in CHAL Area

Our questionnaire survey showed that 73% of people bury their livestock after death, the remaining 27% either throwing the carcasses in an open place/river or taking the old and unproductive cattle to VSFS (Figure 3).



Vulture at feeding site, Nawalparasi by Ankit Bilash Joshi

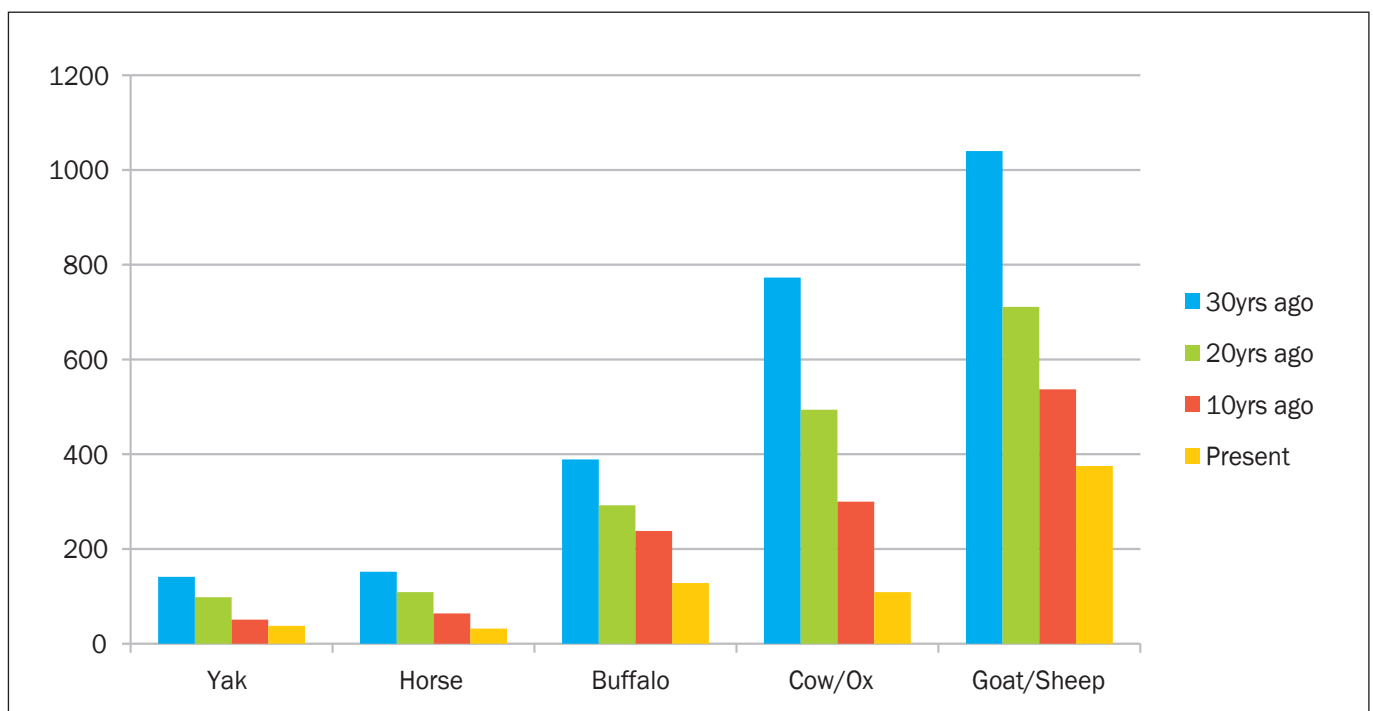


Figure 2: Livestock rearing trends in study area from past 30 years to present

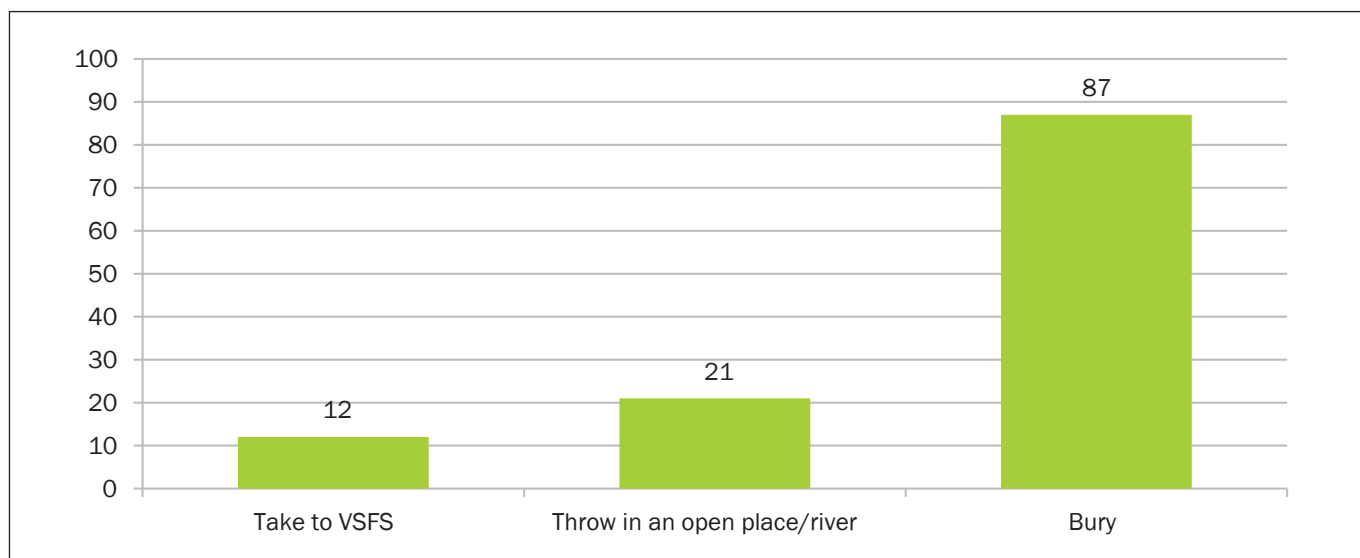


Figure 3: Carcass Disposal Practice

Population status and threats to vultures

Out of the 120 respondents 72.5% (N = 87) thought there had been a decline in the number of vultures, while only 12% (N = 15) indicated they thought numbers had increased (Figure 4). Of those people who thought there had been a decline, 65% (N = 57) thought that food scarcity was the main cause, with others suggesting habitat destruction (11%), veterinary drugs (9%), power line electrocution (6%) and climate change (5%) (Figure 5). Of the 12.5% (N = 15) who suggested there had been an increase in the number of vultures, respondents believed this increase was due to the establishment of VSFS i.e. food availability (67%), community awareness (18%), habitat conservation (9%) and banning of diclofenac (6%).

Distribution of vultures according to food availability

We have been recording five species of vultures during the study period which is detailed below.

Comparing the number of vultures recorded from these two different sites using f-test ($F_{cal} = 7.759 > F_{tab}$) at 5% level of significance and 4, 4 degree of freedom rejected the null hypothesis and indicated significant difference in number of vultures with food availability.

Discussion

The number of livestock that respondents said they owned in all four districts under study was found to have declined in the previous 10-30 years. Similar results have been found elsewhere in Nepal (MoAD 2014). There was reportedly a 50% decline in the number of cattle over just five years on the Terai Arc Landscape (TAL) (BCN 2016); there were also declines in Nawalparasi (Chaudhary et al. 2012) and Rupendehi and Dang districts

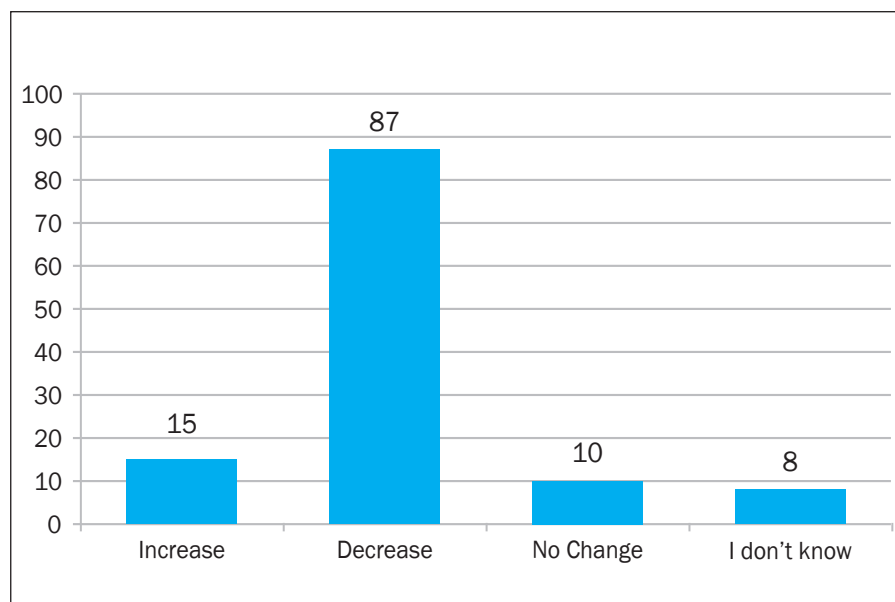


Figure 4: People perception on vulture population changes

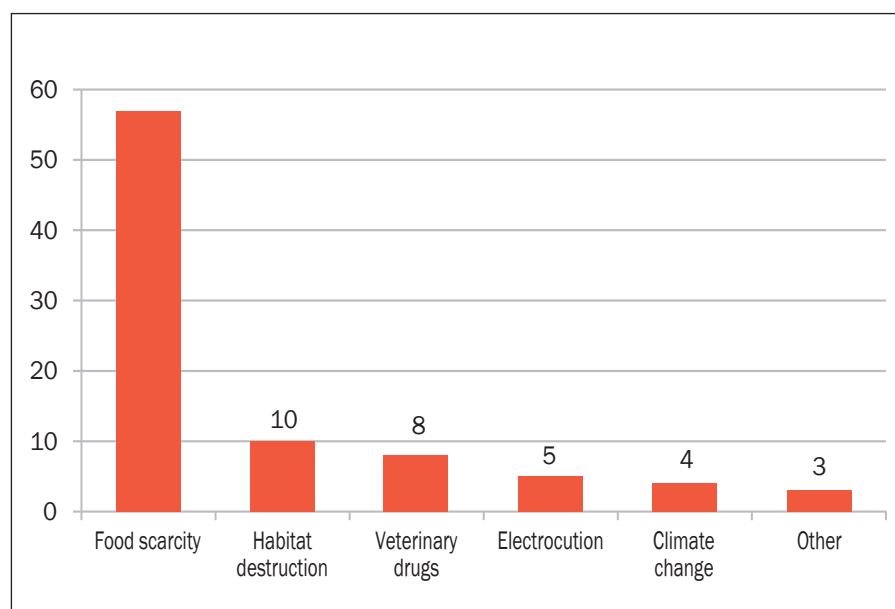


Figure 5: People perception on the cause of vulture population decline

Table 2. Total species and number of vultures in different districts

Species	VSFS Districts (Nawalparashi, Kaski)	VSFS Outside Districts (Palpa, Manang)	Total
White-rumped Vulture	81	30	111
Himalayan Griffon	5	19	24
Egyptian Vulture	14	4	18
Red-headed Vulture	13	5	18
Bearded Vulture	0	3	3
Total	113	61	174

Table 3. F-ratio for distribution of vultures according to food availability

Sites	Total no. of vultures	F-ratio
VSFS Present Districts	113	7.759
VSFS Absent Districts	61	

(Dhakal 2012). Although diclofenac was the main cause of the decline of vultures in South Asia (Green et al. 2007, Chaudhary et al. 2011), this drug is now almost absent from Nepal (Galligan et al. in press). However, other NSAIDs known to be toxic to vultures, e.g. nimesulide, are becoming more commonly available in pharmacies. Nevertheless, food shortages might be another factor limiting the vulture population recovery. This study found that 73% of respondents buried their livestock after death. This result is supported by the study of BCN (2016) on TAL where 92% respondents buried their livestock after death. In contrast, however, KC and Timilsina (2013) recorded 53.8% of respondents from Kaski district who preferred to throw their dead livestock in open places.

Although it is well established that unintentional poisoning by veterinary drugs, i.e. diclofenac, was the main, if not sole cause, of the catastrophic decline of vultures in Nepal and elsewhere in South Asia, this threat was identified by just 9% of respondents, the majority (65%) of whom suggested the cause was food scarcity. Other threats to vultures were identified as habitat destruction (11%), power line electrocution (6%) and climate change (5%). Potential future threats to vultures have been identified as electrocution, poisoning, human persecution and decline in food supply (Chaudhary et al. 2012). Conversely, of 12.5% of respondents who suggested there has been an increase in the number of vultures, believe this increase is due to the establishment of VSFS, mirroring results from Rupendhi and Dang district (Dhakal 2012). This is also supported by the higher number of vultures recorded in the two districts (Kaski and Nawalparashi) holding VSFS compared with those (Manang and Palpa) that didn't, suggesting birds are attracted to easy sources of food. The number of vultures number also increased after establishment of VSFS in Nawalparasi (Adhikari and Bhattarai 2014).

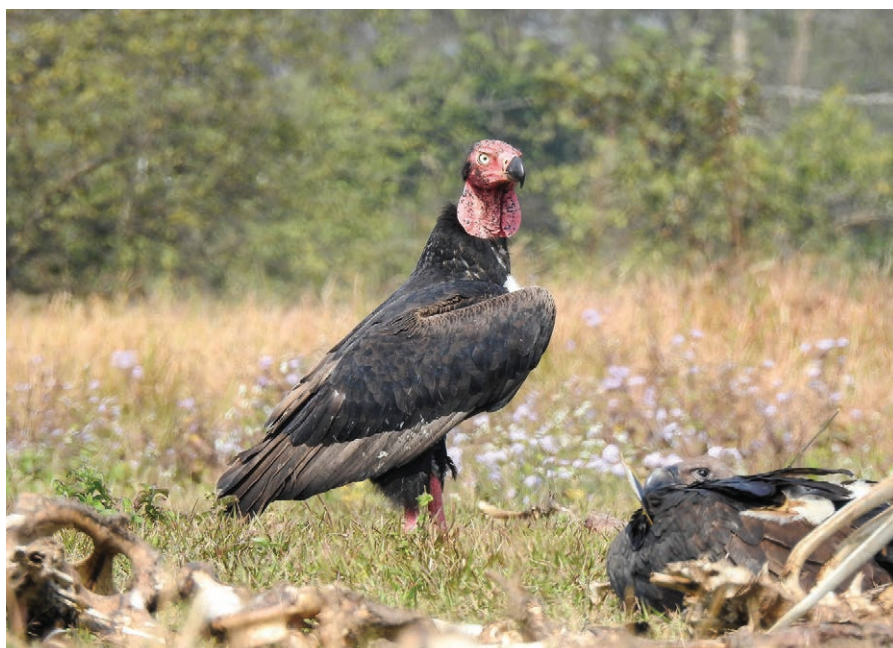
Conclusion

A declining trend in livestock farming was observed in each district of the study area; people were found to be leaving livestock farming. Moreover, most of the dead livestock were buried and many of the livestock were sold before they die or as soon as they become unproductive. Although food abundance may have been declining gradually over time, its impact would have been swamped by the catastrophic effects of diclofenac. However, food scarcity could be a major potential threat to vultures in the future, possibly highlighting the importance of Vulture Safe Feeding Sites (VSFS). Higher numbers of vultures were counted in districts that had VSFS than those that didn't, and local people had recognized the increase after the establishment of the feeding sites,

and the provision of a safe supply of food. Overall, the perception of most of the local people towards the conservation of vultures was positive.

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Red-headed Vulture near carcass by Ishwari Prasad Chaudhary

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Indian Vulture by Ankit Bilash Joshi

प्रतिबन्धित डाइक्लोफेनेक औषधि सम्बन्धी कानुनी प्रावधान

नेपाल सरकार, औषधि व्यवस्था विभागले डाइक्लोफेनेक औषधिलाई वि.स. २०६३ जेष्ठ २३ गते देखि पशु उपचारका लागि उत्पादन, प्रयोग र विक्री वितरणमा प्रतिबन्ध लगाएको छ । औषधी ऐन २०३५ बमोजिम पशु उपचारका लागि डाइक्लोफेनेक उत्पादन, प्रयोग, विक्री वितरण आयात, निर्यात र भण्डारण गरेको पाइएमा ३ वर्ष कैद वा रु. २५,००० जरिवाना वा दुवै सजाय हुनसक्ने कानुनी प्रावधान छ ।

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People's perception on vulture conservation at core breeding area of Rampur IBA, Palpa, Nepal

Bikash Ghimire^{1*}, Kuppusamy Sivakumar² and Sas Biswas³

Abstract

Humans have benefited from a close relationship with scavengers since prehistoric times. Vultures play significant role in health of livestock and humans, in the environment and also are connected in culture and tradition of many communities. This study focuses on peoples' perception and their livestock practices through questionnaire survey. Domestic livestock numbers in the area have declined mostly due to modernization in agriculture, however people are well aware about population decline of vultures. Food scarcity, habitat loss, electrocution are some of the limiting factors for population recover of vultures in the area. People-vulture relations are of paramount importance for the long-term survival of vultures and this survey indicates some positive attitudes which can help in the longer term.

Introduction

The relationship between humans and vultures dates back to Late Pliocene period when meat was incorporated into the diets of early hominins (Moleón *et al.* 2014) wherein both (hominids and vultures) consumed middle sized mammals and also competed with other scavengers. Till today, modern humans and other terrestrial scavengers like Hyenas, Lions and wild dogs use vultures to locate carcasses (Morelli *et al.* 2015). Since the origin of early *Homo* species, humans have benefited from close relationship with scavenging birds and mammals including from health services of removing the rotting animal debris before putrefaction (Markandya *et al.* 2008, Ogada *et al.* 2012) as well as a range of cultural services including where feathers or claws are used as personal ornaments and in symbolic contexts (Finlayson *et al.* 2012).

Once abundant across much of their historic range, including Indian subcontinent, many species of vultures are now ironically facing extinction. In Nepal a steep population decline of over 90% population of *Gyps bengalensis* and *Gyps tenuirostris* between 1995 and 2011 (Chaudhary *et al.* 2012) and the reason of which has been human introduced and exploited veterinary NSAID diclofenac to

treat livestock (Bhusal K.P. 2018). The decline of vultures in Asia also affecting human cultural traditions. Once a stronghold for vulture population primarily due to reverence for the cows, across the Indian subcontinent where the Parsi communities are among the most significantly affected communities by the drastic vulture population (Ogada *et al.* 2012).

In Hindu Mythology vultures are believed to be carrier of Saturn. Also in Holy book Ramayana, goddess Sita was believed to be rescued from Ravana by vultures. In the highlands of Nepal, vultures have an important cultural role of *Sky Burial* where human corpses are consumed by the scavenging vultures. However, in other communities, people have a negative regards for vultures, believing that they bring ill luck and deaths in the community (DNPWC, 2015).

With less awareness about vulture population decline, their ecological importance and superstitious false beliefs, it will be difficult to successfully implement conservation plans. To overcome this, sensitization on vulture population decline and its detrimental effect in ecology, to all stakeholders including students, farmers, veterinarians and governmental authorities through intensive education and awareness

campaign may garner support for their conservation (DNPWC/MoFSC/GoN 2009). For effective formulation of education/awareness programs, it is important to interpret peoples' perception, their attitude and level of knowledge on vultures. This study aims at understanding people's perceptions of vultures in and around Rampur Valley of Palpa District which includes a very important core breeding habitat of *Gyps bengalensis*, the Khairani Community Forest.

Methodology

Study Area

Rampur Valley (27° 51' 80" N, 83° 54' 24" E), an Important Bird and Biodiversity Area (IBA) lies in NE of Palpa District of Nepal having average altitude of 442 meters with subtropical climate (Baral *et al.* 2005).

Methods

A questionnaire survey was conducted at Rampur Municipality ward no-08, to assess sociocultural status and livestock practices in the study area nearby vulture breeding site. A questionnaire was developed to assess the livestock number and disease problems,

carcass disposal methods and other issues related to vulture conservation.

Each questionnaire was divided into three general parts namely 1. General background of the respondents; 2. Livestock holding; 3. Local knowledge and 4. perception about vulture conservation. Most questions were closed-ended, although some open-ended contingency questions were included.

Pretesting was done before administering the questionnaire to the respondents. Respondents were also asked about sightings of vultures in and around, changes in vulture numbers, and reasons for the population declines. Importance of vultures and management techniques for vulture populations were also discussed to gauge awareness level and peoples' mindset for protection and conservation of vultures.

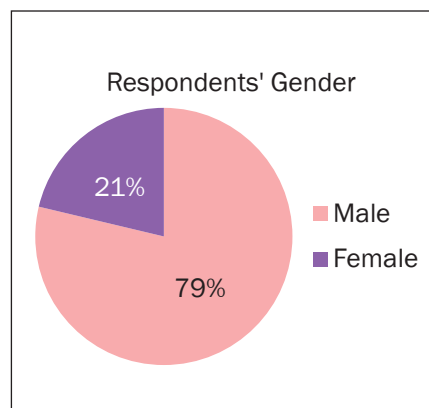
For the assessment of disease prevalence in livestock and availability of veterinary services, questions related to livestock diseases and deaths plus the availability of different veterinary NSAIDs and the veterinary practitioners that are consulted.

Random sampling was used to select four wards within the municipality. Both structural and non-structural questionnaires were used to get information from the study area. Also, focal person discussions were carried out with village heads and heads of community forest user group. The questionnaire survey was conducted to a sample of 94 randomly

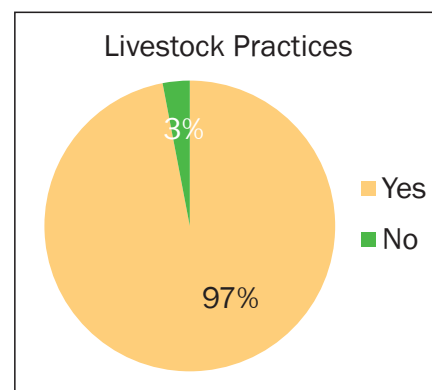
selected households living within a 5 km radius (Rampur side) of vulture colonies during the month of March 2016.

Results

During the survey, one adult person (>20 years old) in each household was interviewed in their residence. Heads of the households were interviewed mostly; however, in their absence, any family members willing to participate were interviewed. Of 94 respondents, 21% were female and 79% were male. Age of the respondents ranged from 20 to 65 years.

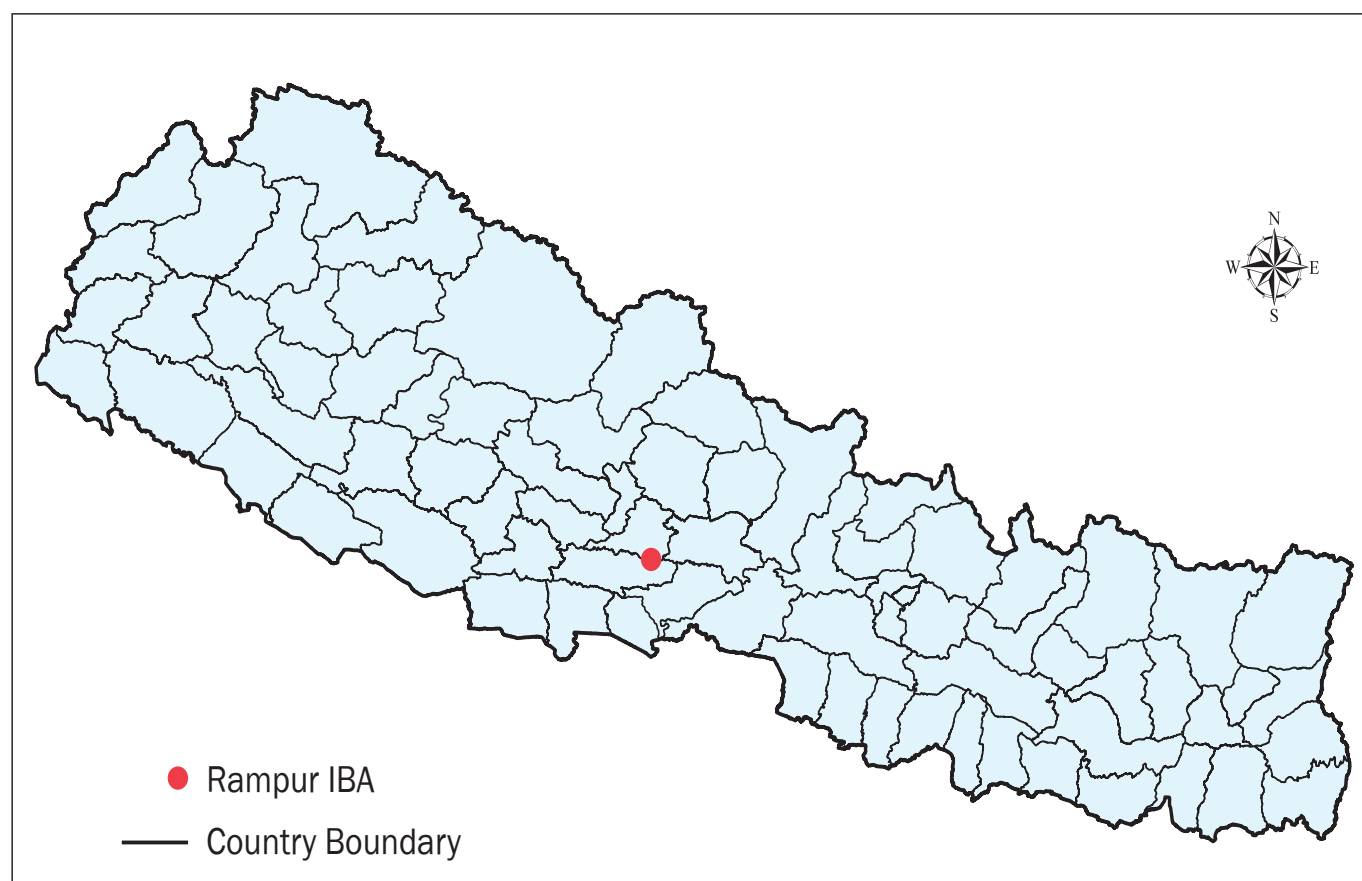


Around 97% of households had one or more kinds of livestock. The most preferred livestock species was goat, followed by buffalo, cow/oxen and swine.



It has been noted that livestock holdings in the region has come down in terms of number of livestock holdings. There had been general insight about population of oxen and cow declining with increasing modernization agricultural works and buffalo farms.

Within the past 10 years, 67% of households lost livestock to disease and 95% household said they used veterinary services to treat their livestock. The carcass disposal practices in the study area were not so beneficial to vultures. When asked what they do with dead livestock, 49% of respondents said they throw away carcasses at community managed carcass disposal place, while 51% said they bury them. In informal discussions with locals, we learned that, governments' livestock insurance scheme requires a photographic evidence of burying the carcass by digging the field before handing over the



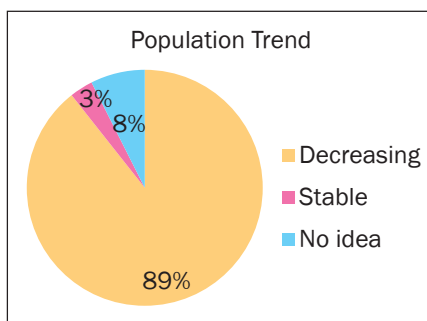
Map: Study area



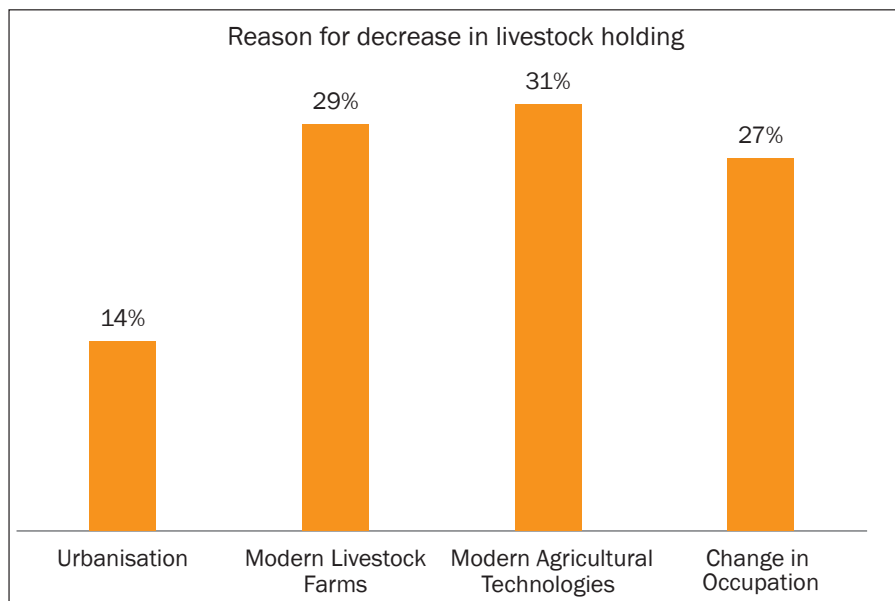
White-rumped Vulture juvenile on nest by Ankit Bilash Joshi

insurance payment. This leads to the practice burying the carcass rather than throwing at a common place, ultimately lessening the possibility of food provision for the vultures.

Local people seemed to have good level of awareness towards vultures and their decline. When asked about the population trends of vultures in the locality, 89 % (N=84) of the respondents affirmed that the population of vultures is decreasing.

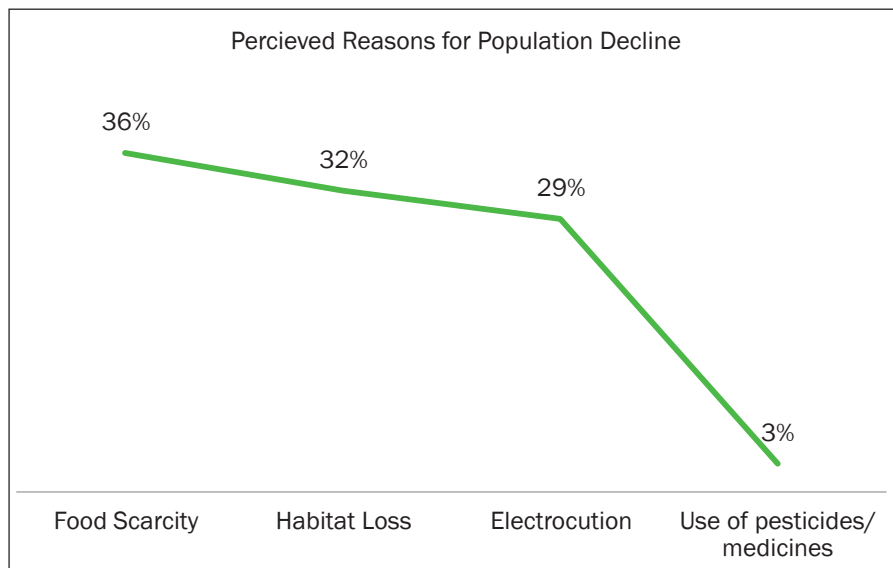


During the questionnaire survey, the reasons given for vulture population decline were: Food scarcity (36%, N=67); Habitat loss - loss of nesting trees (32%, N=62); Electrocutation (29%, N=56); Use of pesticides/veterinary drugs (3%) and Others (2%). Although not quantified, the use of pesticides and chemical fertilizers was common practice among local farmers. Some of the local people were aware about the effect of veterinary drug Diclofenac.



When asked how to prevent vulture population from declining and about management techniques, respondents emphasizing towards increasing the food availability, nesting trees conservation through community participation and increasing conservation awareness. Nobody mentioned removing diclofenac as they thought that it is unavailable. People in the study area are also seeking incentives from government for livestock practices.

Two veterinary doctors were consulted to assess prevailing livestock diseases in the study area and medicines generally referred. The use of veterinary medicine diclofenac was reported as nil, however diclofenac on human use was not assessed. Both veterinary doctors were well aware about the harmful effects of diclofenac and its possible substitute meloxicam.



of its use was assessed with the help of indirect discussions and consulting veterinary doctors. The result is favorable to vultures as both veterinary doctors were well aware about the consequences of diclofenac use and they are aware of the banned status of this drug.

Prior to 2005, the Community forest user group (CFUG) was logging *Bombax* trees, which are the main roosting and nesting sites for vultures. In 2003, from 120 mature *Bombax* trees in the study area, 40 were logged to support a community school, an action that may have seriously compromised the availability of breeding trees (Baral *et al.* 2005).

The logging practice of *Bombax* trees in the Community forest has stopped in the study area. However, *Bombax* trees in

Discussion

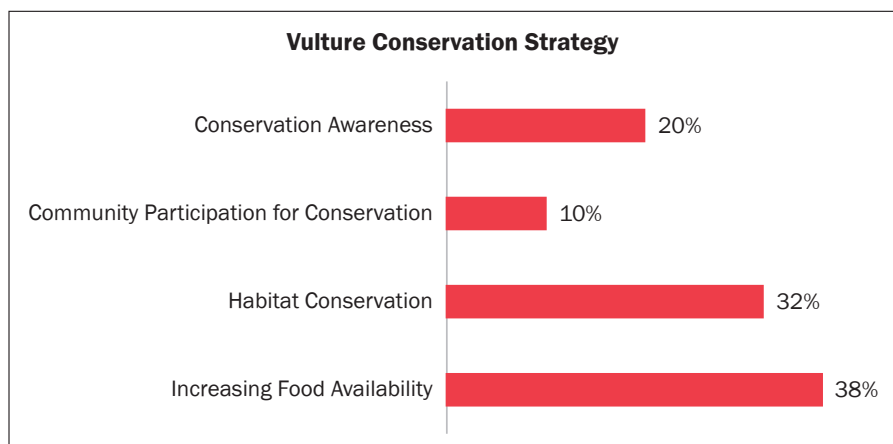
Conservation attitudes are influenced by socio-economic variables such as gender, ethnicity, education, occupation, household affluence and participation in conservation. Study conducted by Baral *et al.*, 2005 shows high proportion of respondents (99%, N=67) reporting that they had never killed or seen anybody persecuting and poisoning vultures by any means. The cattle carcass disposal practices in the study area is beneficial to some extent as 97 % of respondents practice agriculture and livestock rearing, 67 % of them said livestock death occurs due to various reasons and 49% of animal carcasses are thrown away in an open place.

The population of large mammals in the forests of Rampur valley is not significant and there have been rare incidence of people baiting wildlife with poisons as a retaliatory action. This low incidence reduces the chance of indirect poisoning to the vultures in the study area. However, the use of pesticides and chemical fertilizers, although not quantified, was a common practice among the local farmers.

Diclofenac, the major culprit of catastrophic vulture population decline, and extent



Egyptian Vulture on flight by Manshant Ghimire



private land holdings are still vulnerable for logging for high prices. Local people had good level of awareness towards vultures and their declining population. 89% of the respondents were aware of the fact that vulture population is decline. The majority of respondents had favorable attitudes towards the concept of vulture conservation.

Animal husbandry practices, livestock health and human attitudes are all important variables that play significant roles in securing uncontaminated food for vultures. There was general consensus that the population of oxen and cow

declining with increasing modernization, urbanization and change in occupation. Prakash *et al.* 2003 documented that, from mythological times to the present, vultures have held a special role in human society. Their environmental role have been brought to the fore. Local people were concerned about losing the ecosystem services that vulture provides and if the decline continues the health and environment consequences.

At present, the population density of stray dogs is low (Baral *et al.* 2005), however demographic changes are likely to occur in years and food scarcity could be a major concern in the study area. Rampur valley is undergoing major changes and human immigration is increasing adding pressures on natural resources, which in long run will affect the nesting and roosting habitat of vultures.

When asked how to prevent that vulture population from declining and about management techniques, respondents suggested to increasing the food availability, nesting site conservation through community participation and increasing conservation awareness. People in the study area seek incentives to increase their livestock rearing. Local people do not deliberately kill vultures in the Rampur Valley. Overall local people have positive attitude about them. We suggest that providing economic incentives to local people to bury all contaminated carcasses and not to cut *Bombax* trees as well as environmental education about threats posed by veterinary diclofenac to stakeholders may help to secure uncontaminated food for vultures, their viability and long term conservation.

Acknowledgment

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Himalayan Griffon by Jyotendra Jyu Thakuri

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Distribution of Vulture in Pyuthan, Nepal: An Opportunistic Survey

Chiranjeevi Khanal^{1*}, Prashant Ghimire², Suman Ghimire³

Abstract

This study explores vultures of Pyuthan district, a western mid-hill of Nepal, assessed between April 2017 to September 2019 during opportunistic survey. We recorded seven species of vultures during this study period. Himalayan Griffon was most frequently observed species followed by Red-headed vulture while Cinereous vulture and Slender-billed vulture were recorded least during survey. A single case of Electrocutation found could be one of the prevailing threats for vultures in district.

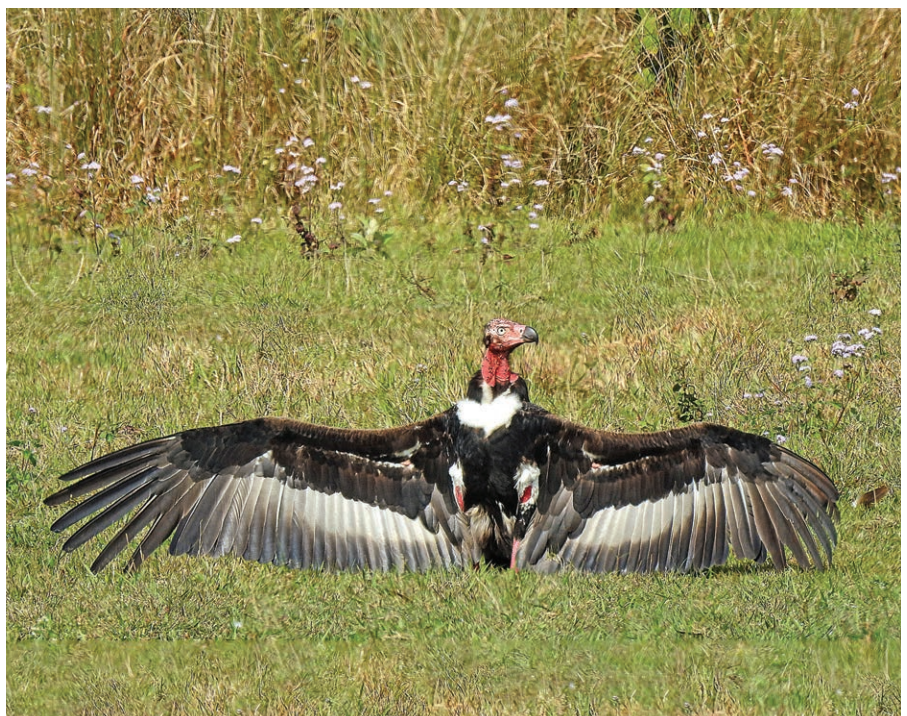
Introduction

Vultures are the natural scavengers, which provide essential ecosystem services, yet they are among the most threatened groups of birds worldwide (Ogada *et al.*, 2015). Nepal supports all nine species of vultures recorded from Indian Sub-continent, all of which belongs to Accipitridae family (DNPWC 2015). Gyps vultures in the Indian subcontinent have undergone catastrophic decline in number since the mid 1990 (Chaudhary *et al.*, 2012). Non-steroidal anti-inflammatory drug (NSAID) named diclofenac, which was widely used to treat livestock in South Asia in the 1990s and 2000s, has been solely responsible for such catastrophic decline (Paudel *et al.*, 2016 and Safford *et al.*, 2019). Other accessory causes that accelerated this declination are habitat destruction, indirect poisoning, electrocution and electric collisions, food shortage and superstitious beliefs of rural people (Ghimire, 2018 and Chaudhary *et al.*, 2019).

Moreover, recent studies suggest that the declination rate of vulture population have slowed and probably reversed (Paudel *et al.*, 2016, Safford *et al.*, 2019 and Galligan *et al.*, 2019). Participatory conservation initiatives, in-situ and ex-situ conservation measures along public awareness and provision of diclofenac free food through establishment of Vulture Safe Feeding Sites (VSFS), Vulture Safe Zone (VSZ) and federal concern to declare Nepal as diclofenac free country are critical steps adopted for ceasing the

catastrophic decline of vulture population in Nepal (Paudel *et al.*, 2016 and Bhusal, 2018). However, population of all vulture species in Nepal is still small for their sustainable recovery. Therefore, identification of new habitat ranges and regular monitoring of population throughout these ranges is crucial. Understanding species distribution

foster conservation intervention. In this scenario, this paper presents the distribution of vultures in Pyuthan which is fully untouched with any kind of conservation approaches adopted by Government of Nepal viz. protected areas, conservation landscapes and important bird areas.



Red-headed Vulture by Ishwari Prasad Chaudhary

Methodology

Study Area

Pyuthan district is located in western midhill Nepal (27°52' to 28°22' N and 82°36' to 82°6' E) and covers an area of 1328.9 km² (DFO 2017). The survey covered the elevation range from 400m to 3659m upto KothiLek, highest altitude in Pyuthan. Study area comprises *Shorea robusta* forest, riverain forest, *Pinus* forests, *Schima-castanopsis* forests, *Quercus-Rhododendron* forest and pasture land at higher elevation of Pyuthan also a part of Pyuthan has been proposed as Gaumukhi Protected forest (DFO 2017). Survey conducted using six major roadways Darbhan- Badaadaa- Jaspur-Bagdula, Jaspur-Bhingri-Sworgadwari, Cherneta-Baraula, Bagdula-Machi-Thulabesi-Syauliwang, Bagdhula-Bahane, Bagdhula-Khalanga-Simalchaur) however; foot and forest trails were walked through Bahane-Swauliwang and Syauliwang- KothiLek due to difficult geography.

Methods

The data were recorded for two and half years; from April 2017 to September in 2019. We made opportunistic observations throughout the study period. The vehicle roads and trails were used during vulture survey. The vulture species seen while walking along the roads and trails were recorded. Binoculars (8*40) were used for observation and GPS (Garmin Etrex 10) for geographic coordination. Species were identified using Grimmett *et al.*, 2011 and expert consultation in case of photographed individuals. Further, we conducted informal interview with local to understand the perceived trend of vulture in the study area.

Result and Discussion

Seven species of vulture were recorded from Pyuthan district during the study period. Cinereous vulture and Slender-billed vulture both were recorded only once from Sarumarani, likewise White-rumped vulture was recorded from two sites of Districts: Mandavi and Sarumarani. Himalayan Griffon

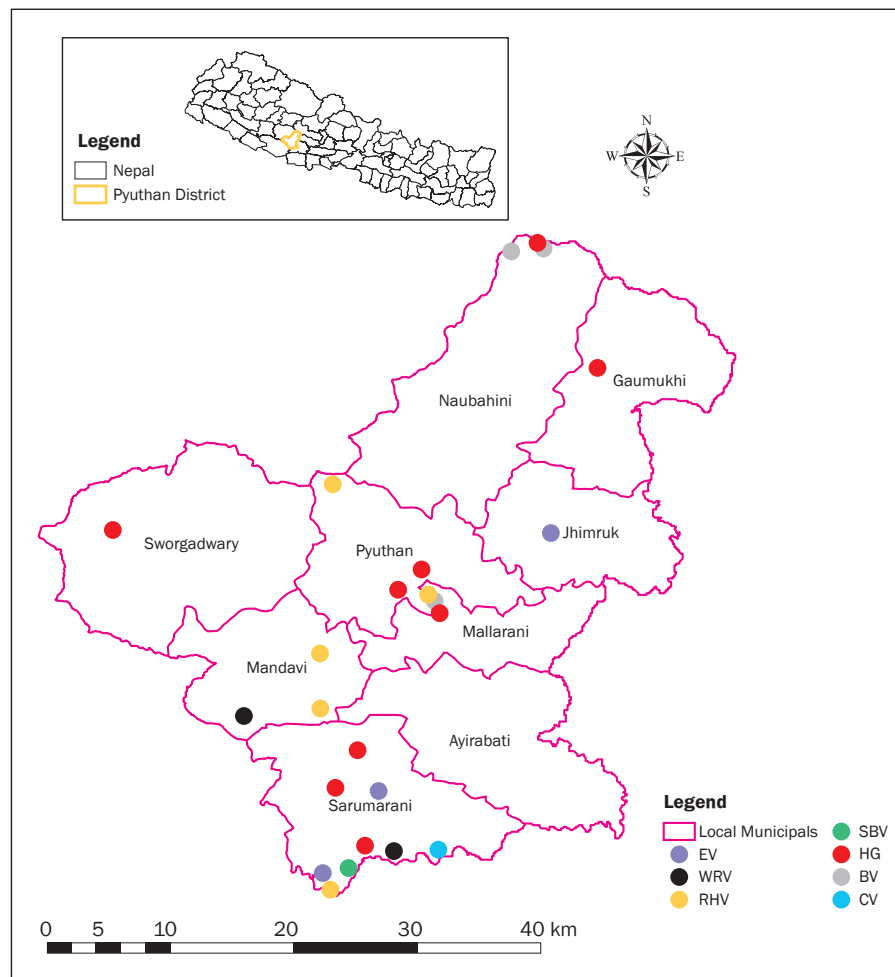


Figure 1. Distribution of all seven vulture species in Pyuthan District

was the most widely distributed species and was recorded from six local municipalities (Sworgadwari, Sarumarani, Mallarani, Pyuthan, Gaumukhi and Naubahini). Likewise; Red-headed vulture was the second most distributed species in Pyuthan and was recorded from four local municipalities (Sarumarani, Mandavi, Pyuthan and Mallarani). Egyptian vulture was sparsely distributed and was recorded only from Jhimruk and Sarumarani. There were no records of vulture from Ayirabati rural municipality. Also there was no evidence of nests of vultures from Pyuthan during this survey period.

Most of the vultures were recorded during soaring and flying however; carcasses feeding were also observed. A flock of seven Himalayan Griffon were recorded feeding carcasses nearby Badanda-Jaspur highway likewise two Red-headed Vulture were recorded feeding on carcasses in Maadii river. Khalanga; administrative headquarter of district is hotspot for vulture as Red-headed Vulture, Himalayan Griffon and Bearded Vulture can have observed frequently. The reason behind no records of vulture in Ayirabati could be due to less survey attempts in Cherneta-Baraula road during study period.

Table1: Detail of Vulture Species, recorded Location and Altitudinal range

S.N	Species	Recorded Locations	Altitudinal Range (m)
1	White-rumped Vulture	Sarumarani, Mandavi	400-1200
2	Cinereous Vulture	Sarumarani	500
3	Himalayan Griffon	Sworgadwari, Sarumarani, Mandavi, Mallarani, Pyuthan, Naubahini	450- 3600
4	Slender-billed Vulture	Sarumarani	500
5	Egyptian Vulture	Sarumarani, Jhimruk	400-1200
6	Red-headed Vulture	Sarumarani, Mandavi, Mallarani, Pyuthan	450-1300
7	Bearded Vulture	Mallarani, Naubahini	1200- 3600

No evidence of hunting of vulture was found however, few injured vultures were rescued during study period. One Himalayan griffon was found injured due to electrocution near Jumri; it was rescued and sent to VSFS of Lalmatiya in Dang District for further treatment with coordination of Division Forest Office, Pyuthan. Second Himalayan Griffon escaped before rescue team reached location. Though it was escaped with a thread on its neck and it was not recaptured. Vultures are often misidentified in Pyuthan. During study period, an information of vulture's chick in captivity was found misleading because latter we confirmed that chick to be of black kite. Interestingly, Asian Woollyneck stork, a large wading bird which is common breeder



Group of Himalayan Griffon near carcasses in Pyuthan by Chiranjeevi Khanal

of Pyuthan is also referred as “HileGidda” i.e “swamp/mud vulture” (Ghimire, 2018). Therefore, people were found confused with correct identification of vultures.

Local people reported that the population of vulture is in decreasing trend and it was supported by rare sighting of vultures with scattered individuals. Likewise, in other part of country, burial of carcasses might have

posed food scarcity. But, according to local, even when carcasses were not buried, it is either decayed or consumed by feral dogs and other wildlife such as Jackals, Wild boar and porcupine. Arrival and feeding by vulture is becoming rare.

Most of the forest areas in Pyuthan are declared as community forest and some area at remote place are handover to local

community as Leasehold forest to improve livelihood of pro pors. Some of the potential habitat with large trees comes under private land, such private land with forest are high in number in this district so coordination with land owner is important to protect habitat of vulture. The prioritization of research and conservation inside and outside the Protected Areas in Nepal is generally biased (Khanal & Baniya 2018) in contrast vulture conservation and research occupy more area outside protected area system. This study provides basic premises about vultures of Pyuthan district and general understanding of local people about vulture over there. We recommend to further study on status and nesting of vultures in Pyuthan.

Acknowledgements

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Estimating Numbers of Himalayan Griffon and Bearded Vulture in Langtang National Park, Central Nepal

Krishna Prasad Bhusal^{1*}, Rajendra Gurung¹ and Toby Heath Galligan²

Abstract

We carried out a transect survey of vultures from the Syphrubensi-Kenjing trail, at an altitude of 1500-3900 m, representing all the main habitats found in Langtang National Park. We recorded 49 Himalayan Griffon *Gyps himalayensis* (39 adult, 4 sub-adult, 6 unknown age) and 8 Bearded Vultures *Gypaetus barbatus* (7 adults, 1 sub-adult) along 28.9 km of trail between 1681 m and 3845 m altitude. Himalayan Griffon were recorded on all four survey days, average 12.25/day and 1.69/km and Bearded Vulture were recorded on three survey days at 2.66/day and 0.27/km. Langtang is a small part of the range of Himalayan Griffon and Bearded Vultures in Nepal, so our results may not be applicable to the entire range of these species.

Introduction

Unintentional poisoning by the veterinary non-steroidal anti-inflammatory drug (NSAID) diclofenac, which was commonly used to treat domestic ungulates in South Asia during the 1990s and early 2000s, resulted in the decline of *Gyps* species by 95% (Oaks et al. 2004; Prakash et al. 2017). Himalayan Griffon and Bearded Vulture are resident cliff-nesting species in Nepal, typically breeding in mountainous and trans-Himalayan regions (Bhusal, K.P 2011). Both species were uplisted to Near Threatened in 2014, owing to evidence that they had undergone a moderately rapid population decline over three generations (BirdLife International 2020). Both are considered Vulnerable nationally in Nepal (Inskipp, et al. 2016).

Methods

Study Area

Langtang National Park; Important Bird and Biodiversity Area (IBA) lies in central Himalayan region of Nepal established in 1976 with an area of 1,710 sq. km extending



Bearded Vulture on flight in Langtang National Park by Rajendra Gurung



Himalayan Griffon by Manshant Ghimire

over parts of Nuwakot, Rasuwa and Sindhupalchowk districts, the southern mountainous terrain of the Nepal-China (Tibet) border (DNPWC 2016). It is one of the three famous trekking destinations in Nepal, along with Annapurna and Mount Everest.

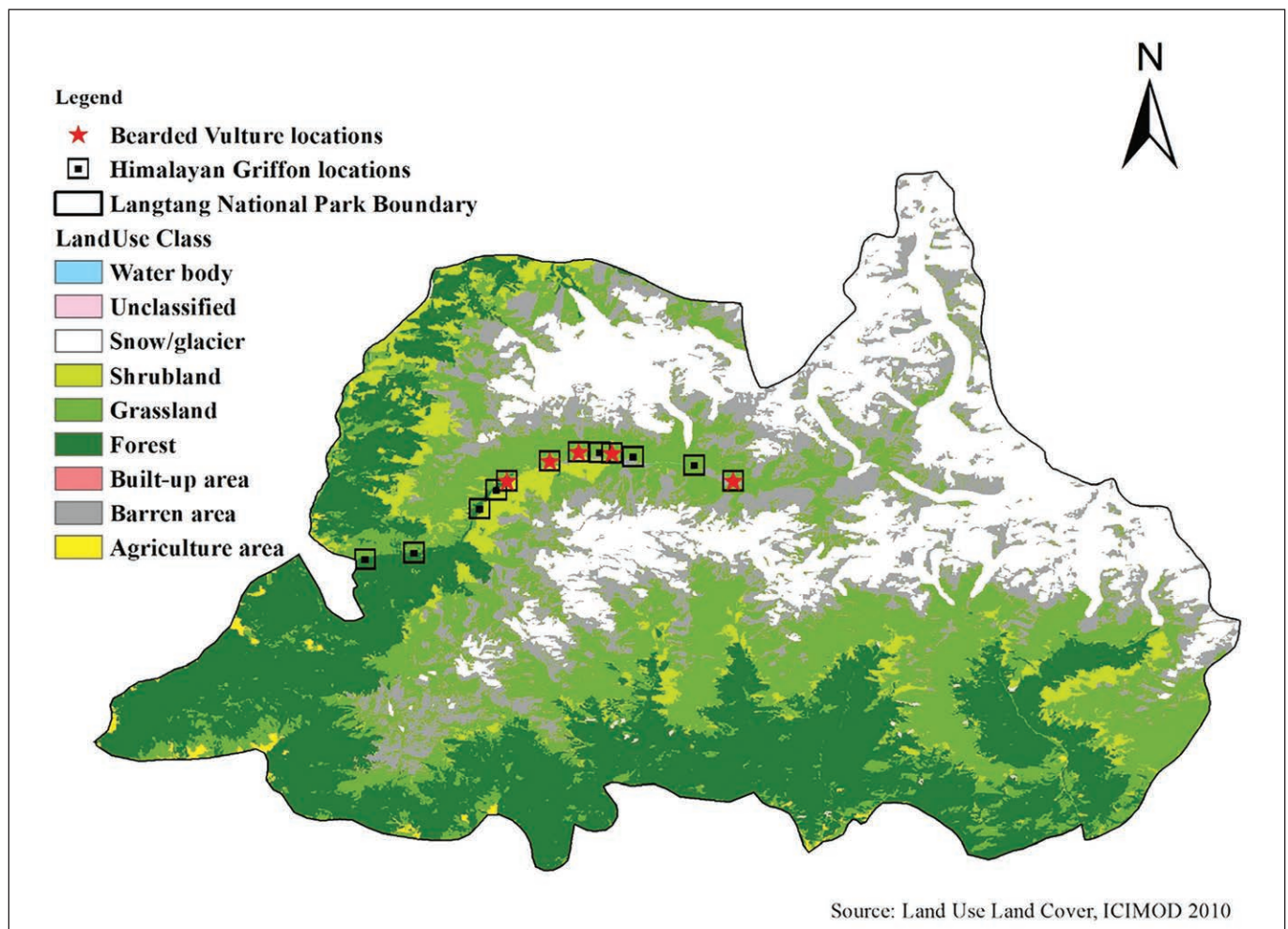
There is great altitudinal variation, from 1,500 m to the top of Mt. Langtang Lirung at 7,234 m. There is rich biodiversity due to the meeting of Indo-Malayan and Palaeartic biogeographic realms. Vegetation varies from sub-tropical to the alpine, and the park

plays host to several charismatic mammal species, such as Snow Leopard, Red Panda, Alpine Musk Deer, Himalayan Tahr and Himalayan Black Bear. A total of 380 species of bird have been recorded from the park, including ten that are globally threatened and 49 nationally threatened.

Field Surveys

We carried out the survey from 18 to 21 April 2016 along the Syphrubensi-Kenjing trail, a length of 28.9 km, at an altitude of 1500 - 3900 m, which covers all the main habitats of Langtang National Park. Surveys commenced at 09h00 and ended at 16h00, the peak activity period of the species (Andersen 2007), following a consistent walking pace and rest periods throughout the day. All Himalayan Griffon and Bearded Vultures observed on both sides of each transect were counted and all sightings were confirmed by two or more surveyors. Distinguishable plumage features, associated with age and/or moult, and behaviour, e.g. circling, flying, including altitude and direction, were agreed by the surveyors present and used to help identify individual vultures in order to avoid counting the same individual more than once. The numbers of vultures per day and per km were calculated for both species.

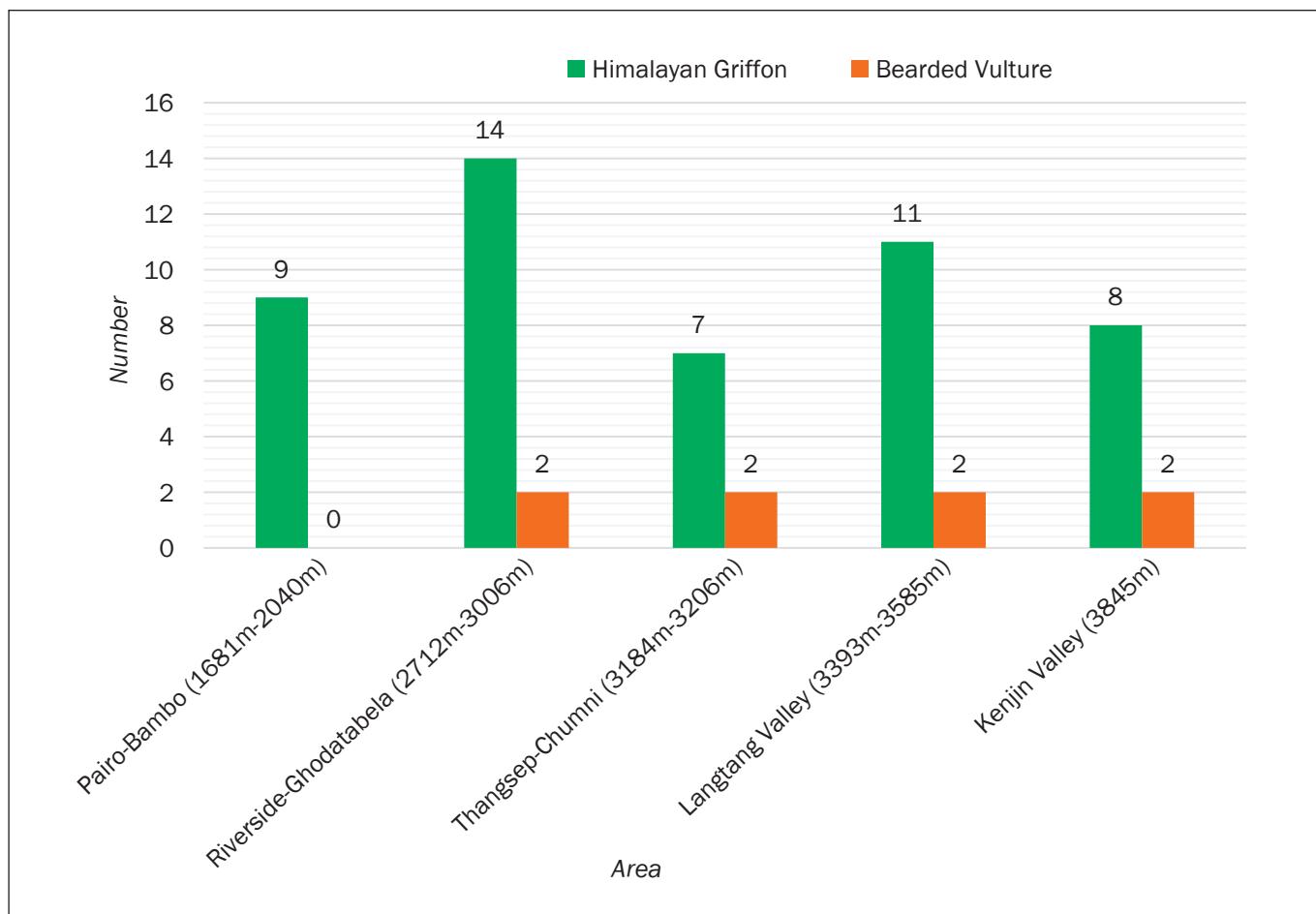
The each observed location for the respective species is shown in map below:



Map showing the observed locations of vulture



Research team observing vulture in Langtang National Park



Graph shows the area wise observed number of vultures



Bearded vulture in flight by Deu Bahadur Rana

Results

Distribution: Vultures were recorded from the locations in between 1681 m to and 3845 m altitude (Figure 1, 2).

Population Size: We recorded 49 Himalayan Griffon Vultures, of which 79.6% (n = 39) were adults, 8.2% (n = 4) were sub-adult and 12.2% (n = 6) were of unknown age. Eight Bearded Vultures were recorded, of which 87.5% (n = 7) were adults and 12.5%

(n = 1) were sub-adults. Himalayan Griffon were recorded on all four survey days at an average of 12.25/day and 1.69/km; Bearded Vultures were recorded on three survey days (2.66/day and 0.27/km) (Table 1).

Conclusion

Langtang is a small part of the range of both Himalayan Griffon and Bearded Vultures in Nepal, so our results may not be applicable to the entire range of these species. For instance, the number of Himalayan Griffon

observed in this study was lower than that recorded (using the same method) in its main breeding area in Upper Mustang (Paudel, *et al.* 2015) however, figures were similar for Bearded Vulture (Paudel, *et al.* 2016). That we observed individuals of different ages of both species suggests that they may have been breeding somewhere in the area.

Acknowledgement

We are very much grateful to Department of National Parks and Wildlife Conservation and Langtang National Park for providing the permission for this study and it was funded by BCN and RSPB Centre for Conservation Science, UK.

Table 1. Total number, number per day and number per kilometer of Himalayan Griffon and Bearded Vultures counted on the Syphrubensi-Kenjing transect in Langtang National Park.

Species	Observed Days	Total Number	Number/Day	Number/km
Himalayan Griffon	4	49	12.25	1.69
Bearded Vulture	3	8	2.66	0.27

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Lowest Altitudinal Breeding Record of Bearded Vulture *Gypaetus barbatus* in Nepal

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Abstract

We recorded an active nest of Bearded Vulture at an elevation of 1156 m above mean sea level (asl) on a cliff in Bangad Kupinde Rural Municipality, Salyan district. Following a review of published material and consultation with experts, we believe this is the lowest elevation recorded for Bearded Vulture nesting in Nepal, and possibly in the entire Himalayan range. The nest was situated at a height of 50 m on the northern face of a rock ledge whose total height was approximately 70m. The aerial distance of the cliff from the nearby Bheri river was 1 km and about 35 m from a road.

Background

Bearded vulture *Gypaetus barbatus* the only member of its genus, is a high altitude, territorial species which, uniquely, feeds upon the bone marrow of dead animals, especially medium sized ungulates (Donazar et al., 1993). It is a widespread resident in the Himalayan region of Nepal and has been categorized as Vulnerable at a regional level (Inskipp et al., 2016). Globally, the species is categorized as Near Threatened, as evidence suggests that it has undergone a moderately rapid population decline over the past three generations (BirdLife International, 2017), and is listed on appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2020).

Bearded Vulture has been recorded in Nepal from an altitude of 250 m in Chisapani, Kailali to 7200-7500 m



Bearded Vulture by Rajendra Gurung



Nesting of Common Kestrel on rock ledge situated at Chhatreshwori Rural Municipality by Suman Ghimire

in Khumbu region (Inskipp et al., 2016). Although detailed studies of the species' breeding ecology in Nepal is limited, several active nests have been recorded, for instance at an elevation of 2089 m in (Bhusal 2011); at 1800 m, 2462 m and 2362 m in Jajarkot, Dolpa and Jumla districts, respectively (Govinda Singh per.com., 2019); and at 1705 m in the Chhatreshwori rural municipality of Salyan district (Bhusal 2012). A nest found around the Annapurna Massif at an altitude of 4,800 m, may be the highest recorded nest of Bearded Vulture (Garcia 2020). To date, the lowest altitude nest recorded was at an elevation of 1445 m in the Annapurna Conservation Area (Subedi et al. 2018). This note reports the lowest altitudinal breeding

record of Bearded Vulture in Nepal from Salyan district.

Nest Identification

Detail surveys of vultures in Salyan district, western Nepal, were carried out from June 2017 to February 2018, with the aim of understanding their distribution and nesting status. On June 5, 2017 a nest was located on a cliff situated at Kafalpani village, Bangad Kupinde Rural Municipality ward no. 4. We could not confirm to which species the nest belonged, however, as Egyptian Vulture, Bearded Vulture and Himalayan Griffon were all seen soaring around the cliff, and despite concealing ourselves, no birds landed on

the nest. Residents of a nearby village were unaware of the presence of the nest, and suggested that it may have belonged to a Common Kestrel that was present on the cliff. However, this seemed unlikely as the nest contained large amounts of twigs which is not common in case of Common Kestrel. Common Kestrels usually make their nests directly on rock ledges or of holes of trees (Carrillo and Aparicio, 2001).

On October 11, 2017 we made a second visit to the nesting site, and although we observed fresh droppings around the vicinity of the nest, again both Himalayan Griffon and Bearded vulture were seen soaring high above the cliff, but none landed on the nest. Finally, on our third visit on February 25, 2018, we saw an adult Bearded Vulture sitting on the nest. Concealed, we observed the nest for two hours (11:30 AM to 1:30 PM), and recorded a pair of Bearded Vultures were alternately occupying the nest with an average gap of 45 minutes.

Characteristics of Nest and Nesting Site

The nest was situated on the northern face of a rock ledge, at a height of 50 m above the ground. The total height of the cliff face was approximately 70 m. The nest was at an elevation of 1156 m above sea level, as recorded by hand-held GPS (Garmin Etrex 10) at an accuracy of 3m. This is the lowest recorded elevation of a Bearded Vulture nest in Nepal, and possibly in the entire upper Himalayan range. The aerial distance of the cliff from the nearby Bheri river was 1 km. The cliff base was about 35 m from an earthen road. In between, there was a 30m wide strip of private agricultural land and a 5 m wide strip of bushes. In the agricultural land, we observed cultivation of maize, millets, ginger, mustard, etc. during our three different visits. Similarly, the bushy strip comprised of *Lantana camara*, *Achyranthes aspera*, *Berberis aristata*, *Justicia adhatoda*, *Agave* spp., *Rubus ellipticus* etc. On the top of the cliff there were saplings of *Sapium insigne*. Just below the nest there was a *Rubus ellipticus* plant. The nesting material consisted of twigs of *Pinus roxburghii*, uprooted straw of maize, pieces of clothes and plastics and other fine twigs and sticks of local plant species which were unidentifiable.

The nests of Bearded Vulture are generally large (averaging 1-m diameter), composed of branches and lined with animal remains, such as skin and wool. They tend to be located on remote overhanging cliff ledges, or in caves, and are re-used over the years (Birdlife International, 2017). Subedi et al., (2020) in their study from Annapurna Conservation Area, Nepal reported that Bearded Vultures preferred cliffs with a south to west aspect, possibly to avoid cold temperatures. However, the location of this nest in northern aspect could be due to its lower elevation and thus a less adverse climate. Different climatic and environmental

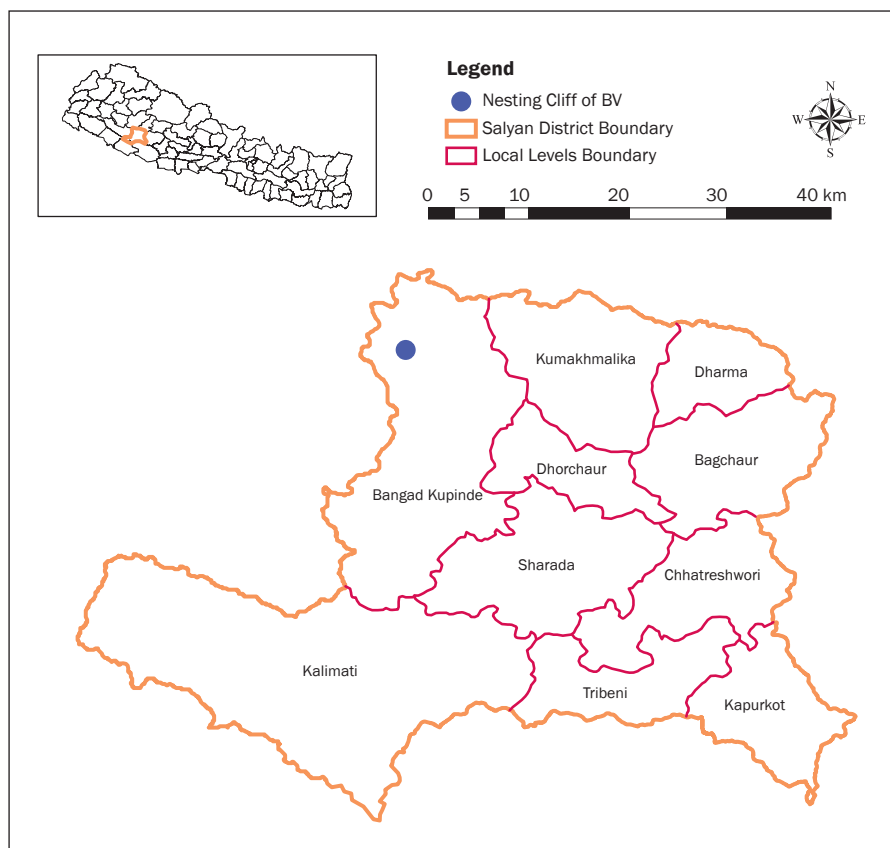


Figure 1: Geographical location of nesting cliff of Bearded Vulture

factors, as well as anthropogenic activities, affect the selection of nesting sites by Bearded vultures (Gavashelishvili & McGrady, 2006; Margalida et al., 2007; Reid et al., 2015 and Subedi et al., 2020). Therefore, we recommend that the factors influencing nest site selection, including the apparent altitudinal shift, of Bearded Vultures in Nepal be investigated.

Acknowledgement

We are thankful to The Rufford Foundation (<https://www.rufford.org/>), UK for providing financial support to conduct vulture study in Salyan district. We are indebted to all local people, especially Mr. Keshab Basnet, of Kafalpani village for updating the nest status to us throughout the study period.

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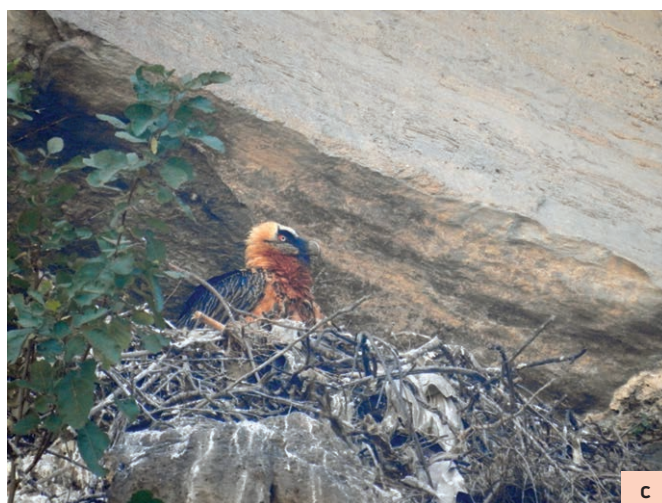


Figure 2: State of Bearded Vulture nest in three different surveys (a) June 2017- unoccupied, (b) October 2017 unoccupied (c) February 2018 - occupied

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Status of Egyptian Vulture *Neophron percnopterus* in Pokhara Valley, Nepal

Prashant Ghimire^{1,2*}, Hemanta Dhakal², Basant Sharma¹, Manshanta Ghimire², Milan Baral³, Krishna Prasad Bhusal⁴

Abstract

Egyptian vulture is widespread throughout Nepal, apart from in the east part of the country. Despite increasing research and conservation attention given to vultures of Nepal in last two decades, information on this species remains limited. We surveyed 12 potential sites in the Pokhara Valley, using absolute counts from 2017 to 2019, to understand the status of Egyptian Vulture. Totals of 344, 196 and 413 birds were recorded in 2017, 2018 and 2019 respectively. Given that the national population is estimated to be around 1,000 birds, our results indicate that the Pokhara valley is a major hotspot for Egyptian vulture in Nepal. In light of increasing threats, there is a need for conservation action to maintain this population in the long term.

Introduction

Egyptian vulture *Neophron percnopterus*, also known as the 'white scavenger', is a globally threatened raptor distributed throughout southern Europe, northern and central Africa, the Middle East, Transcaucasia, Central Asia and the Indian subcontinent (BirdLife international 2019). It consumes a wide variety of food, including dead animals of all sizes, insects, human waste on rubbish dumps and even live prey (Cramp & Simmons 1998). Populations of the species dramatically declined over recent decades, which has been accompanied by large range contractions (Ogada *et al.* 2015, Veleviski *et al.* 2015) as a result of which it is considered Endangered (BirdLife International 2019).

Populations of vultures in South Asia underwent severe declines as a result of unintentional poisoning by the veterinary drug, diclofenac. Although there is no direct evidence that Egyptian vulture is susceptible to diclofenac, its population declined by 68% in India, the timing of which coincided with the NSAID-driven declines of Gyps vultures (Cuthbert *et al.* 2006). Other threats faced by Egyptian Vulture include poisoning,



Egyptian vulture flock by Suman Ghimire

electrocution, changes in food availability and direct human persecution throughout the world (Ogada et al. 2015; Veleviski et al. 2015). In Nepal, it is a resident breeder, and is widespread and locally fairly common, except in the east of the country (Inskipp et al. 2019). Due to the critical situation of other vulture species, and its relative abundance, Egyptian vulture is less studied and limited information is available. Apart from general vulture surveys, few attempts have been made to study population status and ecology (e.g. Gautam & Baral, 2007; Bhusal 2011; Subedi & Decandido, 2014) of Egyptian Vulture in Nepal. Therefore, this study tries to assess the status of Egyptian Vulture based on a three-year survey (2017-2019) in the Pokhara Valley, which is a globally important location for threatened vultures.

Materials and Methods

Study Area

The study was carried out in the Pokhara valley, which lies in the Mid-hills region, about 200 km southwest of Kathmandu.

Lying between 600m to 2500 m elevation, the valley is well-forested and with natural lakes. Average daily temperature in the valley ranges between 25°C and 33°C in summer and between -2°C and 15°C in winter (Kansakar et al. 2004). A total of 467 species of birds have been recorded in Pokhara valley, including all nine species of vultures found in Nepal (Ghimire et al. 2019). Although vultures are present throughout the valley, we monitored 12 major sites (Fig. 1).

Methods

We conducted absolute counts of all vultures observed. The study was conducted in August – September 2017, July-August 2018 and July - August in 2019 at 12 major locations in the Pokhara valley. Surveys of Nirmal Pokhari, the Landfill site Dobhilla and the proposed new international airport were conducted on the same day due to their proximity and to avoid double counting. Counts were made either during morning from 08h00 to 10h00 or in the evening from 16h00 to 18h00. We observed vultures from selected observation points and counted



Egyptian Vulture by Manshant Ghimire

all roosting, flying or feeding vultures using Bushnell 10 * 42 mm binoculars. The location of each site was recorded using an E-trex 10 hand-held GPS. Descriptive statistics were used to interpret data, using MS excel, and Arc GIS 10.5 for map extraction.

Results

A total of 344, 196 and 413 Egyptian vultures were recorded during 2017, 2018 and 2019 respectively. Similarly counts at individual sites also varied throughout the study period. The highest number of Egyptian Vultures were observed at the Landfill site in 2017 (n= 145) and 2018 (n=67) and at Dovilla in 2019 (n= 197) (Annex 1). More than 10 EV were observed in each of Dovilla, Landfill site and proposed international airport in all three years, with smaller numbers at other sites, (Fig.2).

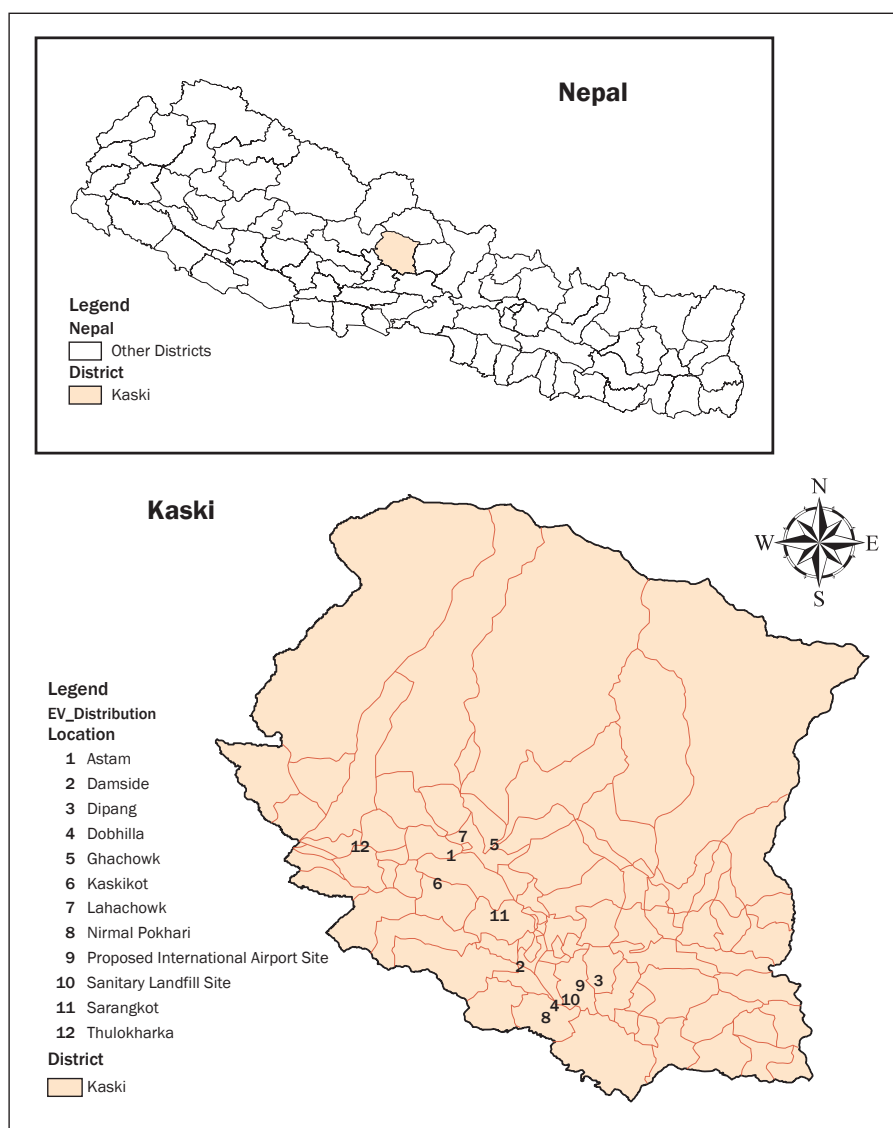


Figure 1 Map of study area showing 12 survey sites

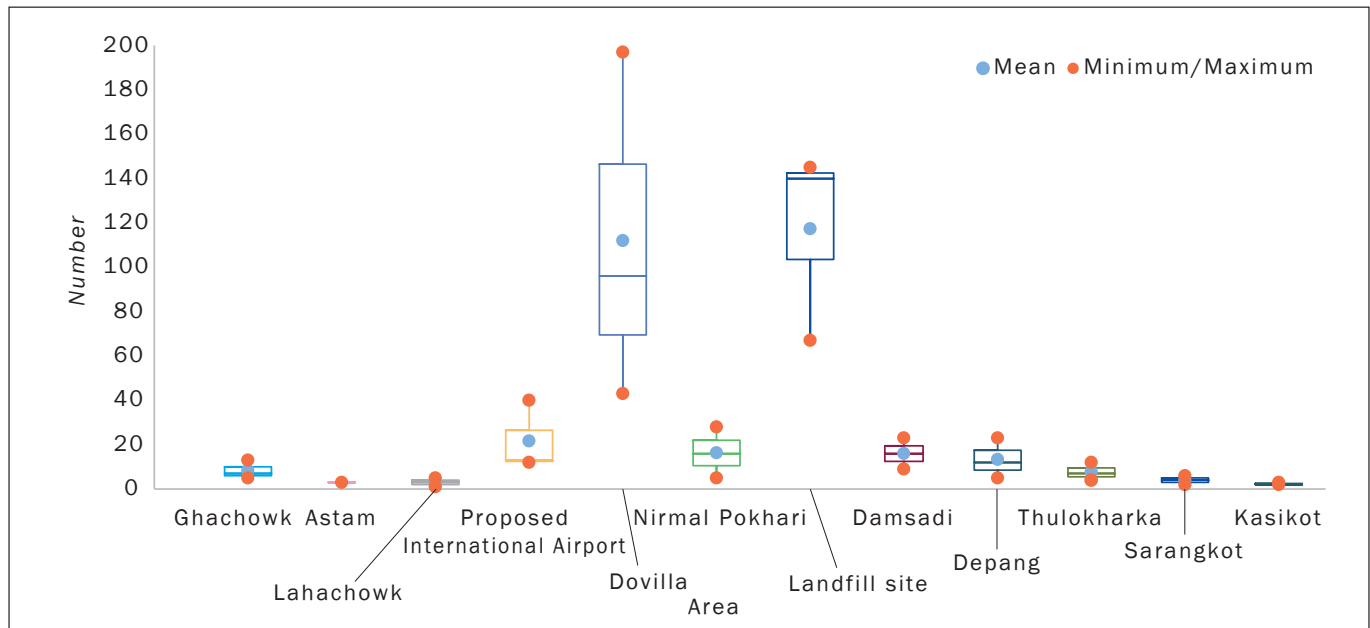


Figure 2 Numbers of Egyptian Vultures seen at 12 sites in Pokhara Valley from 2017 – 2019

Discussion and Conclusion

The national population of Egyptian Vulture in Nepal has been estimated at less than 1000 birds (Inskipp et al. 2016); our results suggest that the Pokhara Valley holds a substantial proportion of these. This is a great news but it adds responsibility of conservation. Amidst increasing threats, this highlights the importance of measures to conserve the species within the valley. Our data add to previous counts made in the Pokhara valley, e.g. 87 nesting and roosting birds at five sites in 2007 (Baral and Gautam 2009), and 211 in 2013/14 at nine sites (Gautam and Baral, 2014). Although there could be increase in population, the number of species observed could be attributed to number of sites studied. Therefore, our study in 12 sites couldn't be directly compared with above studies. However, through these past studies and our research, trends of population size can be represented as below.

Our results indicated population of Egyptian Vulture in the Pokhara valley at different time series goes increasing till 2019 except during 2018 (Fig 3).

Landfill sites are known hotspots for vultures (e.g. 217 EV counted by Subedi and Decandido, 2014) and our survey found the highest number of Egyptian Vultures at the Landfill sites in 2017 and 2018. Carcasses of livestock are disposed of at landfill sites, providing a regular food source that attracts vultures from surrounding sites (Subedi and Decandido, 2014). The number of vultures counted at such sites is dependent on the availability of carcasses, and will therefore result in fluctuations between nearby sites, hence, the lower counts in 2018.

Given that Egyptian Vultures are highly dependent on landfill site, any changes to the dumping regimes at such sites and, especially, disposing of poisoned garbage

will affect them. Food scarcity and habitat destruction have been suggested to be major threats to vultures in Pokhara Valley (Gautam and Baral 2013). There have also been deaths recorded of two Himalayan Griffon, one Cinereous and one White-rumped vulture due to high voltage lines (Dhakal et al. 2019), although there are no such records for Egyptian vulture in Pokhara Valley. However, anthropogenic disturbance caused by the construction of the International airport may have an impact on vultures feeding and roosting around the site.

We can conclude that Pokhara valley harbors about 41.3% of Egyptian Vultures as of the national estimated population. This is great news but it adds responsibility of conservation amidst exponentially rising threats.

Acknowledgement

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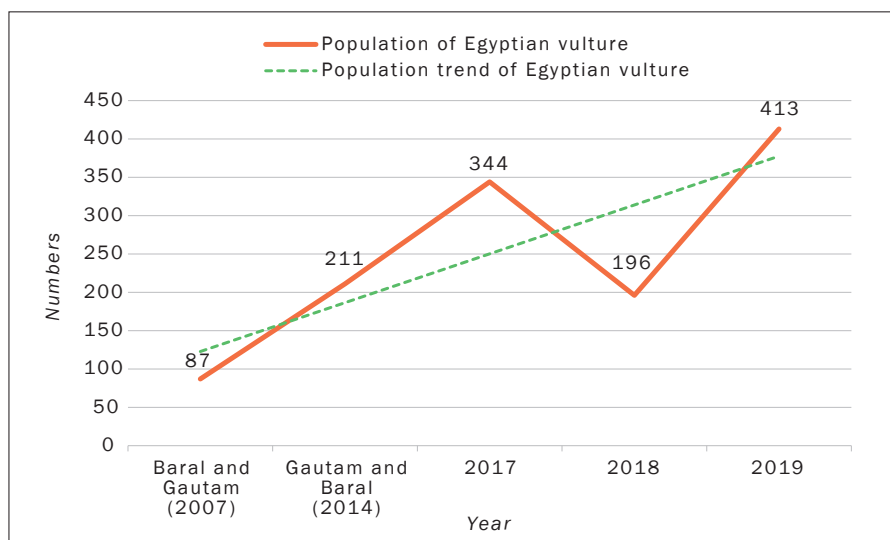


Figure 3 Trends of EV population in Pokhara valley



Egyptian Vulture pair by Deu Bahadur Rana

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Annex 1. Location-wise population estimate of EV from 3 year data (2017 – 2019)

Statistic	Ghachowk	Astam	Lahachowk	Proposed international airport	Dovilla	Nirmal Pokhari	Landfill site	Damsadi	Depang	Thulokharka	Sarangkot	Kasikot
No. of observations	3	3	3	3	3	3	3	3	3	3	3	3
No. of missing values	0	2	0	0	0	0	0	0	0	0	0	0
Minimum	5	3	1	12	43	5	67	9	5	4	2	2
Maximum	13	3	5	40	197	28	145	23	23	12	6	3
Sum	25	3	9	65	336	49	352	32	40	23	12	7
Mean	8.33	3.0	3.0	21.66	112.0	16.33	117.3	16.00	13.3	7.6	4.0	2.3
Standard deviation (n)	3.39	3.39	1.63	12.97	63.88	9.39	35.64	7.0	7.40	3.29	1.63	0.47

Assessing the Vulture Based Ecotourism in Ghachowk, Kaski Nepal

Madhuri Khadka^{1*}, Anisha Rana², Manju K.C³ and Sabita Thapa⁴

Abstract

We studied the current status of vulture-based ecotourism in the vicinity of the Vulture Safe Feeding Site (VSFS) at Ghachowk in the Machhapuchhre Rural Municipality, Nepal. We carried out SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of vulture-based ecotourism and recommended relevant strategies for its development in the study area. Data were collected via household surveys, focus group discussions and reliable secondary sources. These data were used to conduct a SWOT analysis and assess the problems and prospects of vulture-based ecotourism in Ghachowk. This study revealed that there is currently tremendous potential for ecotourism in Ghachowk. Prospects for Vulture-based ecotourism in Ghachowk include an increasing number of vultures, the location of the vulture restaurant within the Annapurna Conservation Area (ACA), the VSFS being managed by the local community, social cohesion among the members of the committee, exposure and trainings, a new local-level political structure in Nepal, and other natural and cultural attractions. Problems include budgetary constraints, unexplored tourist attractions, management problems, rules and regulations, lack of support from concerned stakeholders, conflict among the villagers for land tenure and religious sentiment of people.

Introduction

Ecotourism is defined as: "a responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education" (The International Ecotourism Society (TIES), 2015). Ecotourism, having a goal of biodiversity conservation, poverty reduction and business viability (Hawkins, 2004), can assist biodiversity conservation and community development through local economic benefits (Stem et al., 2003). Promoting ecotourism can be an important strategy for sustainable conservation of biodiversity (Shelar, 2016). Ecotourism and conservation of biodiversity can benefit one another.

During the late 1990s, there was a catastrophic and unprecedented decline in the number of south Asian vultures, caused by unintentional poisoning by the veterinary drug, diclofenac, which was commonly used to treat livestock (Chaudhary et al., 2011). These rapid declines attracted significant attention

from conservation organizations, research institutions, individuals and government of Nepal, and internationally, towards Vulture conservation. This resulted in the banning of diclofenac for veterinary use by the Governments of Nepal and other south Asian countries.

Other measures have been adopted to help maintain vulture populations, including the provision of Vulture Safe Feeding Sites (VSFS), also known as vulture or Jatayu restaurants. These are sites where vultures are provided with diclofenac-free food. People leave their old and dying cattle in the restaurant, where they are taken care of, and after they die naturally, they are fed to the vultures (Bhusal, 2017). There are seven community-managed vulture restaurants in Nepal: in Nawalparasi, Rupandehi, Dang (two vulture restaurants), Kailali, Kaski and Sunsari districts, all established between 2007 and 2013 for vulture conservation (DNPWC, 2015).

Initially started for the benefit of conservation,

vulture restaurants are increasingly becoming an ecotourism hub for both national and international tourists, especially birdwatchers. As vulture restaurants are run by the community, ecotourism development in the adjacent areas can be beneficial for both vulture conservation and the local economy. It could incentivize local communities towards conservation, creating a win-win situation for vultures and local people. To develop ecotourism, the first step is to study the prospects and problems potentially faced by ecotourism in an area. Therefore, the aim of this study is to document the problems and prospects of vulture-based ecotourism in Ghachowk, Kaski, Nepal, where one of the vulture restaurants is currently operating. Specifically, we determine the present status of vulture-based ecotourism in the study area through a SWOT (Strength, Weakness, Opportunities, and Threats) analysis, and to recommend strategies for effective development of vulture-based ecotourism.

Study Area

This study was carried out in Ghachowk village of Machhapuchhre Rural Municipality.



Foreign visitors with VSFS management team at Ghachok by Krishna Prasad Bhusal

It is situated in Gandaki province of Northern-central Nepal. According to the National Population and Housing Census 2011, the

Ghachok has a population of 2707 living in 588 households (CBS, 2012). Agriculture is the major occupation of people in Ghachowk.

And almost all of the residents also rear livestock. The majority of the inhabitants are Brahmins; other caste groups include Chhetris, Thakuris, Gurungs, Magars and Dalits. The VSFS is situated in Ghachowk, and was established in 2010.

Methods

Data Source

A household survey was conducted in 59 of the 588 households (i.e. 10% sampling intensity). Twenty-four households with home stays were selected, while the remaining 35 households were selected on a random basis. A questionnaire was administered on the present status of, and future prospects for ecotourism, and the problems for ecotourism development. Discussions within focus group and with other key stakeholders, both inside and outside of the Vulture Conservation Management Committee (VCMC), were undertaken. Secondary data were collected from relevant books, annual reports and other publications from different governmental and non-governmental organizations, websites, records and libraries.

To determine the problems and prospects of vulture-based ecotourism, SWOT analysis was conducted. SWOT is a useful planning tool to understand the strengths,

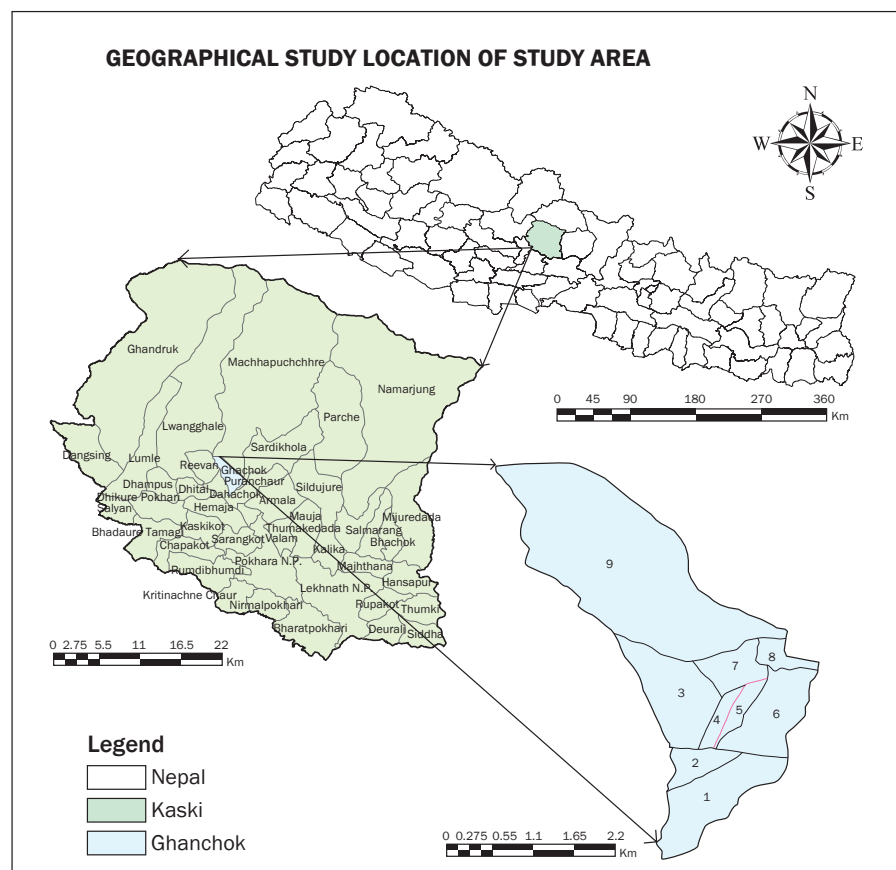


Figure 1. Map of the Study Area

weaknesses, opportunities and threats as a part of the strategic planning process (Hung and Chan, 2010). It is often employed when monitoring or evaluating a specific program, service, product or industry and exploring improvement measures (Harrison, 2002). It has been extended to assess natural resource management (Schmoldt et al., 2001) and sustainable tourism (NOAA, 2011). SWOT could generate many ideas that could be useful in summarizing key management issues and opportunities. While strengths and weaknesses are internal factors of the organization itself, opportunities and threats are external factors. Here in this study, strengths and opportunities were identified and listed as prospects of vulture-based ecotourism whilst weakness and threats were identified and listed as problems of vulture-based ecotourism in Ghachowk.

Result and Discussion

Socio-demographic information of the respondents

The table below presents the socio-demographic information of the respondents:

Table 1 : Socio-demographic Information of the Respondents

Characteristics	Percentage % (n=58)
Gender	
Male	53%
Female	47%
Age group	
19-35	30%
36-55	41%
56 and above	29%
Education	
University	27%
Secondary	24%
Literate/Primary level	20%
Illiterate	29%
Occupation	
Agriculture	81%
Business	2%
Service	17%

Vulture Conservation via Vulture Restaurant

Data kept by the VCMC shows that the highest number of vultures present at a single feeding at the Vulture Restaurant has increased from 58 in 2011, to 89 in 2013 and 2014 (Fig. 2).

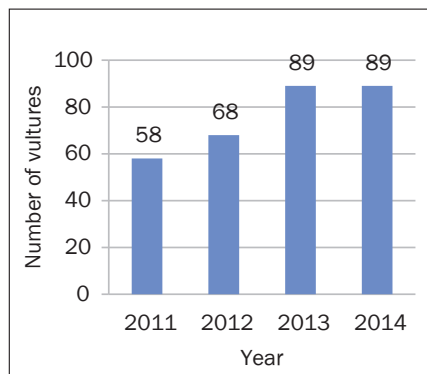


Figure 2.: Highest number of vultures recorded in a single feeding

Presence of Home Stay

Twenty-four people from different households have received home stay training organized by Bird Conservation Nepal (BCN) to promote vulture based tourism and increase the living standard of the local people. Of 24 homestays, only ten are in an active condition, the remaining 14 having stopped accepting guests. The main

reasons for stopping were very few, or no tourists visiting in their home stays.

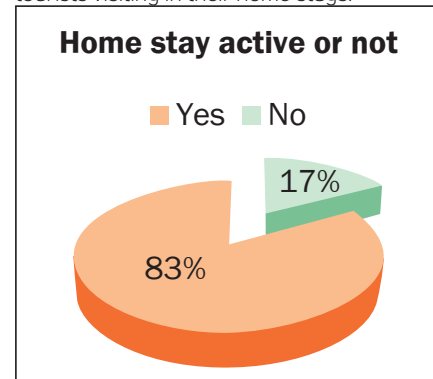


Figure 3.: Active and passive homestays

Annual Income of the households from active home stays

Income from homestay is very low, the maximum annual income being only between 5,000 to 10,000 rupees (Fig. 4). Four homestays had income below 1,000



Slender-billed Vulture by Ankit Bilash Joshi

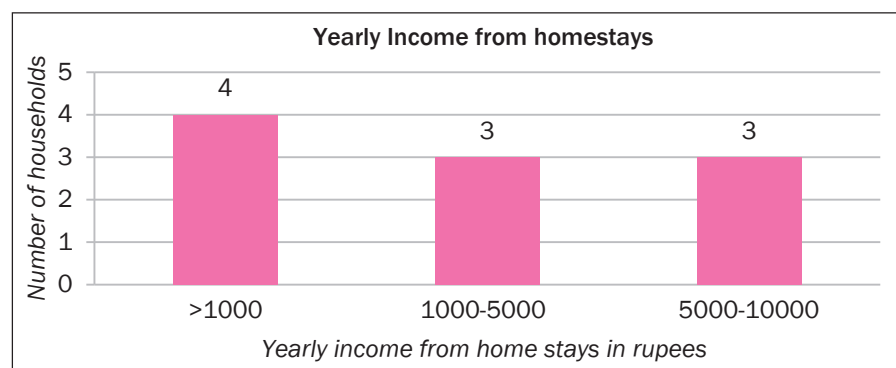


Figure 4 : Yearly income from home stays.

rupees, three between 1,000 to 5,000 rupees and three between 5,000 to 10,000 rupees yearly. These incomes reflect the critical status of vulture based ecotourism in Ghachowk.

Benefits of Vulture Restaurant from tourism point of view

The majority of respondents (61%) thought that the vulture restaurant was beneficial in promoting ecotourism (Fig. 5). This suggests that vulture-based ecotourism could flourish in Ghachowk, if ecotourism development is carried out appropriately. The remaining respondents argued that if ecotourism has not flourished seven years after the restaurant's establishment, the situation is unlikely to improve in the future.

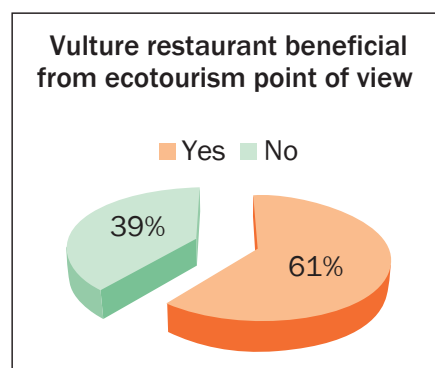


Figure 5. Vulture beneficial from ecotourism point of view or not

SWOT – Strength, Weakness, Opportunities and Threats Analysis

Strengths

1. Increasing number of Vultures: The data presented by Vulture Conservation Management Committee (VCMC) showed that the maximum number of vultures recorded at a single feeding event has increased annually. This could attract many national and international tourists interested in vulture-watching, as well as those involved in research.

2. Located inside the Annapurna Conservation Area: Annapurna Conservation Area (ACA) is one of the most tourists receiving protected areas of the country. The fact that both Ghachowk and vulture restaurant lie inside ACA makes it a favorable spot for vulture based ecotourism.

3. Managed by the community themselves: The VSFS is managed by the VCMC, which is composed of members of the local community. Nepal has a history of success with community-based management of forests, Conservation Area Management Committees and Community Based Anti-Poaching Units successfully conserving biodiversity. Hence, vulture restaurants

being managed locally creates a sense of ownership within the community.

4. Social cohesion among the members of the committee: There is a good relationship among the members of the VCMC. Despite the poor status of ecotourism, trust and support among the committee members has prompted them to continue with the vulture restaurant, suggesting that it is likely to operate in the future as well.

5. Exposure and Trainings: The local people have got an opportunity to interact with people of different cultures, languages and educational backgrounds via vulture restaurant. Different livelihood trainings are organized by different conservation related organizations in which local communities get opportunities to participate. BCN has organized home stay training, kitchen gardening training and has also constructed a milk collection centre intending to favor vulture based ecotourism.

Weakness

1. Limited funding sources – VSFS sustains on the fund generated from permit tickets and donations received from Maachhapuchhre Rural Municipality, BCN as well as other conservation organizations. BCN regularly providing funds on an annual basis which is primarily supporting on operation of VSFS. Limited funding sources for the infrastructure development and ecotourism promotion is the main weakness of vulture based ecotourism in Ghachowk.

2. Tourist attractions- Although Ghachowk's attractions hold a tremendous potential for ecotourism, they have not been explored, developed and promoted. There is a poorly developed infrastructure, and many areas of natural beauty remain unexplored. For comparison, the community forest adjoining the Vulture restaurant of Nawalparasi, near Chitwan, Nepal, has been developed and wildlife promoted to entice tourists to lengthen their stay. In contrast, in Ghachowk, vultures are the only attraction; there is nothing else developed to encourage longer visits by tourists. This has rendered the homestays uneconomic.

3. Management problems: Management problems also tend to be one of the weaknesses of the committee. Vulture restaurant is intended to keep and take care of cattle's until they die. Initially, people used to receive NRs. 50 per livestock but later on, they started to leave their cattle in vulture restaurant haphazardly without notifying VCMC. Those cows which do not give milk or give only a little milk were being left there. Because of this, the number of cattle in the restaurant exceeded the capacity of the restaurant causing difficulties for VCMC to manage the cattle.

4. Rules and regulations: Rules and

regulations serve as a strong barrier for development of vulture based ecotourism in Ghachowk as per the local people. Along with the advantages of VSFS being situated inside Annapurna Conservation Area, it has its own disadvantages too. International tourists must pay an entrance fee to ACA to come to Ghachowk. Committee members strongly believe that if tourists were not charged for visiting Ghachowk, visitor numbers to the vulture restaurant would increase. The Committee strongly believes that it is the burden of having to buy tickets twice (to ACA and the Vulture restaurant) that prevents the tourist from visiting. Also, there are no strict rules for entering the restaurant, such that many visitors go unnoticed, entering the restaurant without tickets.

Opportunities

1. New local level structure of Nepal: The committee believes that the new federal system of the country is likely to favor the promotion of vulture based ecotourism in Ghachowk. They have faith that the local government will make a plan and allocate the budget for the vulture restaurant and ecotourism development. The committee has already written an application to the newly nominated chairperson of the rural municipality. Also, the local level government is expected to develop necessary infrastructures like road and view towers which will aid in ecotourism development.

2. Cultural diversity: It is composed of many cultural and ethnic groups. Constructing a cultural hall to showcase their traditional dances and dresses, would help promote ecotourism in the study area, attracting more people to the site.

3. Natural attractions: Like other places in ACA, Ghachowk is rich in terms of natural beauty, such sites need to be explored and developed to promote ecotourism. Local people suggested that, in addition to beautiful snow-covered mountains in the north, there is also the potential for canoeing; there are also hot water ponds and bat caves which could attract tourists if promoted.

Threats

1. Lack of support from concerned stakeholders: Committee members complained of a lack of support from the Trekking Agencies Association of Nepal (TAAN), which is an umbrella association of trekking agencies in the country. There are two hotels one to two hours from Ghachowk, and TAAN takes all tourists to these rather than local homestays. Hence, the benefits of tourism are confined to the hotels, and local communities are deprived of the financial benefits.

2. Conflict among the villagers for land tenure: Although the relationship among the committee members is very good and



Landscape view of VSFS, Ghachok by Som G.C.

strong, conflict exists between the villagers of ward number 2 and the VCMC. People of ward number 2 claims that the land on which the restaurant is situated belongs to them. and have complained that despite this they have received no benefit from it. They added that they use to cut the grass in the area where the restaurant is located, but with the restaurant fully operational, and cattle being haphazardly left around the restaurant, the grass is full of ticks and mites. Therefore, people have stopped cutting the grass inside or around the restaurant in case their cattle get infected by ticks and mites. This is why they are not fully positive regarding the vulture restaurant.

3. Religious sentiment of People: It was evident from the household surveys that most elderly people, as well as some youths, believe that it is a sin to leave old cows, after they have ceased being productive, to be fed to vultures. Since cows have great religious significance in Hinduism, and most respondents were Hindu, many were not

positive about the vulture restaurant, except for those in ward numbers 1 and 2.

Conclusion

The present status of vulture-based ecotourism in Ghachowk is poor. Only ten homestays are currently active, with a very low annual income. Most respondents (61%) believed that the vulture restaurant is very beneficial from an ecotourism point of view. However, benefits are still limited to people's perception only. Ghachowk holds tremendous potential for developing vulture-based ecotourism. SWOT analysis was used to determine the problem and prospects of ecotourism.

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Prospects of Vulture based ecotourism include:

1. Increasing number of Vultures,
2. Location of Vulture restaurant inside Annapurna Conservation Area,
3. Vulture restaurant being managed by the community themselves,
4. Social cohesion among the member of the committee,
5. Exposure and trainings,
6. Federal structure of Nepal,
7. Cultural diversity,
8. Natural attractions.

Strength

Opportunities

Problems in Vulture based ecotourism development include:

1. Funding problems for vulture restaurant,
2. Unexplored tourist attractions,
3. Management problems,
4. Rules and regulations
5. Support from concerned stakeholders,
6. Conflict among the local people
7. Religious sentiment of people.

Weakness

Threats

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Vultures and People: Some Insights into an Ancient Relationship and Practice of Sky Burial Persisting in Trans-Himalayan Region of Nepal

Krishna Prasad Bhusal, Ishwari Prasad Chaudhary and Deu Bahadur Rana

Sky burial is one of the ancient cultures of Buddhism in high Himalayas of Tibetan plateau, also among Zoroastrians in Parsi communities of India. Sky burial is here defined as a traditional Tibetan funeral ritual in which the human corpse is exposed to the

open area to be eaten by sacred vultures. It is deliberate and culturally countenanced practice in the trans Himalayan region. Vultures in this context symbolize or are associated with the purification and rebirth (Eldar, 2008). Besides the Buddhist culture, in

Hindu culture vulture are the symbol of "God Sani" and is epitomized as the symbol of bravery in famous holy book "Ramayana" (Bhusal *et al.*, 2019). In the trans-Himalayan region of Nepal include the Humla, Jumla, Dolpa, Mustang and Manang districts which holds



Vulture Monitoring in Upper Mustang



Himalayan Griffon in Upper Mustang by Rajendra Gurung

the important breeding populations of the globally near threatened Himalayan Griffon *Gyps himalayensis*, and Bearded Vulture *Gypaetus barbatus* and the wintering ground of Cinereous Vulture *Aegypius monachus* (Paudel *et al.*, 2016). Thus, the continued existence of these scavengers has not only an ecological role but also cultural implications because of their unique role in the centuries-old sky burial tradition. This article is based on the information gathered during the vulture monitoring field visits to the Upper Mustang, which is typical of the trans-Himalayan region in Nepal. The area was visited in 2012, 2014 and 2019 AD by the authors who informally interviewed with the key local respondents.

Mustang district is situated at Northern central region of Nepal connected with Tibetan border of Trans-Himalayan regions of Nepal. Geographically the region is cold high-altitude steppe, vast and arid valley distinguished by eroded canyons with boot-shaped piece of land thrusts of vividly colored stratified rock formations and barren high-altitude desert. The majority

of local inhabitants of the area are Lama and Gurung believe in Buddhist culture. According to the tradition, on the juncture of the funeral, they carry a human corpse to certain locations and where they placed on a mountaintop, exposing it to the vultures. The location and preparation and sky burial are understood in The Tibetan Buddhist tradition as "Jhator" (Historical, 1977). When a person dies a Tantric Buddhism "Lama" upholds the belief that the sum of all life and its process encompasses four stages: life, death, the intermediate and rebirth. Based on these four wheels of life he decides to complete the funeral in one of the four ways: feeding to vulture, cremation, being buried or being fed to fish (hover in the water). When any local person dies, the lama, the religious leader and respected holy person of the area, decides how to carry out funeral rites. The Lama invites the vultures by praying and playing a trumpet or bell. If vultures do not visit the corpse it is believed that the person has committed some serious sins during their lifetime. Local Buddhist people believe that the vultures take the soul of the dead person to heaven.

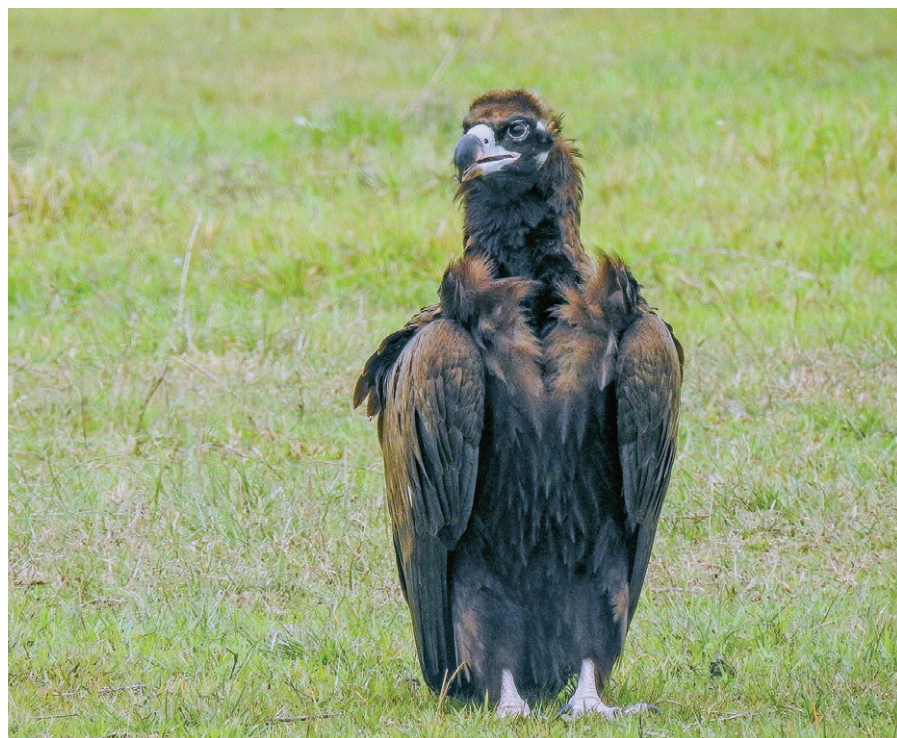
"Whatever the fortune redirects, due to the relative absence of timber resources for cremation in the barren, rocky and ice-covered region corpses were offered to vultures after religious ceremonies" said Thakur Gurung of Chhusang, Mustang. Chenduk Gurung of Yara said that the responsible person cleaves the dead body construing the Mantra into small pieces and offers the vulture to feed. If the vultures clear the all corpses then the person is alleged to have achieved enlightenment otherwise, he is cogitated as the bad said by Chhojen Lama of Chhoser. According to Jhesang Tenzing of Syangbochhe, the remaining parts of bone of the corpse are further hewed which are consumed by bone eating vulture ie Bearded Vulture whereas Himalayan Griffon consumes the corpse thus aid to clean-up the carrions quickly and finally amity to varnish the rituals successfully. The tradition of sky burial is believed by more than 90 % of Upper Mustang's Gurung communities (Acharya *et al.*, 2009) and has venerated and virtuous relationship with human religious ceremonies and vultures. Different studies have revealed that the population

of vulture species have been declining in the region which has impacted the tradition of sky burial. Mr. Gyalche Bishokarma from Chhonup, a person who is doing the incised of corpse in sky burial believes that number of vulture participation is experienced as fewer than in previous decade. He also stated that Himalayan Griffon is the common participants with *Jhator* whereas Bearded Vulture and Cinereous Vulture seldom appears at the sky burial. Furthermore, he added in places where there are several *Jhator* offerings each day, the birds sometimes must be coaxed to eat, which may be accomplished with a ritual dance. It is considered a bad omen of the vultures will not eat or if even a small portion of the body remains after the birds fly away.

The Last forbidden Kingdom, Upper Mustang is a popular and well frequented destination for national and international travelers. According to the Lonely Planet Upper Mustang is ranked as the third popular tourist destination. The practice of *Jhator* "Sky Burial" remains mysterious, it is actually a tourist attraction in the region. Yearly thousands of tourists visit the region by paying the royalty for the privilege of witnessing this exquisite



Funeral Site in Upper Mustang



Cinereous Vulture by Krishna Prasad Bhusal

geographical landscape. "If we could institutionalize the culture, tradition and the ritual of such community in the region Sky Burial also could allure tourists" according to a former Mayor of Lomangthang Rural municipality Mr. Subarna Kumar Bista. Mr. Shree Krishna Neupane, Natural Resource Management Officer, Annapurna Conservation Area Project, Upper Mustang said there is an incredible relationship between funeral rituals and supply for the Tibetan community and food chain and supply for vulture. This positive generosity and compassion are the important virtues in Buddhism and plays an important role in conservation of vultures and other wildlife. Thus, this mysterious tradition not only coincide with the food chain of vulture and important indicator of biological diversity the region could be the hub destination of culture and tradition in near future for many national and international tourism.

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Local Community: Building Block for the Vulture Conservation in Nepal

Bhupal Nepali

Vultures are birds of prey and keystone species. They are important indicators of terrestrial biodiversity and the environmental health of different landscapes. In the decade of 1990, the vulture populations decline dramatically due to the use of drug diclofenac for the livestock treatment across South Asia. When vultures were declining at an alarming rate in Nepal, Bird Conservation Nepal (BCN) initiated a plan to engage and mobilize to local conservation groups (LCGs) for vulture conservation. Local conservation group is a group of people working for the welfare of bird and biodiversity conservation in their own locality and beyond. There are more than 60 LCGs in Nepal working

together with BCN. They have always stood in the forefront of decades long efforts of Vulture conservation in Nepal. After rigorous advocacy and campaigns of BCN and other conservation organizations, Nepal has successfully banned manufacture and import of veterinary diclofenac since 2006, and significantly it has prevented illegal use at a grass-roots level, which has continued in other parts of Asia despite such bans being in place. In recent years these population declines have been successfully reversed and population recovery is now underway (Galligan et al. 2019). This recovery can be attributed to successful implementation of Vulture Safe Zone work at a community level

in Nepal, along with government support.

Bird Conservation Nepal has initiated a participatory vulture recovery program partnering with LCGs since 2002. LCGs mobilization, awareness/advocacy, community managed vulture safe feeding sites (VSFS), habitat management, pharmacy monitoring, vulture nest /colony monitoring, diclofenac free declaration, captive breeding and release, community motivation and various scientific studies have been conducting in Nepal. Community managed vulture conservation program of Nepal is acknowledged as pioneers and success across the globe and has inspired



Community Awareness in nesting site by Krishna Prasad Bhusal



Vulture feeding in VSFS, Nawalparasi by Kewal Prasad Chaudhary

was validated through monitoring presence of harmful drugs in pharmacies/veterinary practices, carcass dumps and corpse of any dead vulture. Till the date 72 districts out of Nepal's 75 have been declared as veterinary diclofenac free districts. This participatory conservation approach brings success to create a wider VSZ and local conservation groups are playing vital roles for vulture conservation initiative in Nepal.

Local conservation groups and community people are motivating for vulture conservation in grassroots level. Nepal has witnessed the partial recovery of vultures' population and nest number in the recent years because of their impactful intervention. Thus we can say that the local action impact on the global scale by conserving these globally threatened vulture species and are the good example people living with the harmony of nature. The result of increasing vulture populations in Nepal can be directly attributed to this successful combination, and we hope this can be replicated in other countries to benefit vultures more widely.

other countries to replicate this model, which has been highlighted through the Saving Asia's Vultures from Extinction (SAVE) website, reporting and blueprint. This community led conservation work is supported by Government of Nepal, BCN, conservation organizations such as RSPB and stakeholders. Without the support and ownership of local community it would have been very difficult to achieve the level of success on vulture conservation we have in Nepal.

The pioneering of community managed vulture safe feeding site (Jatayu Restaurant) is showcase not only providing safe food for threatened vulture also an important focal point for conservation message dissemination. The community take in old and ailing cattle from local farmers which get rid the burden of unproductive cattle to the farmers. The remains of carcass like skin and bone and manure are sold separately and generate modest income support which help to sustain the safe feeding program. In Nepal the vulture nesting areas are mainly distributed in the community forests, private forests and government forests which are not a protected area. So the local community are the key safe guarding the vulture nests and mainstreaming vulture conservation activities in their organizational operation plan. These communities are often very proactive on other wildlife and biodiversity conservation and are also looking out for any opportunities where these can combine with livelihood support of the local people. BCN is supporting to indigenous people who are living around a VSFS through various income generating activities, such as setting up bee, fish and chicken farms, purchasing pumps for irrigating cropland. They are key for contributing to awareness and advocacy for community people, students, farmers, veterinary community, local government

bodies, community based organization, other key government and non-government stakeholders for vulture conservation. The LCGs are also contributing on the removing of vulture killer drug diclofenac and promoting safe drug meloxicam then create a Vulture Safe Zone. Vulture safe zone concept have its main focus to make the area free from diclofenac use in cattle treatment which was initiated in 2009 actually from the VDC (Village Development Committee-small unit of district) in the area of vulture safe feeding site, Gaidatal, Rupandehi. Dang district was declared as first Diclofenac Free District (DFD) in 2010 by the joint effort of LCGs and stakeholders. The DFD is government certified and in line with Vulture Conservation Action Plan for Nepal (2015-2019). The impact

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Interaction with community by Krishna Prasad Bhusal



Bird Conservation Nepal

नेपाल पक्षी संरक्षण संघ



नेपाल पक्षी संरक्षण संघ चरा र चराको वासस्थानको संरक्षणमा काम गर्ने अग्रणी गैर सरकारी संस्था हो। सन् १९८२ मा स्थापित यस संस्थाको जनसाधारणमा चराहरूका बारेमा ज्ञान अभिवृद्धि गर्ने, चराहरूको विविधता तथा जीवनचक्रबारे अनुसन्धान गर्ने, चराहरूलाई पर्ने प्रमुख खतरा पत्ता लगाउने, तिनीहरूको वासस्थान संरक्षण गर्ने र विभिन्न समुदायको जीविकोपार्जनमा पनि टेवा दिने मूल सिद्धान्त रहेको छ। यस संस्थाले विगतका वर्षहरूमा जैविक विविधता संरक्षणका साथै नेपालका ३७ पक्षी संरक्षणका लागि आवश्यक पर्ने अन्तर्राष्ट्रिय स्तरको महत्वपूर्ण चरा तथा जैविक विविधता क्षेत्रहरू (IBAs) घोषणा गरी कार्यक्रम गर्दै आइरहेको छ।

नेपाल पक्षी संरक्षण संघ यसका संस्थापक, संरक्षकहरू, कार्यसमिति सदस्यहरू, अध्यक्ष, आजीवन सदस्यहरू, संघका शुभचिन्तकहरू तथा क्रियाशील समर्थकहरू रहेका संस्था हो।

यो संघ अन्तर्राष्ट्रिय संस्था बर्डलाइफ इन्टरनेशनलका १२२ सदस्य देशहरू मध्येमा यस संस्था पनि साझेदार संस्था हो र हाल यसले एसियाकै सकुट्टापन्न गिद्ध (जटायू) संरक्षणमा देशभरी विभिन्न कार्यक्रमहरू कार्यान्वयन गरिरहेको छ।

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- वातावरण तथा ग्रामीण विकास केन्द्र (इन्दुरेक), कोहलपुर, बाँके
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