# Human-monkey interface in Arkhale and Nayagaun, Gulmi, West Nepal

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## Abstract

The ecology of existing monkey species in Arkhale and Nayagaun Village Development Committee of Gulmi district Nepal was studied with human versus monkey interface. Two species of monkeys, Rhesus monkey (*Macaca mulatta*) and Hanuman Langur (*Semnopithecus entellus*) were found in study area. Monkey population was counted by direct observation. Four troops of rhesus monkey with a population of 128 and a troop of Hanuman Langur with 14 individuals were recorded. Rhesus monkey was considered most crops damaging (65% respondents) while physical hurt and harassment (27%) were also perceived monkey related problem in the study area. Shouting and chasing (30%) with using stone and catapult (24%) were the common local deterrent method against monkeys. Monkey problem was increasing (82% of respondents) in the area. Worth compensation (39%) would be the effective measure to reduce human-monkey conflict in the studied area. Both primary and secondary data were used for analysis. Quadrates were laid to explore the habitat and vegetation pattern of natural forest.

***Key Words:*** *Rhesus, Hanuman langur, conflict, remedial measures, Nepal*

## Introduction

Monkeys are included under the sub-order Simiae of order primates. Monkeys according to the geographical distribution are further categorized into two types: New World monkeys and Old World monkeys. The New World monkeys lack cheeks pouches and nostrils are open to side rather than down. Area between the nostrils is wide and flat. Some of them have prehensile tail and non-have callous pads on the buttocks, E.g. Spider monkeys, Capuchins,

etc. The Old World monkeys have protruded muzzle and well developed cheek pouches, nostrils set close together facing forward and downward. The tail is never prehensile and some species are tailless. Both the hands and feet are adopted for grasping (Chalise 1999).

In Nepal, only three species of monkeys (Hanuman Langur, Rhesus and Assamese Monkeys) are recorded (Chalise et al. 2005). The Rhesus monkeys (*Macaca mulatta* Zimmermann, 1780) are found freely ranging in wild as well as in urban religious places. The Langur monkeys (*Semnopithecus entellus* Dufresne 1797) are found freely ranging in wild forest and marginal areas of Nepal (Southwick et al. 1982). The other species Assamese monkey (*Macaca assamensis* McClelland 1840) reported from mid-hills and high Montana forest of Nepal, whose ecological and behavioral details are still largely unknown (Chalise 2006).

Human beings and wild monkeys share the common resources to meet daily needs in most part of the country. Human being often ignore them and exploit their habitat. It results the beginning of the monkey and local people conflicts. Local people often reports that monkey population is increasing due to habitat protection and wild lifers claimed that habitat has been continuously decreasing. Moreover, rapid increases in human population demand more space and resources resulting in the encroachment of ancestral habitat of wild fauna while expansion of agricultural area created a serious environmental problem. The scarcity of prefer food in natural habitat and habitat destruction compels monkeys to enter human interest area causing damage of food and clothes while food stealing and human harassment are common (Chalise 1999a).

## Materials and Methods

### Study Area

The study sites Arkhale and Nayagaun lie in south-western part of the Gulmi District of Lumbini Zone in the Western development region of Nepal. The district occupy the mid-hill region and located between latitude 22º55' N to 28º 27'N and longitude 83º10' E to 83º35' with the elevation between 465 m to 2690 m asl. These areas consist of forest predominantly subtropical and temperate characters. At higher altitude as well as south facing areas consists of pine forest patches while lower basins as well as north facing slopes consist of mixed forest of *Schima-Catanopsis* species. In general, main floral species observed in Arkhale and

Nayagaun consist of Pine (*Pinus ruxbergii*), Sal (*Shorea robusta*), Chilaune (*Schima wallichi*), Katus (*Catanopsis indica*), Uttis (*Alnus nepalensis)*, etc. Major wild animals reported are Leopard (*Panthera pardus*), Jungle cat (*Felis chaus*), Common langur (*Semnopithecus entellus*), Rhesus monkeys (*Macacca mulatta*), Common mongoose (*Herpestes edwardsii*), Porcupine (*Hystrix indica*) etc. The bird species are Owl (*Bubo bubo*), Black Kite (*Milvus migrans*), Vulture species, Eagle (*Spilornis cheela*), Kalij pheasant (*Lophura leucomelana*), Cuckoo (*Cuculus* sps.), Common myana (*Acridotheres tristis*), House crow (*Corvus splendens*), Woodpecker (*Picus* sps.), etc.

## Sampling Method and Sample Size

Four wards were selected; two from each, Arkhale and Nayagaun VDC (wards 1 and 2 from Arkhale and 8 and 9 from Nayagaun). Fifty percent of the households from these wards were taken randomly for the survey.

## Household questionnaires

A pre-tested and semi-structured questionnaire was used to collect the information from local villagers contained period of monkey visitation, monkey related problem, preventing methods used by the locals, possible remedial measures of conflict, flora and fauna of the area, etc.

## Monkey's population and distribution study

Regular diurnal observation was done to locate the monkey species, numbers, age, sex and distribution in study sites. Observation was done without disturbing natural setting with the help of binoculars. Repeated observation was made to confirm the collected data on monkeys in their home range. Individuals were distinguished by their body colour, proportion and body size as described by Roonwal and Mohnot (1977).

## Quadrate method

In the study area there was interruption of natural forest by human settlement, thus forest was fragmented into four patches. Each patches were divided into three transect of more or less equal difference and randomly Quadrate of 25×25m was laid to study the vegetation pattern of the natural forest. The local name of plant was identified by the experienced local persons and later scientifically enumerated in the Botany Department TU.

### Data Analysis

Both descriptive statistics (percentages, frequencies) and inferential statistics were used to analyze the data. Household's questionnaires responses were carefully processed and arranged to make sense to researcher for scientific writing.

## Results

### General Distribution

A total of 4 troops of Rhesus monkeys were counted with 128 individuals and one troop of 14 individuals Langur were observed during the study period. The forest of Sitheni, Mulaghari, Khannichaur-Harrachaur, and GurungGaun each consists of one troop of Rhesus monkeys each (Table 1). Langur was found residing between the forest of Khannichaur-Harrachaur and GurungGaun (Table 2). No Langur troop was observed in the forest of Sitheni and Mulaghari.

**Table 1.** Population of Rhesus

| Site | Number of troop | Total individuals | Ward/ Block |
|---|---|---|---|
| Sitheni | 1 | 30 | 1/A |
| Mulaghari | 1 | 23 | 2/B |
| Khannichaur | 1 | 44 | 8/C |
| GurungGaun | 1 | 31 | 9/D |
| **Total** | **4** | **128** | |

**Table 2.** Population of Langur

| Individual | Numbers |
|---|---|
| Adult male | 1 |
| Adult female | 2 |
| Sub adult male | 3 |
| Young adult female | 2 |
| Juvenile | 4 |
| Infant | 2 |
| **Total** | **14** |

### Troop Composition

Among the population of Rhesus monkey the first troop (A) in the forest of Sitheni composed of 30 individuals with 2 adult males, 6 adult females, 4 sub-adult males, 4 young-adult females, 9 juveniles and 5 infants. The second troop (B) in the forest of Mulaghari was composed of 23 individuals with 2 adult males, 4 adult females, 6 sub adult males, 4 Young-

adult females, 5 juveniles and 2 infants were found. The third troop (C) in the forest of Khannichaur-Harrachaur composed of 44 individuals with 3 adult males, 8 adult females, 7 sub adult males, 6 sub adult females, 14 juveniles and 6 infants. The fourth troop (D) which was found in the forest of GurungGaun composed of 31 individuals. Troop D consists of 3 adult males, 7 adult females, 5 sub-adult male, 3 young-adult females, 7 juveniles and 6 infants.

Among the total 128 individual of Rhesus, adult males were 10, adult females 25, sub-adult male 22, young-adult female 17, juveniles 35 and infants 19. Population composition of the monkey troops recorded in the study area showed the highest percentage of Juveniles i.e. 27% followed by adult female 20%, sub-adult male 17%, infants 15%, young-adult females 13%, and adult male 8% (Fig 1).

Population composition of langur troops recorded in the study area showed the highest percentage of Juveniles i.e. 29% followed by sub-adult male 22%. Percentage of young-adult male, infants and adult male was same i.e. 14%, followed by adult male 7% (Fig 2).

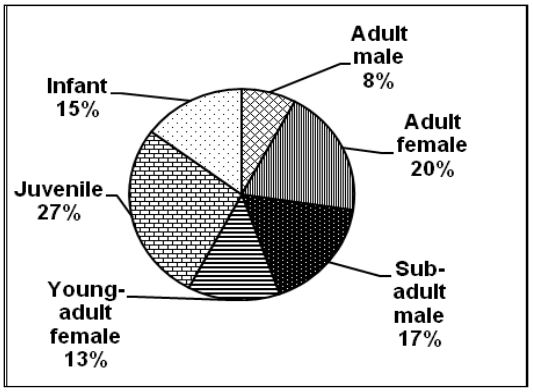



**Figure 1.** Group composition of Rhesus

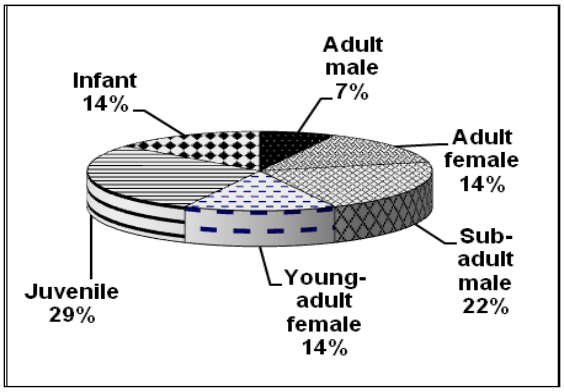



**Figure 2.** Group composition of Langur

## Problem caused by monkey

Out of the total sample population (i.e. 242), one hundred and fifty five respondents (i.e. 64%) answered crop damage as the major problem. Physical hurt and harassment was the second with 65 respondents (i.e. 27%), whereas 22 respondents (i.e. 9%) were found with other problems due to monkey, like stealing household goods and some socio-economic burden. Some of the local people reported that they even had to quite their daily job to care

the crop field against monkeys, local children seems deprived of going to school as they have to guard their crop field all over the day during peak crop fruiting period.

### Species of monkeys damaging more

Population of rhesus monkey was far higher (n=128) than that of the Langur (n=14) in the study area and the extent of damage was also high by the rhesus. Sixty five per cent of farmers in the study area reported that the rhesus monkeys were more damaging to crop and thirty five per cent of the respondents replied that both species of the monkeys equally damaged their crop (Fig 3).

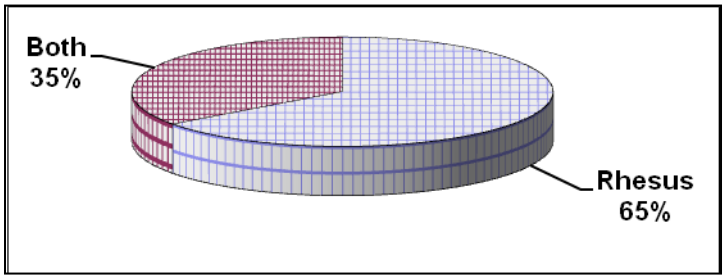



**Figure 3.** Crop damaging intensity of monkeys in Gulmi, Nepal

### Percentage of Crop raiding by monkeys

From the analysis of crop depredation in the study area, it was found that maize was the highest (53%) attraction of monkeys that followed by wheat (23%), paddy (16%) and others (8%) like potato, fruits, mustard, millet, barley, pulses, etc. The extent of damage was also different in various stages of growth.

### Cause of monkeys' problem

Thirty four, out of 242 respondents were of the opinion that monkeys were raiding to their crop field to feed because of less palatable food in the forest (Fig 4). People thought the increase of monkey population itself was the next major cause for the problem. Lack of arms and no provision of killing the monkeys, increase of planted forest area, crop field adjoining to forest etc. were other major issues marked as responsible to heighten the problem of monkey.

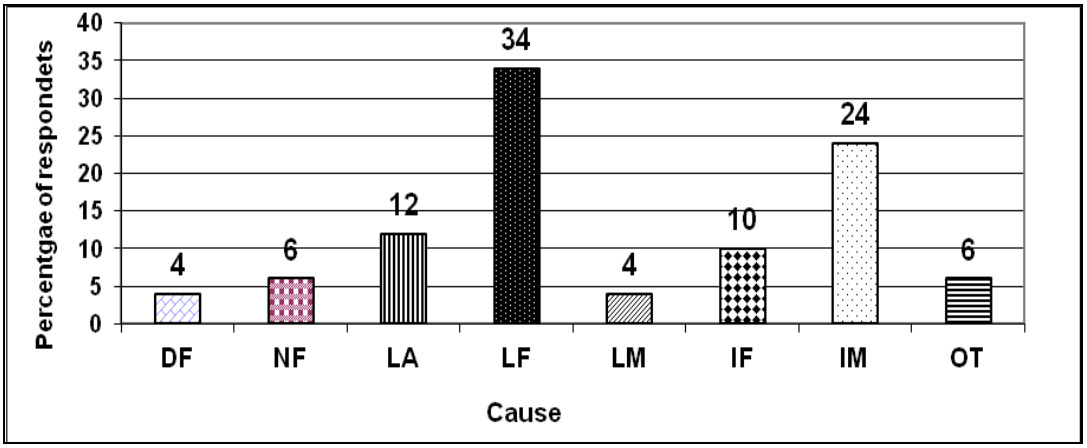
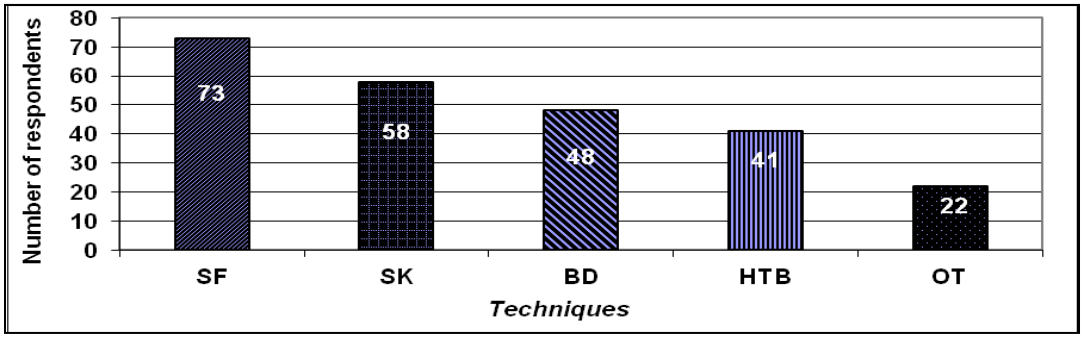



**Figure 4.** Local people perception towards increasing monkey problem

(Note: DF= Deforestation, NF=Crop fields near to forest, LA=Lack of arms, LF=Lack of food in forest, LM= Lack of manpower, IM=Increase of monkeys population, IF- Increase of forest, OT= Others)

## Deterrent methods against Monkey

Local peoples adopted various methods to protect their crops form the monkeys. About 30% of the people shouted and followed monkeys to chase from the field and about 24% of the people used stone and catapult. Similarly, chasing the monkeys by dog as well as hitting tin boxes was other methods used by local people. Some of the people said that they used gun, fire cracker and catapult to chase the monkey. Local farmers guarded their crop fields all over the day in local huts called *Tharku*. Lighting fire in the edge of field, playing music through cassette player or radio with loud sound as well as planting thorny plants and non-palatable crops were the major strategies adopted by the farmers to keep away monkeys (Fig 5).




Note: SF=Shouting and following, SK= Stone and catapult, BD= By dog, HTB= Hitting tin boxes, OT=Others

**Figure 5.** Methods applied to chase out monkeys from the human crop fields.

### Remedial Measures

Most of the people of Arkhale and Nayagaun (39%) suggested worth compensation as best remedial measure of monkey problem. Catching and killing (26%), mass chasing (21%) and alternative crop (14%) were the other measures suggested by local farmers.

## Discussion

Among the three different species of monkeys reported from Nepal (Chalise 2006), only two species of Monkey Rhesus monkey (*Macaca mulatta*) and common Hanuman Langur (*Semnopithecus entellus*) were observed in Arkhale and Nayagaun of Gulmi. Assamese monkey (*Macaca assamensis*) was not found in the study Area. Rhesus monkey was in highest number (128) among the two species available locally. It may be due to its most commensal characters to human and crop raiding. Langur population was found to be 14. The lesser number of Hanuman Langur may be due to the small natural leafy habitat and being less commensally to human (Khatry 2006).

Crop raiding was found as a major cause of conflict caused by monkeys though physical hurt and harassment, grabbing and taking of food materials were also reported. Among the respondents crop raiding was reported by 64%. But the extent of crop raiding was found to be different in different areas. Crop raiding was found to be highest in the village near to the forest of GurungGaun (73%) followed by the village of Khannichaur-Harachaur. Village near to the forest of Mulaghari reported least to the crop raiding (59%). Higher extent of crop raiding in former two is due to the settlement and crop field very near to the forest. Khatry (2006) found that 76% of the respondents of Vijayapur area of Dharan reported the crop raiding as the major problem. Similarly, the study of McCourt (2005) showed that 92% respondents of Hetauda were found to be suffered from crop damage from monkeys. 87% of respondents complained the harassment by monkey by taking food spilling or eating from the kitchen, porch or roof.

Of the different crops raided by monkeys, maize was of highest preference (53%) of monkey. It was followed by wheat 23%, paddy 16% and others 8%. Regarding the monitory loss also maize occupied highest loss (48%); fruits shared 17%, paddy 12%, wheat 11%, potato 4%, millet 3%, mustard 3% and pulses 2%. Barley has least share in the monitory loss with about 0.5%. Raid percentages of crop also followed nearly similar trend. Maize was highly raided

crop (21.5%) of the total yield destructed by monkeys followed by wheat (20%), paddy (12.5%), fruits (10.22%), millet (9.33%), potato (9.2%), mustard (4.17%), barley (4%) and pulses (1.94%). This finding is also supported by the previous researches of Chalise (1997, 1999, 2001, and 2003). Chalise (2001) and Chalise and Johnson (2005) reported that crop depredation proportion by monkeys is different in different crops in different localities. Chalise (2010) reported that the crop raiding data can be collected in combine as the locals are unable to report categorically crop loss done by Langurs, rhesus and Assamese. The monkeys most favored crop is maize (43%) while potato (20%), millets (16%) and wheat (13%) for assamese monkeys in Langtang National Park.

As perceived by local farmers of Gulmi, lack of natural food in the forest was the major cause compelling monkey to raid the crop field. Thirty four, out of 242 respondents were of the opinion that monkeys came to their crop field to eat as there was no food in the forest. People thought the increase of monkey population was the next major cause for the increase of problem. Lack of different repellent tools and location of cropland were other major components responsible to heighten the problem of monkey in the area. Different preventive measures were applied to deter monkey. Local peoples usually guarded their crop field and chased monkey by shouting and following. Use of catapult and stone, use of dog to chase monkey, hitting tin boxes, as well as other method like radio and cassette players, fire crackers as well as planting alternative crops were also found. Khatry (2006) in Vijayapur, Dharan found the use of catapult to frighten the monkeys to be most effective.

Chalise (2001) reported that farmer's suffering from monkey crop damage in eastern Nepal was considering planting alteration of crop pattern. From the study, monkeys' unflavored crops would minimize the crop raiding problems. Ginger, garlic, chili, yam, and colocasia, etc. were the major alternative crops planted by the local people. People should give priority for alternative farming like mushroom cultivation, planting of chili, lady's finger, ginger, garlic etc. Alternative crop was found to be effective to lessen the loss by monkey. Local people were found to prefer worth compensation to lessen the conflict with monkey.

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