



**Assessment of Population status,
Distribution and Conservation of two
Critically Endangered
Vultures in Royal Manas National Park.**



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ABSTRACT

This study on population status and conservation threats of The White-Rumped Vulture (*Gyps bengalensis*) and Red-headed Vulture (*Sarcogyps calvus*) carried out in Royal Manas National Park which was established southern part of country bordering India (Assam State to the south and Arunachal Pradesh to the east). A total of 6 months field study from November to April 2019 was carried out. The population status of Vultures in the study area was assessed through direct observation at roosting and nesting sites through random trail work covering almost entire park areas. It was monitored early in the morning (0630-0930 hours) and late in the evening (1730- 1930 hours). From the four vulture colonies, four individual vultures were found in the two vulture colonies.

The carcasses of domestic and wild animals are the main source of food for the vulture but due to the scanty carcasses observed suggests there is shortage of food. A questionnaire survey was also conducted to know the conservation threats and ethno-vulture relationships. Local people are found to be in favour of vulture conservation owing to their ecological values. The 98% (N=85) of the respondents have the favorable attitudes towards vulture conservation. More than 500 farmers and stakeholders has been advocated on importance of conserving the vultures. People are also found keen interest to take initiative in vulture conservation actions.

Key words: Population status, White-rumped vulture, roosting sites and Royal Manas National Park.

ACRONYM

BC	Biological Corridor
CFO	Chief Forestry Officer
CNR	College of Natural Resources
DBH	Diameter at Breast Height
DoFPS	Department of Forest and Park Services
E	East
FNCRR	Forest and Nature Conservation Rules and Regulation
GBH	Girth at Breast Height
GPS	Global Positioning System
IBAs	Important Bird and Biodiversity Areas
IUCN	International Union for Conservation of Nature
N	North
NE	Northeast
NW	Northwest
NTFP/NTWP	Non-Timber Forest Products
NGO	Non-Government organization
PAs	Protected Areas
RMNP	Royal Manas National Park
RSPN	Royal Society for Protection of Nature
S	South
Sp	Species
Sq.km	Southwest
UWICER	Ugyen Wangchuk Institute for Conservation and Education Research

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CHAPTER 1 – INTRODUCTION

1.1 Background

Vultures have declined from many parts of their home ranges owing to food shortages and loss of Habitat (Pain *et al.* 2003). However, since the early 1990s, there has been a catastrophic decline in the three *Gyps* species in the Indian sub-continent: white-rumped, Indian *G. indicus* and slender-bellied vultures *G. tenuirostris* (Prakash 1999, Virani *et al.* 2001). The collapse in numbers of three resident species of *Gyps* vultures in South Asia has also become one of the most urgent issues in bird conservation, with four of the nine vulture's species recorded in Nepal now listed as critically Endangered species (Birdlife 2007). Recent work in Pakistan has showed that diclofenac, a widely used painkiller and anti-inflammatory drug administered to livestock and humans, a cause mortality in vultures (Oaks *et al.* 2004)

A postmortem examination of dead or dying birds from India and Nepal also showed the high incidence of diclofenac contamination is the major cause of the recent vulture population decline. However, other causes such as habitat destruction food shortage, human persecution, poisoning and pesticide use may have caused a gradual decline in the vulture population in the region (Birdlife international 2001). Models indicate that only a small proportion (1 in 130) of carcasses contaminated with lethal levels of Diclofenac can cause the observed vulture mortality rate. Large scale surveys of domestic ungulate carcasses (the principal food source of vultures in south Asia) across India indicate that 10-11% of the carcasses are contaminated with Diclofenac (Cuthbert *et al.* 2011b).

The Red-headed vulture occurs in Nepal, India, Pakistan, Bangladesh, Bhutan, Myanmar, Laos, Vietnam and Cambodia (Birdlife 2012). It has been extirpated from its historical ranges in China, Thailand, Malaysia and Singapore. Those historical reports indicate it was widespread and generally abundant, but it has undergone a population and range decline in the last half century (Birdlife 2012). White-rumped vultures (*Gyps bengalensis*) were classified as critically endangered species under the IUCN list. Until 1985, white-rumped vultures were described as possibly the most abundant large bird of prey in the world (Houston 1985).

Ban on veterinary Diclofenac, establishment of captive breeding centers, monitoring of vulture colonies in the wild and raising conservation awareness are some strategies to save the critically endangered vultures species from extinction. This paper estimates the population status of this two vulture species and document the conservation attitude towards these vulture species.

1.2 Problem statement

White-rumped Vulture (*Gyps bengalensis*) and Red-headed Vulture (*Sarcogyps calvus*) are Critically Endangered Species listed in IUCN Redlist. These species has been studied to greater extend in some resident countries such as India, Pakistan and Nepal but though Bhutan is also a resident country for those species, yet no scientific study has been carried out in the entire country and little is known about their population status, distribution, nesting sites, ecology and conservation status. There is huge dearth of knowledge base on these critically endangered species in their critical habitat. With threats from ever increasing developing activities and use of veterinary drug Diclofenac, there is increasing chance of extinction of these species for the current habitat, if left unnoticed. It is henceforth, very important to enrich current knowledge on the conservation of these critically endangered species.

This project aims to establish baseline data on the current population status through population counts and nesting sites and distribution pattern along with questionnaire survey to understand the awareness level and ethno-vulture relationship in the study area and also to impart conservation knowledge to the local communities by integrating traditional and scientific knowledge for the conservation of these species.

1.3 Objectives of the study

- The study will assess the population status, distribution pattern of this two vulture species
- The conservation status, conservation attitudes, awareness and ethno-vulture relationship. This will be first scientific study on the species concern in the country.

1.4 Scope and contribution of the study

Bhutan has pristine and intact forest coverage with rich in biodiversity. But there is lack of an effective protection and monitoring of many species due to absence of scientific data. White-rumped vulture and red headed Vulture is the one endangered species found in Bhutan particularly under the RMNP which has no baseline data so far. RMNP, in southern foothills of Bhutan with broadleaved forest harbors many endangered species apart from this two vulture species. The study will collect baseline data on the current population status, finding nesting sites and assessing nesting habitat, understanding the distribution of the vulture species in the study area, assessing conservation status and sensitizing locals on conservation importance of these species.

Through this project, status of the nesting habitat, distribution, population status will be known where locals or national conservation organization can use the research findings to conserve these critically endangered species in their current habitat. Findings from the study will be made available to wider audience through publication in regional or international peer reviewed journals. This will have massive conservation contribution by filling up the existing knowledge gap. The law enforcing agencies, conservation stakeholders and policy makers may use the information to take mitigation measures,

conservation initiatives and strategies from the study.

The environmental and ecological services of these target species, if assessed properly, huge difference can be made in the socio-cultural status of local people which positively influence the conservation perception and attitudes. The study also aims at educating and sensitizing local people on the conservation importance of these species with the help of informal education methods like awareness campaign and interactions through household and questionnaire surveys. This activity will be one of the key factors for the conservation of the species as locals are the one who literally live around bird's habitat vicinity every day.

1.5 Conservation Outputs

Though *Gyps bengalensis* and *Sarcogyps calvus* are Critically Endangered species both regionally and globally, basically no scientific data on these critical species is available in the study area. To save species from eminent extinction, it is critical to know about the present status of population, habitat condition and distribution, disturbances species are facing, food availability and conservation status. This study will generate baseline data on the population status, identification of nesting sites, condition of nesting sites, distribution pattern, assessment of disturbances, food availability, assessment of conservation status and raising awareness on conservation importance of these critically endangered species.

Knowledge about population estimate, nesting sites and distribution pattern in the study area will give insight about population health and necessary action to conserve the species can concluded based on the population health. The information on these two critically endangered and ecologically important species will have direct benefits as it will serve as basis to formulate conservation management strategy in long run. The conservation status assessment will give insight about locals and conservation workers perception and attitudes to conservation importance of these vulture species. These species' cultural value and social value for communities living in the study site will be also known. Informal education through questionnaire and awareness campaign will sensitize locals on the conservation importance of these critically endangered vulture species.

Trend of use of Diclofenac in the study area will be studied and the intensity of threats from this veterinary drug for the species survival will be assessed and mitigation measures will be developed based on study result.

Disturbances and destruction to its habitat and species themselves by anthropogenic activities will be assessed. The information disseminated from the result of the study will of tremendous importance for the longer and sustainable conservation of these Critically Endangered species. The government agencies/NGOs can take steps in creating vulture friendly environment and mitigate ill effect of anthropogenic activities in vulture habitat in the study area. Law enforcing agencies, conservation stakeholders and policy makers can act upon the results and recommendation arising from the study to conserve these critically endangered species as well as overall biodiversity using these vulture species as flagship species. Positive attitude and perception will be developed in the local

communities towards conservation of the species through awareness campaign. With conservation agencies working positively on the recommendation from the study result and positive attitude of locals to the conservation, long time survival of these critically endangered species will be ensured.

1.6 Conservation importance

The white-rumped vulture (*Gyps bengalensis*) and red-headed vulture (*Sarcogyps calvus*) are categorized as critically endangered in IUCN redlist due to the rapid population decline with more than 99% overall population decline in last decade, for this *Gyps bengalensis* is categorized as Critically endangered (CR A2bce+4bce ver 3.1) and *Sarcogyps calvus* as critically endangered (CR A2abce+3bce+4abce ver 3.1).

Gyps bengalensis occurs in Pakistan, India, Bangladesh, Nepal, Bhutan, Myanmar, Thailand, Laos, Cambodia and southern Vietnam, and may be extinct in southern China and Malaysia (BirdLife International 2001)

Sarcogyps calvus occurs in Pakistan (previously regular, now a rare straggler), Nepal (uncommon, population estimated to be 200-400 individuals), India (sparsely distributed and declining), Bangladesh (rare in the north-west), Myanmar (rare resident), China (possibly occurs in south-east Tibet), Bhutan, Thailand (near extinct in the country, Laos (previously widespread and common, but now only occasional wanderers), Viet Nam (occasional wanderers), Cambodia (rare and restricted to the northern and eastern plains), peninsular Malaysia (previously locally common in north, now absent) and Singapore (formerly occurred, apparently now absent).

The vulture population are distributed sparsely and isolated and are in rapid decline. Bhutan being the one habitat for the species, no scientific information on their population, nesting habitat, distribution and conservation status are available. For the conservation of the species in their distribution range, study in Bhutan is must as Bhutan falls right in the heart of their distribution range. There is immediate need of repeated monitoring of pockets of habitat for population status and implementation of scientific and locally accepted conservation strategies.

If healthy population of these species can be conserved, they can be used as seed bird in introduction and reintroductions programs as deemed necessary in their former ranges. Using these species as flagship species, wide range of flora and fauna in the study area can be conserved thereby imparting broader and wider conservation impact as a result of the study

CHAPTER TWO: Distinguish characters of the vultures

2.1. White-rumped vulture

The white-rumped vulture (*Gyps bengalensis*) is an old-world vulture native to South and Southeast Asia. It has been listed as critically endangered on IUCN Red list since 2000, as the population severely declined. White-rumped vultures die of renal failure caused by diclofenac poisoning. In the 1980s, the global population was estimated at several million individuals, and it was thought to be "the most abundant large bird of prey in the world". As of 2016, the global population was estimated at less than 10,000 mature individuals. The White-rumped vulture is typical medium sized vulture with an unfeathered head and neck, very broad wings, and short feathers. It is much smaller than the Eurasian Griffon. It has a white neck ruff. The adults are whitish with the otherwise dark plumage. The body is black and secondary are silvery grey. The head is tinged in pink and bill is silvery with dark ceres. The nostril openings are slit-like. Juveniles are largely dark and take about four or five to acquire the adult plumage. In flight, the adult shows a dark leading edge of the wing and has a white wing-lining on the underside.

The white-rumped vulture (*Gyps bengalensis*) is an old-world vulture closely related to the Eurasian griffon vulture (*Gyps fulvus*). At one time it was believed to be close to white-backed vulture of Africa and was known as the oriental white-backed vulture. The species was present in large numbers in south and south Eastern Asia until the 1990s and declined rapidly in numbers since up to 99.9% between 1992 and 2007.

2.2 Distribution of white-rumped vulture

The white-rumped vulture breeds in east Pakistan, Nepal, India, Bhutan, South East Afghanistan, South East Iran and Bangladesh. It was formally also widely distributed in South-East Asia but is now almost extinct there. It is sedentary, usually found in the lowland (up to 1000m) but exceptionally as high as 3100m.

2.3 Behaviour and Ecology

White-rumped vultures usually become active when the morning sun is warming up the air so that thermals are sufficient to support their soaring. They were once visible above Calcutta in large numbers.

When they find a carcass, they quickly descend and feed voraciously. They perch on trees nearby and are known to sometimes descend also after dark to feed. At kill sites, they are dominated by red-headed vultures *Sarcogyps calvus*. In forests, their soaring often indicated a tiger kill. They swallow pieces of old, dry bones such as ribs and of skull pieces from small mammals. Where water is available, they bathe regularly and also drink water.

A pack of vultures was observed to have cleaned up a whole bullock in about 20 minutes. Trees on which they regularly roost are often white from their excreta, and this acidity often kills the trees. This made them less welcome in orchards and plantations.

They sometimes feed on dead vultures. One white-rumped vulture was observed when getting caught in the mouth of a dying calf. Jungle crows have been sighted to steal food brought by adults and regurgitated to young. The white-rumped vultures used to nest on large trees near habitations even when there were convenient cliffs in the vicinity. The preferred nesting trees were Bayan, peepul, Arjun and Neem. The main nesting period was November to March with eggs being laid mainly in January. Several pairs nest in the vicinity of each other and isolated nests tend to be those of younger birds. Nests are nearly 3 feet in diameter and half a foot in thickness and are lined with green leaves. Solitary nests are not used regularly and are sometimes taken over by the red-headed vulture and large owls such as *Bubo coromandus*. The male initially brings twigs and arranges them to form the nest. During courtship the male bills the female's head, back and neck. The female invites copulation and the male mounts and hold the head of the female in his bill. Usually, the female lays a single egg, which is white with a tinge of bluish-green. Female birds destroy the nest on loss of an egg. They are usually silent but make hissing and roaring sounds at the nest or when jostling for food. The eggs hatch after about 30 to 35 days of incubation. The young chick is covered with grey down. The parents feed them with bits of meat from a carcass. The young birds remain for about three months in the nest.

2.4 Description of Red-headed vulture

The red-headed vulture (*Sarcogyps calvus*), also known as the Asian king vulture, is an old-world vulture mainly found in the Indian subcontinent, with small disjunct populations in some parts of southeast Asia. The red-headed vulture has started becoming more harder to come by as it is being hunted down. Places like Cambodia have put together special programs to help critically endangered vulture species. There has been evidenced compiled that showed hunters have started "the use of poisons in hunting practices" which has led to the population analysis showing "that since 2010 populations of the White-rumped Vulture *Gyps bengalensis* and Red-headed Vulture *Sarcogyps calvus* have declined. The Red-headed vulture is a medium-sized vulture of 76 to 86 cm (30 to 34 in) in length, weighing 3.5–6.3 kg and having a wingspan of about 1.99–2.6 m. It has a prominent naked head: deep red to orange in the adult, paler red in the juvenile. It has a black body with pale grey band at the base of the flight feathers. The sexes differ in colour of the iris: males have a paler, whitish iris, whilst in females it is dark brown.

2.5 Distribution and habitat

This gaudy-faced vulture was historically abundant, range widely across the Indian subcontinent, and also eastwards to south-central and south-eastern Asia, extending from India to Singapore. Today the range of the red-headed vulture is localized primarily to northern India. It is usually in open country and in cultivated and semi-desert areas. It is also found in deciduous forests and foothills and river valleys. It is usually found up to an altitude of 3000m from sea level.

2.6 Conservation status

The red-headed vulture used to be declining, but only slowly; in 2004 the species was up listed to near threatened from least concern by the IUCN. The widespread use of the NSAID diclofenac in veterinary medicine in India has caused its population to collapse in recent years, however. Diclofenac is a compound now known to be extremely poisonous to vultures. The red-headed vulture population has essentially halved every other year since the late 1990s, and what once was a plentiful species numbering in the hundreds of thousands has come dangerously close to extinction in less than two decades. Consequently, it was up listed to critically Endangered in the 2007 IUCN Red list.

CHAPTER 3 - STUDY AREA

3.1 Location of the study area

The study was conducted in the Royal Manas National park which was located in the southern part of Bhutan (27° 1'50.18"N90°42'54.94"E). With an area of 1057sq.km, the RMNP has 58 species of flora, 65 species of mammals, 489 species of birds, 60species of fishes and more than 180 species of butterfly species recorded in the park. The extraordinary rich bird diversity is mainly attributed to existence of vast areas of relatively undisturbed natural habitats, with swatches of savannah grasslands to vast expanses of old growth tropical and subtropical and temperate forests along wide altitude range. The national park falls within the political jurisdiction of three Dzongkhags i.e. Zhemgang, Sarpang and Pemagatshel. The National Park (PA) can be accessed from Bhutan, and Indian state of Assam.

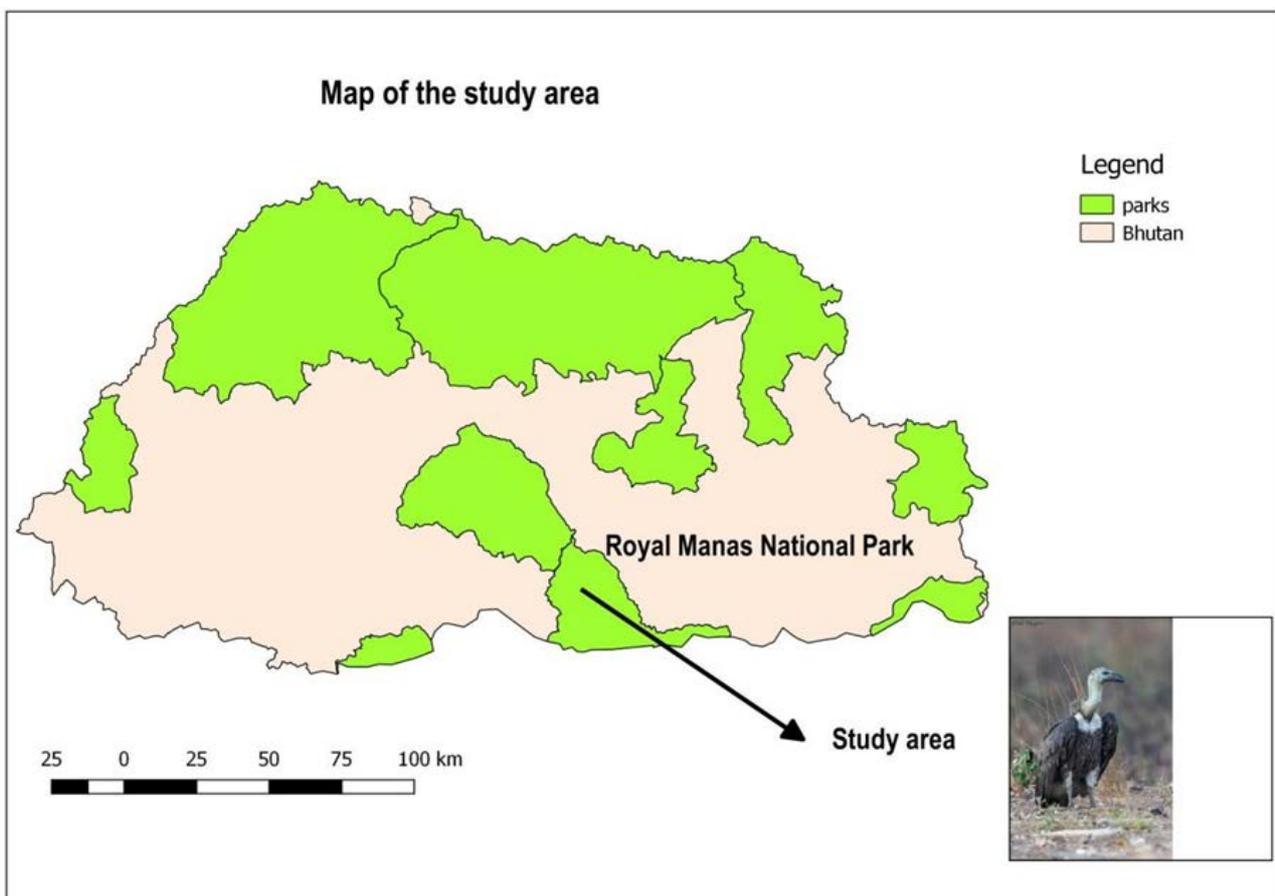


Figure 5. Bhutan map showing study area (RMNP) and all the protected areas with connecting biological corridors (BC).

CHAPTER 4 – MATERIALS AND METHOD

Methods

4.1 Ethno-Vulture Relationship

Household survey and questionnaire was helpful to obtain peoples' perception and willingness towards conservation. A questionnaire survey of households in the vicinity of vulture colonies was conducted. Socioeconomic status of people and their problems were also assessed. The Respondents were asked about their methods of carcass disposal, persecution of vultures, agricultural practices and conservation attitudes. A questionnaire was also done with the veterinary doctors to find out whether the alternative drug Meloxicam is effectively replacing Diclofenac.

4.2 Population Estimation

To study the population status of different species, population of male, female and adult was done estimated separately. Identification of species for this study was also done following (Alstrom, 1997).

4.3 Absolute counts

Because the intensive study areas in Manas are small, it is practical to regularly count all nesting and roosting sites, which will give accurate results. All the roosting and nesting sites were monitored early in the morning (0630-0930 hours) and late in the evening (1730-1930 hours). We recorded all the birds seen on nests and perched on roosts during the specified times with the help of spotting scope and binoculars and the location also recorded using GPS. Counting roosting as well as nesting birds allows a count of non-breeders too. This approach is different from anything done in Pakistan or India. The estimate of population sizes is based on active nests and road transect counts in Pakistan and India, respectively. These approaches may seriously underestimate the nonbreeding portion of the populations. (Baral & Gautam, 2007) Jackknife Technique (cited in Baral & Gautam, 2007) will be followed to estimate a population size.

The underlying assumption of this method is that with repeated counts theoretically there is the probability of counting all the birds in the area at one time. The method requires at least five repeated absolute counts. The method uses the difference between the highest count N_{max} and the second highest count N_{max-1} to calculate N , the estimated total number $N = 2 N_{max} - N_{max-1}$

4.4. Count at carcasses

In order to assess the food availability in the study area, we observed the number of carcasses found as well as the number vultures attending them whenever we had an opportunity in the field. Number of other raptor species and animals seen scavenging the carcass was also noted. The type of available carcass, its state and location were also recorded.

4.5 Nest count

In order to study breeding ecology, nests were counted, and nest occupancy, breeding status, and general breeding behavior was also recorded through digital camera. Following (Postupalsky, 1974), an active nest is defined as a nest in which eggs had been laid, whereas an occupied nest is one in which an egg need not have been laid, but a minimum of nest building must have taken place. In other words, all active nests are occupied but all occupied nests are not active.

Nest observations will be made from the ground using spotting scope, and an assessment of nest status will be recorded. Regular monitoring of nests will be carried out on each visit to assess the breeding success with the help of Mayfield, (1961). Egg and nestling survival from start of incubation to fledging can be estimated (following Mayfield, 1961) as:

Probability that eggs at the start of incubation will produce fledglings = probability of egg survival during incubation X probability of nestling survival during the hatching period X probability of nestling survival to fledging.

- 2 Probability of egg survival during incubation= probability of nest survival during incubation X probability that eggs will survive individual loss.
- 3 Probability of nestling survival during the hatching period= nestlings present/eggs present at hatching time.
- 4 Probability of nestling survival to fledging= the probability of survival of nests with a mortality rate r for a period of days d is $(1-r)^d$; or, since $1 - r$ is the survival rate S , the probability of survival is S^d .

Habitat use: Preference of tree species by vulture will be recorded by identifying the species where vultures rest, roost, and build nests.

CHAPTER 5: Result and Discussion

5.1 Population status of vultures

Data collections were done over six months in the field of the Royal Manas National Park covering the entire park area and villages under the park areas for vulture population survey. During each visit, we spent about 8 to 9 hours a day collecting data. The vulture population estimation was done from the roosting area, nest count and count from the carcasses feeding site were carried out to get the figure of the vulture population in the study area. Similar survey was also done in the few villages adjacent to Park areas. Only 4 numbers of White-rumped vultures' species were recorded in four colonies of the study area. Recent study at the Park found only White-rumped vultures (*Gyps bengalensis*). This study confirms that the previously assumption that Red-headed vulture could be distributed in RMNP is not valid and Red-headed vulture may not be distributed in Bhutan.

Table 1. No. of Vulture recorded among four places walking and distance covered through during the period from November 2018 to February 2019.

Hornbill	No. of vultures sighted				
	Distance walked (Km)	Nov	Dec	Jan	Feb
RMNP	21	1	1	1	0
Gongphu	15	0	0	0	0
Umling	18	0	0	1	0
Chuzega	11	0	0	0	0
Total		0	1	2	1

The White-rumped vultures' sightings were recorded in Royal Manas National park and Umling village. They were recorded at an altitude of 312m to 500 mts. The average distance covered between colonies was 5.6 km and the maximum distance covered was 21km. During the study period no vultures were recorded in other two places Pangbang and Chuzegang because the habitats for this vulture's species were under constant human disturbances. The questionnaires survey with the villages under the park area also found that the use of scarcity of carcasses, habitat destruction through development activities were the reasons for vulture population decline of this two vulture's species in the area.

5.2 Nesting and Breeding

The studies of the vultures were also conducted in the nesting and the breeding areas. However only single nest was found, and breeding areas could not be sighted in the entire study areas. The detail enquiries were also done with the people in those areas to find out the nesting of the vulture, but it was unsuccessful despite several attempts.

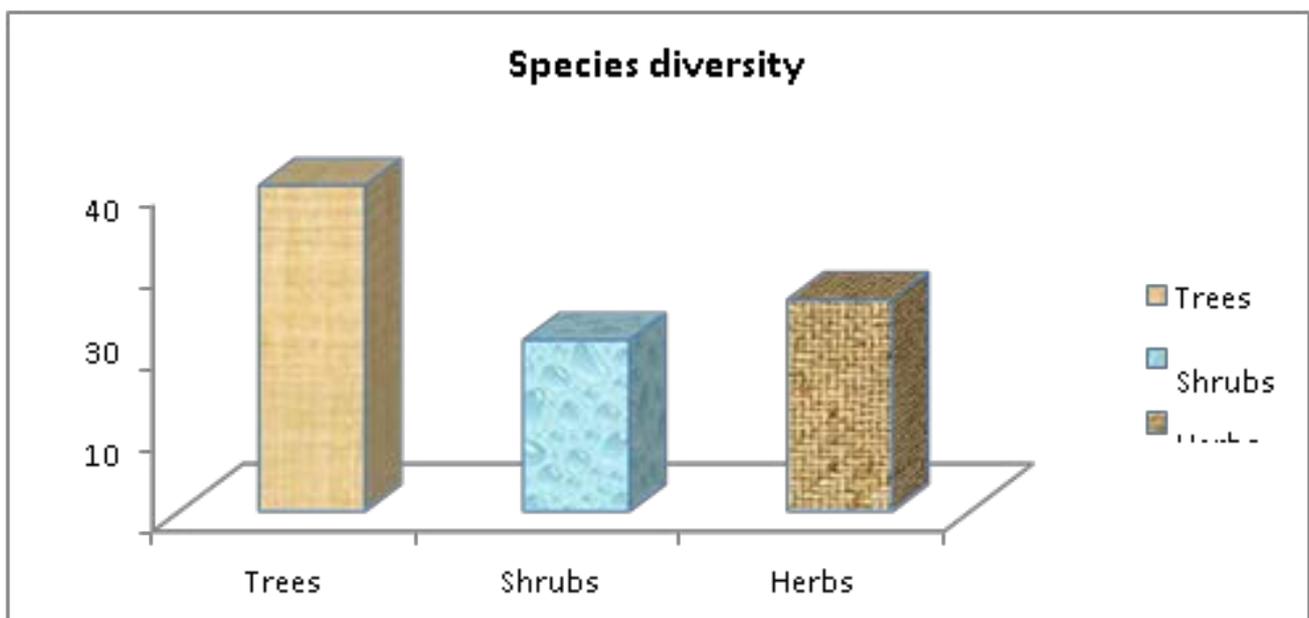
Table 2: The result of the vulture nest in four colonies

Vulture colonies	Occupied nests	Active nests	abandoned nests
RMNP	0	0	1
Umling	0	0	0
Chuzegang	0	0	0
Gongphu	0	0	0

5.3 Tree species diversity

The habitat ecology of the vulture habitat were found diverse with more than 40 tree species, 21 shrubs and 26 species of the herbs. However, the most recorded dominant tree species that could found in the entire study area were *Terminalia myriocarpa*, *Toona Cilliata*, *Michelia champaca*, *Daubanga grandiflora*, *Phoebe altenuata*, *Gmelina arborea*, *Dalbergia sisso*, *pterosperrmom japonica*, *anthocephalas kadampa*, *Acer oblongum*, *Ficus elastic*, *Tectona grandis* and *Pteropsersum acerifoloum*.

Figure 1: Tree species presence in vulture habitat area



5.4 Carcasses availability

Recorded 6 numbers carcasses were of two different mammalian species; wild buffaloes (30%), cattle (50%) and unknown (20%). All the carcasses were exposed in the following habits: 2 carcasses in the forest, 2 in agriculture field and 2 carcasses on the riverbanks. Skeletons of 4 carcasses in the forests land and agriculture field were recorded and asked the villagers about time and nature of death. Cause of death of animals could not be determined. The survey also observed wild dogs, crows and other scavengers feeding on the carcasses but White-rumped vulture were not observed feeding on the carcasses. However, the villagers said the vultures often feed on the carcasses. The carcasses of domestic and wild animals are the main source of food for the vulture but due to the scanty of the carcasses found in the colonies, the number of vulture sighting in the study area was rarely recorded.

5.5 Conservation attitudes

Local people apparently do not kill vultures in the RMNP. A high proportion of respondents (90%, N=85) reported that they have had never killed or seen anybody persecuting and poisoning vultures by any means. People said the number of vultures were drastically reduced and red-headed vulture never spotted. The local people residing under the Royal Mana National Park had favorable attitudes towards vulture conservation. When asked whether they should conserve vultures, 98% said 'yes' while 2% (N=85) of the respondent was unsure about it. The respondents were also asked about the carcass's disposal practices. To this, 80% of the respondents said they left the carcasses in an open place, while 20% (N=62) of the respondent told the carcasses were buried. Although not quantified, the use of pesticides and chemical fertilizers was common practice among local farmer during the agricultural farming. During the questionnaire survey it was found that local people were aware of the potential adverse health effects of these chemical on humans and wildlife. The people of the locality under the vulture habitat never knew the Diclofenac as a possible cause of the vulture mortality.

5.6 Vulture awareness program

The advocacy program to local people and stakeholders on vulture conservation was conducted to different level of people residing under RMNP. More than 560 participants from the 14 villages under the Park were made sensitized on the importance of conserving the biodiversity and particularly the two endangered vulture species through audio-visuals means. A presentation was also given to the school going children under the national park to educate them importance of the biodiversity conservation. More than 300 students took part actively in the awareness program. During the awareness program the posters and pamphlets were also distributed on vulture conservation to local people, farmers, students, teachers, vet professionals, members of community forests and local leaders.

Presentations session to instill conservation stewardship mentality were done incorporating religious beliefs, scientific findings, logical explanations and evidences of need of conservation of such specie to the local communities from environmental, social and economic perspective. During the field survey I been opportunistic to talk about

vulture conservation to people and talked them about the conserving this vulture species and ecological role play by this species in the ecosystem. Local people were quite positive towards conservation of vulture in their vicinity.



CHAPTER 6: CONCLUSION

6.1 Conclusion

The study on the population status on the White-rumped and Red-headed vulture inside RMNP area recorded only one species of the vulture. Study confirms Presence of White—rumped vultures and absence of Redheaded vultures. The RMNP was one of the Park in the country which has one of the highest biodiversity presences. The area falls under sub-tropical region and it has a good coverage of broadleaved forest which indeed is a favorable habitat for many of the species including these endangered vulture species.

This was a first study conducted on vulture species in the area. The study on population status of this vulture species found the White—rumped vulture could be found in the entire study area with highest record of four individuals and of which three of them was recorded on flight and one was found perched on the tree. There had been no occupied nests in the whole study area and only one of vulture abandoned nest was seen with help of the local people. People said few occupied nests was seen before 5 to ten years ago.

Currently, diclofenac contamination, habitat destruction, disturbance, hunting, food shortage and lack of awareness are serious or potential threats to vultures. To avert these threats, diclofenac replacement, local debt-for-nature swap, captive breeding, vulture restaurant, legal protection and awareness campaigns are some of the conservation strategies that could halt vulture decline and reverse the number to some extent.

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