A CASE STUDY ON HUMAN LEOPARD CONFLICT IN KATHMANDU VALLEY

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RUPESH MAHARJAN

AUGUST 2017

A CASE STUDY ON HUMAN LEOPARD CONFLICT IN KATHMANDU VALLEY

RUPESH MAHARJAN

LEE REPORT

SUBMITTED TO THE

AGRICULTURE AND FORESTRY UNIVERSITY

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REQUIREMENTS OF THE

DEGREE OF B.Sc. Forestry

B.Sc. FORESTRY

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Dean Office
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Ref. No.

CERTIFICATE

This is to certify that the project paper entitled **"A case study on Human Leopard conflict in Kathmandu valley"** prepared and submitted by **Mr. Rupesh Maharjan** for partial fulfillment of the requirements for the degree of B.Sc. Forestry from Faculty of Forestry of the Agriculture and Forestry University is a record of original research carried out under my supervision is hereby accepted and no part of the project paper has been submitted for any other degree or diploma.

Amar Singh Dhami

Advisor

Assistant Professor (Forestry)

Faculty of Forestry

Agriculture and Forestry University

Date: August 23, 2017

Assistant Proffessor
Faculty of Forestry
Hetauda, Makawanpur

Tel.: 057-527354 Email: deanforestry@afu.edu.np

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Rupesh Maharjan

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ACRONYMS

ABC	Asian Big Cats
AFO	Assistant Forest Officer
CF	Community Forest
COP	Conference of Parties
Df	Degree of freedom
DFO	District Forest Office
DoHM	Department of Hydrology and Metrology
GIS	Geographic Information system
GPS	Geographic positioning System
HWC	Human Wildlife conflict
SMRF	Small Mammal conservation and Research Foundation
SNNP	Shivapuri-Nagarjun National Park
SPSS	Statistical Package for Social Science
UNESCO	United Nations Educational, Scientific and Cultural Organization
VDC	Village Development Committee
WWF	World wide fund

ABSTRACT

Human-wildlife conflicts are common phenomena from the past and have become significant problem throughout the world with frequent encounters with human and their livestock have resulted into their retaliation killing. Among them human leopard conflict has been one of the greatest issue inside the Kathmandu valley since past times.

This study aimed at exploring the human-leopard conflict in terms of livestock depredation their nature, cause and the people's perception on the conservation effort of common leopard within the Kathmandu valley. For the study to be more effective, random sampling method was applied followed by key informant survey and questionnaire survey. About 206 respondents from selected VDC's and wards within it were interviewed during March 2017 to May 2017. Data showed that the rate of goat depredation and dog uplifting was quite high in the area closer to the main forest where most of dog depredation cases occurred during night hours however, goat depredation cases reported to be high in day time. Most of the cases of goat depredation was found to be occur at shed due to the lack of predator proof shed and absence of electricity. This study also indicates the effort for the conservation is dependent upon people attitude towards leopard with those people not affected by leopard having positive response towards conservation while others having negative.

The fact that local people still consider leopards as pest makes the conservation activities even more difficult in the area. Therefore, the conservation initiatives must be backed up by the needs and aspirations of the local people addressing the problem of livestock depredation.

Keyword: *Goat depredation, Dog depredation, People perception, Street dogs*

शोध-सार

मानव वन्यजन्तु द्वन्द्व पहिले देखिनै विश्वभरी देखा परिआएको एक समस्या हो जसले घरपालुवा जनावरहरुका साथै मानवलाई समेत क्षति पुऱ्याउँदै आएको छ। यस द्वन्द्वको परिणाम स्वरुप विभिन्न जङ्गली जनावरहरुको सिकार हुनुका साथै तिनीहरुको आखेटोपहारको तस्करी बढिरहेको पाइन्छ । यसै सन्दर्भमा मानव चितुवा द्वन्द्व अहिले काठमाडौं उपत्यकाको एक जल्दोवल्दो समस्याका रुपमा देखिआएको छ । जसका कारण काठमाडौं उपत्यकामा मात्र धेरै चितुवाको मृत्यु भएको छ भने चितुवाबाट पनि धेरै मानिसहरु घाइते तथा तिनीहरुको मृत्यु भएको छ ।

यस अध्ययनको प्रमुख उद्देश्य काठमाडौं उपत्यकामा भैरहेको मानव चितुवा द्वन्द्वको प्रकृति, त्यसको कारण र चितुवा संरक्षणको विषयमा मानिसहरुको धारणा के कस्तो छ भनेर बुझ्नु हो । यस अध्ययनलाई प्रभावकारी बनाउनका लागि "Random Sampling" का विधिहरु अपनाएर "Key Informant Survey" / "Questionnaire Survey" गरिएको छ । यस अध्ययनका लागि छनौट गरिएको विभिन्न गा.वि.स. र त्यस भित्र पर्ने वडाहरुबाट २०६ घरधुरीहरुलाई प्रश्नावली सर्भेक्षण गरी त्यस ठाउँबाट तथ्याङ्क संकलन गरिएको छ ।

संकलन गरिएको तथ्याङ्क अनुसार अध्ययन गरिएको क्षेत्रहरुमा बाख्रा र कुकुरहरुको संख्या चितुवाको आक्रमणका कारण घटेको पाइएको छ । ती जनावरहरुमा बाख्राहरुलाई दिनमा बढी आक्रमण गरिएको छ भने कुकुरहरुलाई राती आक्रमण गरिएको पाइएको छ । यसै गरी चितुवाको संरक्षणको प्रसंगमा चितुवाले हानि नपुऱ्याएको मानिसहरुमा चितुवाको संरक्षण प्रति सकारात्मक धारणा रहेको पाइयो भने अरु मानिसहरु जुन चितुवाको आक्रमणको सिकार भएका छन् तिनीहरुको चितुवा संरक्षणप्रति नकारात्मक धारणा राखेको भेटियो ।

अहिले पनि धेरै मानिसहरु चितुवालाई घाटक र हिंस्रक जनावरका रुपमा लिने गरिएकोले यस जनावरहरुको संरक्षणको कार्यमा विभिन्न कठिनाईहरु उत्पन्न भइरहेको छ । यसको संरक्षण गर्न विभिन्न क्षेत्रमा चितुवाको आक्रमणको चपेटामा परेका वा पर्न सक्ने मानिसहरुलाई समेटेर संरक्षणका कार्य योजनाहरुमा समावेश गर्नु पर्ने देखिन्छ ।

मुख्य शब्द: *बाख्राको सख्या, कुकुरको सख्या, मानिसको धारणा, छाडेका कुकुर*

CHAPTER 1
INTRODUCTION

1.1 Background

Nepal is home for three species of leopard: Common Leopard *Panthera pardus*, Clouded Leopard *Neofelis nebulosa* and Snow Leopard *Uncia uncial* (Ghimirey, 2006). Among these three species Common Leopard is the most common one which not only is restricted to forest or heavy cover but also thrive well in open country (Prater, 1998). The species is also known as forest leopard. The common leopard (*Panthera pardus*) is the most widespread carnivore (Myers, 1986) occurring throughout sub-Saharan Africa, India and southern Asia (Nowell & Jackson, 1996) mainly due to its highly adaptable hunting and feeding behavior (Bertram, 1999). They have been perceived as a threat to human survival because of danger to human life and to livestock. People respond to livestock depredation by poisoning carnivores, habitat destruction and direct killing (Yirga et al., 2011).Local people often hold negative attitudes, when carnivores prey upon livestock (Oli et al., 1994).

The common leopard (*Panthera pardus*) has 14 recognized subspecies worldwide (Kala & Kothari, 2013), of which Nepal contains one: *Panthera pardus pernigra* (Ghimirey, 2006). The common leopard is common in forests across Himalayas, and its food consists of wild prey species such as goral, barking deer, wild boar, jungle fowl and langur (Kumar, 2011). Within Nepal, Leopards are known to be distributed widely from Terai to interior areas of the Himalayas, spanning over 73 of the nation's 75 districts (Shah et al., 2004). A recent study by WWF Nepal's Hariyo Ban program reported that incidence of leopard attack on livestock and human are especially prevalent in Terai Arc Landscape and Chitwan Annapurna Landscape regions. This study documented 137 cases of human death/ injury from conflict with leopard in the 2006 – 2013 period (Thapa T. , 2014) while this study highlights high potential for conflict, with adverse impacts both on leopards and human, little is known on how and to what extent human leopard conflict has affected both leopards and people Kathmandu valley is composed of three different district namely, Kathmandu, Bhaktapur, and Lalitpur; within which several leopard conflict incidence have been found to occur, among them there has been quite increase in sighting and the conflict incidence occurring in recent years (Bhandari, 2015).

Human-wildlife conflict arises through loss, degradation and fragmentation of habitats by human activities such as logging, animal husbandry, agricultural expansion and development projects when people occupy or approach a place/resources (Madden, 2004). People lose their crops, livestock, and property and sometimes even their lives while on the other hand animals, that are already endangered or threatened, are often killed by people (Mishra et al., 2004). As habitat gets fragmented, the length of `edge' for the interface between humans and wildlife increases, while the animal populations become compressed in insular refuges. Consequently, it leads to greater contact and conflict with humans as wild animals seek to fulfill their nutritional, ecological and behavioral needs (Pokhreal, 2015). The conflict problem is hence a cause for concern that urges managers to shift their conventional policy from that of managing wildlife populations to enhancing their societal values. As such understanding the ecological and socio-economical context of the HWC (Human Wildlife conflict) is a prerequisite to bring about an efficient and long-term management of wildlife and its habitats. Crop damage caused by raiding wildlife is a prevalent form of human-wildlife conflict along protected area boundaries (Rijal B. , 2015).

1.2 Statement of the Problem

Human – wildlife conflict is increasingly becoming a critical threat to the survival of many globally endangered species, particularly large and rare mammals. The numerous cases from buffer villages of National parks and other protected areas all over Nepal demonstrate the severity of human-wildlife conflict and demand an in- depth analysis to understand the problem and support the conservation prospects of threatened and potentially endangered species. Similarly Human – wildlife conflict is increasingly gathering attention and concern in Kathmandu Valley in recent years. Rising concern can be attributed to an increase in incidences of leopard captures in the Kathmandu city. The trend that caused to rapidly increase in the conflict situation is perhaps the result of encroachment of the forest land, climate change that has a great possibility of altering the habitat previously occupied by the leopard.

Although, few literatures on Human leopard conflict within Kathmandu valley has been published by different researchers, the study of leopard and the conflict that has been arising inside the valley are yet to bet fully discussed. In recent years human- leopard conflict is increasingly gathering attention and concern in the Kathmandu Valley which has thus risen the

perspective on incidences and captures of leopard and its victims. Apart from direct danger to human lives from leopard attacks, livestock depredation is an issue of great concern. However documentation of livestock depredation events is lacking and it is thus difficult to discern the magnitude of conflict. The most important fact to be considered while connecting the Kathmandu's acute leopard problem is people's attitude towards leopard in their midst. While public safety cannot be compromised, it is also vital to protect and safeguard leopards. Negative behavior of people towards leopard could result in injury or death of leopards. Since there is no monitoring mechanism established either to assess the status of leopards or to document conflict, little is known about leopard population sizes, their spatial and temporal trends in population occurrence/density. It is often feared that carnivores which come in conflict could be poached or poisoned. Therefore, assessing the loss of human and leopard is necessary to minimize the human leopard conflict around the Kathmandu valley.

1.3 Objectives

The aim of the study is to explore the human-leopard conflict in Kathmandu Valley and to recommend solutions for an effective future conservation strategy. Moreover, this study envisaged the perception of local inhabitants to leopard conservation and their tolerance to losses of livestock and human casualties caused by leopard. Similarly, the study tried to analyze the effects of human-leopard conflict on leopard conservation and also explored possibilities for better leopard conservation by means of conflict mitigation. The objectives of this study are listed below:

1. To identify the current situation of human leopard conflict in the valley
2. To evaluate human attitudes towards leopard living in their area

1.4 Limitation of the study

- All the area of Kathmandu Valley cannot be included in the area of study
- All the VDCs and wards within Kathmandu valley cannot be covered due to the limitation of time and financial resources.
- Data analysis will be mainly based on people's response rather than from secondary sources due to less availability of document records of all related topics.

CHAPTER 2

LITERATURE REVIEW

2.1 Habitat and Distribution of Leopard

Panthera pardus could at one time be found from British Isles to Japan and throughout most of Asia (Ghimirey, 2006). Today they can still be found in Africa, except for the true deserts of Sahara and Kalahari, and some parts of Asia such as Sri Lanka, India, Nepal, Pakistan, Myanmar, Thailand, China, Vietnam, Afghanistan, and Asia Minor etc. The leopards are more common in Eastern and Central Africa. Conversely, they are rare in Western and Northern Africa and most of Asia (Ghimirey, 2006).

Leopard being versatile animals can survive well in dense forest as well as in the grasslands with sufficient food and cover with only the factor concerning their presence is an area (Ghimirey, 2006). According to study conducted by *Eliassen* (2003) in Bardia National Park, the leopards commonly do not inhabit the prey-rich area if the area has high tiger (or other large carnivore) density. Although sufficient prey was available, the leopards were probably displaced by tigers through social dominance in the prey rich part. (Smith, 1993) state that sub-adults are pushed- away by dominant, forcing them to search and establish a new territory. Recent work of (Athreya et al 2015) reported the mother and cubs residing in an areas vicinity to human settlement in Southern India, and affirms leopards being resident and breeding in human landscape

Leopards were once considered present in almost all districts of Nepal, but due to the species decline this may no longer be true (Thapa T. B., 2015). Common leopard has been enlisted in Appendix I of CITES list, CoP (Conference of Parties) decision 12.5 and 14.5 for the conservation of ABC (Asian Big Cats), National Parks and Wildlife Conservation Act 2029 (1973).

2.2 Food

Bista,(2016) encountered 140 scats during 141.5 km foot survey in the forest based on morphological differentiation of scats, one-third of these scats were found not to be leopards, species as Himalayan Black bear, canids and 4 small cats (Jungle cat, clouded leopard, fishing

cat, leopard cat) occur in the park, and scats of these species can be confused with that of the leopard (Sidhu et al., 2015).
(Henschel et al., 2005) studied the food habit of the leopard in Lope National Park of Gabon. They collected and analyzed 196 common leopard scats. A minimum of 30 different prey species were identified, 27 of which were mammalian. The leopards preyed mainly on ungulates, which made up 59% of the biomass consumed. Diurnal primates (18%) and large rodents (17%) were also heavily preyed upon. The mean prey weight estimated from scats was 29.2 kg.

According to (Bailey, 1993) at least 92 prey species have been documented in the leopard's diet in sub - Saharan Africa. (Bailey, 1993) reviewed the literature, and concluded that leopards generally focus their hunting activity on locally abundant medium-sized ungulate species in the 20-80 kg range, while opportunistically taking other prey. The common leopard have a number of prey items, including gazelles, wildebeest, antelopes, duiker, impala, sheep, goats, monkeys, jackals, eland, rodents, hyraxes, hares, peacocks, snakes and insects,. The leopards can live independently of water for long periods of time, obtaining liquid from their prey (www.bbc.co.uk).

The flexibility of the diet is illustrated by Hamilton, (1976) through the analysis of the leopard scats from Kenya's Tsavo West National Park, of which 35% contained rodents, 27% birds, 27% small antelopes, 12% large antelopes, 10% hyraxes and hares, and 18% arthropods. He found that the leopard's diet was extremely varied, including Thompson's baboons, gazelle, wildebeest, impala, aardvarks, jackals, pangolins, snakes, birds and rats. Even cheetahs are occasionally eaten. The Leopards in the Ivory Coast feed on over 30 different mammal species (www.members.aol.com). (Karanth and Sunquist, 1995) found that leopard focused on prey in the 30-175 kg class. (Johnsingh, 1983) reported that 69% of leopard kills were less than 50 kg. Eliasson, (2003) found in his study in Bardia National Park (BNP), Nepal that leopards used to take mostly small and medium sized species, with smaller species comprising 45.4% of their diet. Chital, monkeys, smaller domestic and small wild mammals constituted their main prey in all seasons, with wild boar and birds as other important prey in the dry season.

2.3 Reproduction

The leopards in Africa and India will mate at any time of the year, while those living in Manchuria and Siberia mate most often in January and February. One female may be pursued by several males, the successful male grabbing her by the back of her neck with his teeth, the female swatting him off when copulation is completed. Copulation is very frequent, from 70 to 100 times a day. Estrus lasts on average 7 days (4-14 days). The gestation period of the 18 leopard is an average of 96 days (90-112 days) with up to six cubs being born. Early mortality is high though and it is rare to see a female with more than two cubs. (www.members.aol.com/cattrust/leopard.htm).

2.4 Status of Common Leopard in Nepal

Every part of Nepal except high Himalayan regions sufficient studies have not been carried out in Nepal regarding the status, distribution and number of the leopards (Ghimirey, 2006). If forest cover and prey supply are available, the vertical distribution range of common leopards extends as high as 4000m (NTNC, 1998). It is reported to visit up to 3500m in the Trans-Himalayan region like Upper Mustang (Shah et al., 2004) but (Jackson, 1984) even reported it at 5200m. According to Shah et al., (2004), it is concluded that common leopards are found in 73 districts of Nepal. The only districts where any evidences of the presence of the species were not found were Dhanusha and Okhaldhunga.

A study was carried out by Poudel, (2002) in Chitwan National Park (CNP) in Chitwan valley. The study found that the population of common leopard in RCNP was 18 – 35 individuals then. Outside the park also, the leopards exists though the density was found relatively lower than inside the park. The study estimated 25 – 55 common leopards in the Chitwan valley.

2.5 Global Conservation Status

As with many endangered animals, increasing human populations, loss of habitat and hunting have dramatically reduced the number of the leopards. Leopards are considered pests by villagers as they will take livestock and are considered to be more dangerous as “man-eaters” than lions or tigers. They will even enter a hut and drag out a victim which a tiger would not do (www.members.aol.com/cattrust/leopard.htm).

They are endangered through much of their range, with the Amur, Anatolian and Barbary leopards being almost extinct. The data on seizures of parts of tiger and common leopard, TRAFFIC, shows that for one tiger killed, more than five leopards are poached (Aryal, 2003). The leopard is placed on Appendix 1 of the CITES, which prohibits trade in any part of the animal in those countries that are members, but smuggling still occurs.

The IUCN Red Data Book has the Arabian leopard (*P. p. nimr*), the Amur leopard (*P. p. orientalis*), North African leopard (*P. p. panthera*) and Anatolian leopard (*P. p. tulliana*) as Critically endangered, the caucasus leopard (*P. p. ciscaucasia*), Sri Lankan leopard (*P. p. kotiya*), North Chinese leopard (*P. p. japonensis*) and Javan leopard (*P. p. melas*) as endangered and all other leopards as least concern. Leopards are good breeders in captivity and are a lot more resilient in the face of growing pressures than either lions or tigers appear to be, making conservation programs slightly easier (www.aol.com/cattrust/leopard.htm).

2.6 Livestock Depredation by Common Leopard in Nepal

Livestock depredation is one of the main reasons for the human-leopard conflict in Nepal. Areas with good numbers of wild prey could face some degree of livestock depredation but where natural prey has been depleted, livestock depredation is likely to be inevitable (IUCN – CSG, 1992). Shrestha, (1994) found that out of the total livestock loss in Royal Chitwan national Park, 63.33% were killed by Tiger and 36.36% were killed by the leopard.

A study by (Gurung, 1995) in Gokarna, Kathmandu found that common leopard was one of the main predators along with Jungle cat *Felis chaus* and Jackal *Canis aureus*. (Tamang, 2000) found in his study that in the buffer zone area of Bardia National Park, livestock depredation was quite high. It was found that the depredation by the leopard was second only to Tiger. The total loss of livestock to the leopard during six years prior to 2000 was 87 which was 19.68% of the total loss (Tamang, 2000).

2.7 Human-Leopard Conflicts in Nepal

Common leopards are also known to visit the human settlements quite frequently killing the domesticated animals and also terrorizing and sometimes injuring or killing the people.

Table 1 Mortality causes of Leopard (Panthera pardus) in Nepal, based on confirmed report from 2006 to 2013

Year	Causes of death during 2006 to 2013					
	Natural	Lethal control	Poaching	Retaliation	Road accident	Total
2006	1	0	3	0	0	4
2007	0	1	0	0	0	1
2008	0	0	0	1	0	1
2009	0	0	0	1	0	1
2010	3	3	0	1	0	7
2011	3	2	0	3	1	9
2012	7	0	1	3	1	12
2013	4	4	0	7	1	16
Total	18	10	4	16	3	51

(Source: Thapa, 2014)

CHAPTER 3
MATERIAL AND METHODS

3.1 Study area

Kathmandu is bowl-shaped valley lying on central development region of Nepal, lower part of which is situated at 1,425 meters (4,675 ft.) above sea level. Kathmandu valley is surrounded by four mountain ranges: Shivapuri (towards north with an elevation of 2,800 meters or 9,200 feet), Phulchowki (towards southeast with an elevation of 2,795 meters or 9,170 feet), Nagarjun (towards northwest of an elevation of 2,825 meters or 9,268 feet) and Chandragiri (towards south with an elevation of 2,300 meters or 7,500 feet) (Bhattrai A. , 2015).

The study area consists most part of the Shivapuri Nagarjun National Park that joints with the major two protected areas system the Langtang National Park to the North and Gaurishanker Conservation Area to the East, These protected areas are corridor to the wild carnivore. It extends along the coordinates of 27°32’13”N to 27°49’10” N latitude and 85°11’31”E to 85°31’38”E longitude (Bhattrai A. , 2015). As Shivapuri-Nagarjun National Park is located in between the transitional zone of sub-tropical and temperate climate, it is rich in faunal and floral diversity (Bertram, 1999). National, private, community forests and the national park of the valley are the habitat of diverse fauna and flora. The Kathmandu valley is developed, populated and important industrial/commercial center of Nepal. According to the population census of 2011, Kathmandu metropolitan alone has 1.7 million inhabitants and the valley has a population of more than 2.5 million inhabitants. The valley is cultural and political hub of Nepal. The Kathmandu valley was accorded with the status of a World Heritage Site by UNESCO in the year 1979 (Rijal B. , 2015). Kathmandu valley consists of different vegetation type, ranging from subtropical broadleaved forest to temperate deciduous forest (SMRF, 2015). The valley lies in warm, temperate zone and has a mild climate almost throughout the year (world travels, 2016). In recent days most of all previous VDC has been upgraded into municipality such as Kirtipur, Dakshinkali, Chandragiri, Bhimdhunga, Chalnakhel in Kathmandu district Badikhel, Chapagaun, Dhapakhel in Lalitpur and Bageswori, Balot, Changunarayan in Bhaktapur.

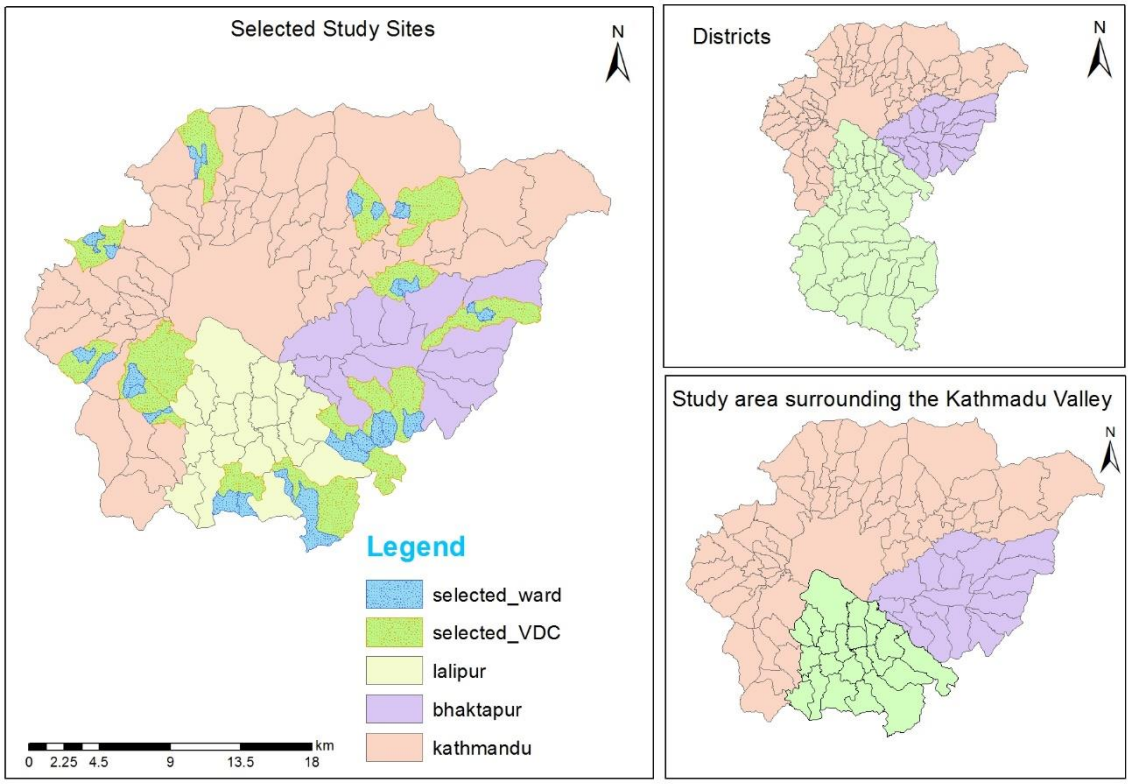


Figure 1 Study site location of the Kathmandu Valley

3.2 Climate

The Kathmandu valley falls on warm temperate zone ranging from 1,200 to 2,300 m where the climate is fairly temperate. The valley has a climate with warm days followed by cool nights and mornings. Rainfall is mostly monsoon-based from June to August receiving approximately 80% of rainfall with dry winters (DoHM, 2015). During summer, Maximum temperature reaches to 29^{o}c and minimum temperature reaches about 2^{o}c and average humidity is 75% Kathmandu valley is typical Mahabharata hill and enjoys mostly sub-tropical type of climate and partly temperate climate with rainy summer and dry winter (Choudhury, 2008).

Table 2 Maximum and Minimum Temperature recorded in Kathmandu Valley in 2016

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
High(^{0}C)	17	19	24	28	29	29	27	27	27	25	22	18
Low(^{0}C)	2	4	8	12	15	17	18	18	17	14	9	4

Source: (Weather, 2016)

The southern aspect is sunny and evidently much drier than the northern aspect. According to the meteorological data of 2016, the minimum temperature ranges from 18^{0}C July to 2^{0}C

January while the maximum temperature ranges from 17^0C January to 27^0C August (Table 2). Likewise maximum and minimum rainfall in the year 2016 were recorded in July at 325 mm and November at 7 mm. respectively (Table 3).

Table 3 Average rainfall and average rain days recorded in Kathmandu Valley in 2016

	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
mm	13	14	10	29	70	129	325	239	175	67	7	8
Days	25	26	26	24	11	10	13	10	12	26	24	26

Source: (Weather, 2016)

3.3 Biodiversity

3.3.1 Flora:

Forest of Kathmandu valley can be categorized into four types: *Schima wallichii* forest, pine forest, mixed broadleaved forest (*Phoebe lanceolata, Machilus duthiei, Michelia kisopa* as major species) and dry oak forest (Kanai & Shakya, 1970). Among these four types of forests recognized in Nagarjun hill, *Schima wallichii,* forest constituted nearly two-thirds of total forest cover. GIS (Geographic Information system) analysis has shown that coverage of *Schima wallichii* forest, mixed broadleaved forest, pine forest and dry oak forest in Nagarjun hill was 61.29%, 27.91%, 9.08% and 1.72%, respectively (Rijal B. , 2015). There are few small patches of grassy meadow in Kathmandu valley (Rijal B. , 2015).

3.3.2 Fauna:

Sixteen species of herpetofauna including *Naja kaouthia, Ophiphagus hannah, Trimeresurus albolabris, Japulura variegate* are recorded from the valley forest among which *alotes versicolor* common among reptiles. Many Bird species including Kalij Pheasant (*Lophura leucomelanos),* Yellow napes (*Picus sps.),* Barbets (*Megalaima sps.),* Green-billed Malkoha (*Phaenicophaeus tristis*), Owlets (*Glaucidium sps.*), Himalayan Griffon (*Gyps himalayensis),* Harriers *(Circus sps.),* Drongos (*Dicrurus sps*.) Thrush (*Monticola sps* and *Myophonus sp.)* Tits (*Parus sps.),* Nuthatch (*Sitta sps.*), Bulbul (*Hypsipetes sps.*), laughing thrush (*Garrulax sps.*), Babbler (*Pomatorhinus sps.*) and many species of warbler's were recorded in valley (Shrestha, 2004). Two species of macaques are recorded in different religious temple and patchy forests of valley, namely Assamese macaque (*Macacaas samensis*) and Rhesus macaque (*Macaca mulatta*), (Wada, 2005, Chalise et al., 2013). The valley inhabits variety of wildlife, including common leopard (*Panthera pardus*), Deer (*Cervus sps*), Jungle cat (*Felis chaus*), Wild boar (*Sus scrofa*), Squirrel (*Sciurus carolinensis*), Porcupine (*Hystris indica),* Lokharke (*Rautufa*

indica), Jackal (*Canis aureus*), Yellow-throated martin (*Martes flabigula*), Rabbit (*Oryctolagus cuniculus*), etc. Several surveys carried out in Shivapuri National Park situated in the valley have identified different faunal species such as Himalayan black bear (*Ursus thibetanus*), Himalayan goral (*Naemorhedus goral*), Barking deer (*Muntiacus muntjak*), Chinese pangolin (*Manis pentadactyla*), Clouded leopard (*Neofelis nebulosa*), leopard cat (*Prionailurus bengalensis*) etc. (Shrestha, 2004, Rijal, 2015, Pokhreal, 2015).

3.4 Data Collection:

First of all, the selected study area within Kathmandu valley were visited and potential habitat of leopard along with the livestock and human use of forest; human attitude toward leopard conservation were recorded. For the study to be more effective the sampling area was selected in terms of VDC's and wards recommended by DFO (Kathmandu, Bhaktapur and Lalitpur) followed by random sampling of households taking at least 5% of total household from those sample area (Bhattrai B. , 2009). As a result 14 potential VDC's were selected from which 27 wards from each VDC lying close to the nearby forest boundary was taken and represented as a "sampling units" for the study. Then household survey was done within 500 m distance from the nearby forest of the respective VDC (Bista, 2016). Based on Bista, (2016) instead of regular grid design, wards within the VDC were taken as sampling units due to the following reasons:

a) VDC and ward boundaries are known to people residing in respective VDC and therefore it would be easier to bound response from respondents on survey locations. Since boundaries of grids would not be known to people clearly, it would make data collection cumbersome and unreliable.
b) VDC's and wards being administrative units, results are of relevance for managers and can easily be communicated to administrative authorities and citizens.

The sample size for this study was determined on the basis of number of household based on the available data of the study area. A multistage random sampling method was adopted where data of leopard kill, livestock depredation, people's attitude towards leopard conservation were assessed through direct observation and household interview. Various shocks borne due to wildlife damaged experienced by the local people were explored along with assessing the adopted coping strategies (risk management strategies) through key informant survey and general group discussion and other questionnaire survey. Data collection used for the research

mainly consists of review of secondary data, direct observation, and Questionnaire survey of the study area, GIS data collection and interview with concerned personnel and institution.

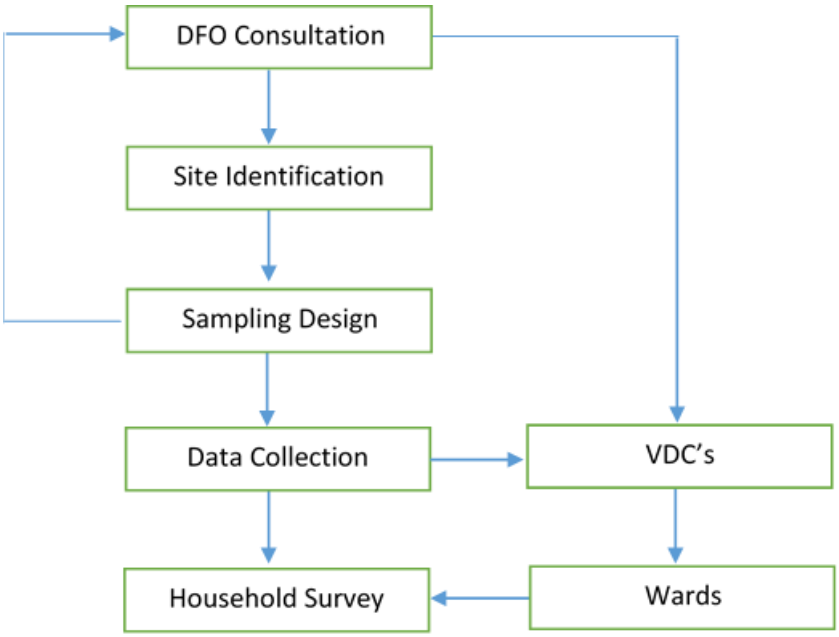


Figure 2 Methodological framework for data collection

Direct observation: Observations were made in all potential habitats of leopard and in surrounding areas within the study area. Direct observation involved the identification of vegetation and game animals in which leopard depend. These areas were located by visiting the study area and by questioning the local people living in the study area.

Questionnaire survey: Survey was done on the basis of random sampling method in which households were selected randomly from the selected wards within the Kathmandu valley. Study area were mainly focused on the outskirts of Kathmandu valley; since, higher frequency of conflict occurs at a place closer to the forest area rather than in the areas far from the forest. On the basis of recommendation from DFO of Kathmandu, Bhaktapur and Lalitpur district 14 VDC within which 27 wards were selected on the basis of purposive sampling; among them 5% of household were interviewed (Bhattrai B. , 2009). All questions were close ended (closed-ended questions have multiple options and respondents are required to choose one from among these options, therefore, respondents are directed to the interviewers own set response, whereas open ended questions have no options and respondents are required to answer themselves) for simplicity in quantitative analysis. Questionnaires were designed in reference to Bista, (2016) and Bhattrai, (2009) and was then finalized after consultation with my supervisors, Assistant

Prof. Amar Singh Dhami and field supervisor Dr. Indra Prasad Sapkota (DFO of Kathmandu) and Mr. Utsab Thapa (AFO of Kathmandu). In many parts of Nepal people get confused with Tiger (bagh) and Leopard (chituwa) so, to ascertain of which we were speaking, I used the photographs of a common Leopard so that my interviewees could readily identify which animal was responsible for livestock predation and human casualty.

a. **Secondary Data Collection:** Secondary data relevant to the study were collected from various published and unpublished documents.
b. **GIS data collection:** In this study, GPS coordinates of the interviewed site along with its elevation were collected and the location of conflict area were recorded to support the human conflict analysis.

3.5 Data Analysis:

All quantitative data were analyzed using the statistical software tool SPSS (Statistical Package for Social Science). Before entering the data into Microsoft Office Excel, each questionnaire was given an identity number. Every question and the responses were coded. These codes were saved in the next sheet (MS Excel) of the same file. After completion of the data entry into the "Excel sheet", the data was imported into SPSS. Before analyzing anomalies, typing errors and missing information were corrected by comparing the original data sheet (protocol) with the frequency output table of SPSS data was analyzed using descriptive statistics. To understand the relationship between the attitude of people in the leopard conservation area and their education level and gender, the Pearson Chi-Square test (two tailed) was applied. Results were presented in bar diagrams and pie charts.

CHAPTER 4
RESULT AND DISCUSSION

4.1 Demographic study

With an intensive sampling effort, 14 VDCs from which 26 ward closer to the nearby forest boundary inside the Kathmandu Valley were sampled (covering 5% of the total population from the selected wards) on the recommendation of District forest office(Kathmandu, Bhaktapur, and Lalitpur) and also based on the leopard incidents occurred in the past. From these VDCs 206 respondents were interviewed during March 2017 to May 2017, out of which (n = 82) 38.61% were female and (n = 124) 61.39% were male. Those respondents primarily were dependent on agriculture-based occupation for their livelihood (Figure 4). As for the education background (n = 49) 23.81% of them had university degree whereas (n = 28) 13.6% only had primary level education and (n = 56) 27.2% didn't have any education background at all. (Figure 5)

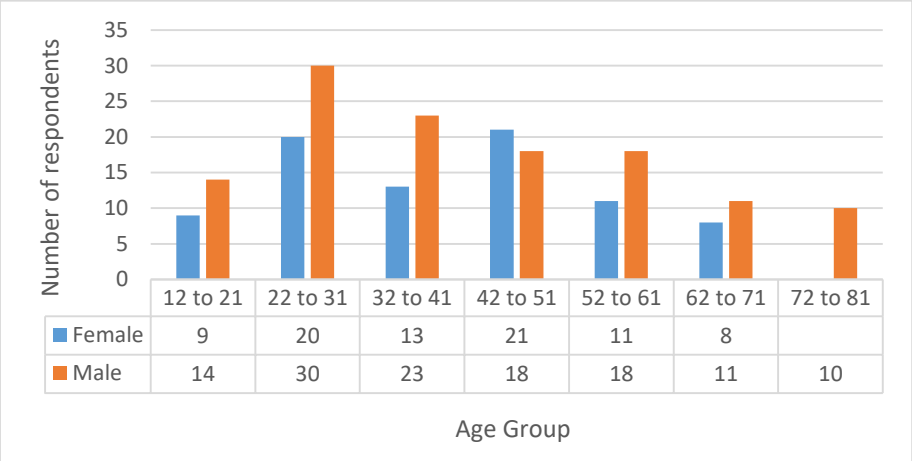


Figure 3 Respondent's age class distribution

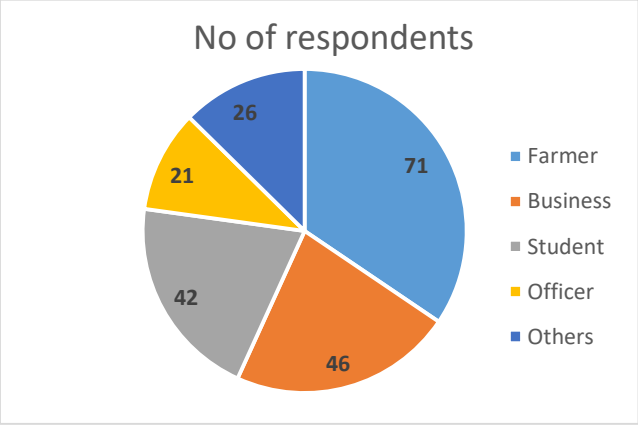


Figure 4 Respondent based on Occupation

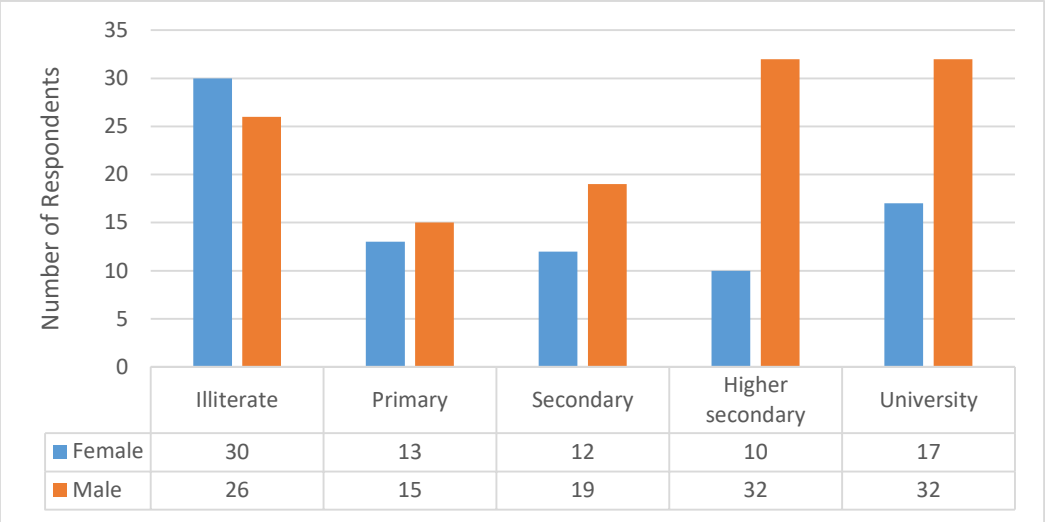


Figure 5 Respondents based on education level

4.2 Nature of Human Leopard conflict inside the Kathmandu Valley

The questionnaire survey done in 14 VDC showed that there was a high rate of goat depredation and dog uplifting in the area closer to the main forest (Figure 14, 15). Among 206 respondents 126 raised the livestock (dog, goat and cow). Among them, 49 responded raised only dog, 34 raised goat and cow, and 45 raised all of them. Along with it, respondents were asked whether they had seen or heard the sound of leopard in their locality in order to find out presence of leopard in their area. 68 respondent had directly sighted, 58 respondent had only heard leopard roar and 80 respondents had neither heard nor seen the leopard directly. Data suggested that high number of sighting occurred during spring (Chaitra, Baishak) and heard during winter (Magh, Falgun) (Figure 6).

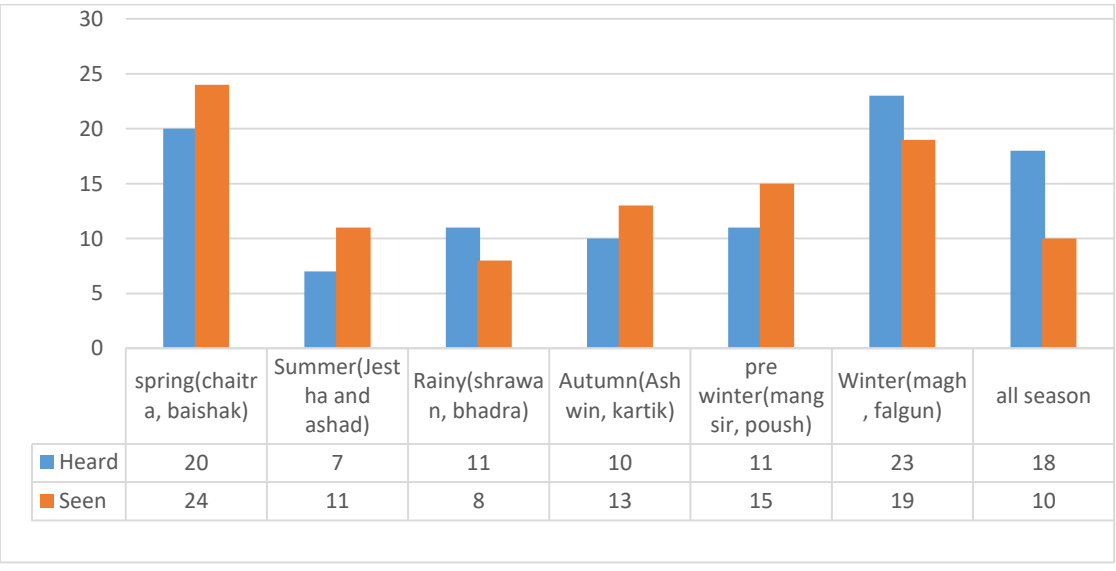


Figure 6 Respondent reporting sighting of leopard on the basis of season (%)

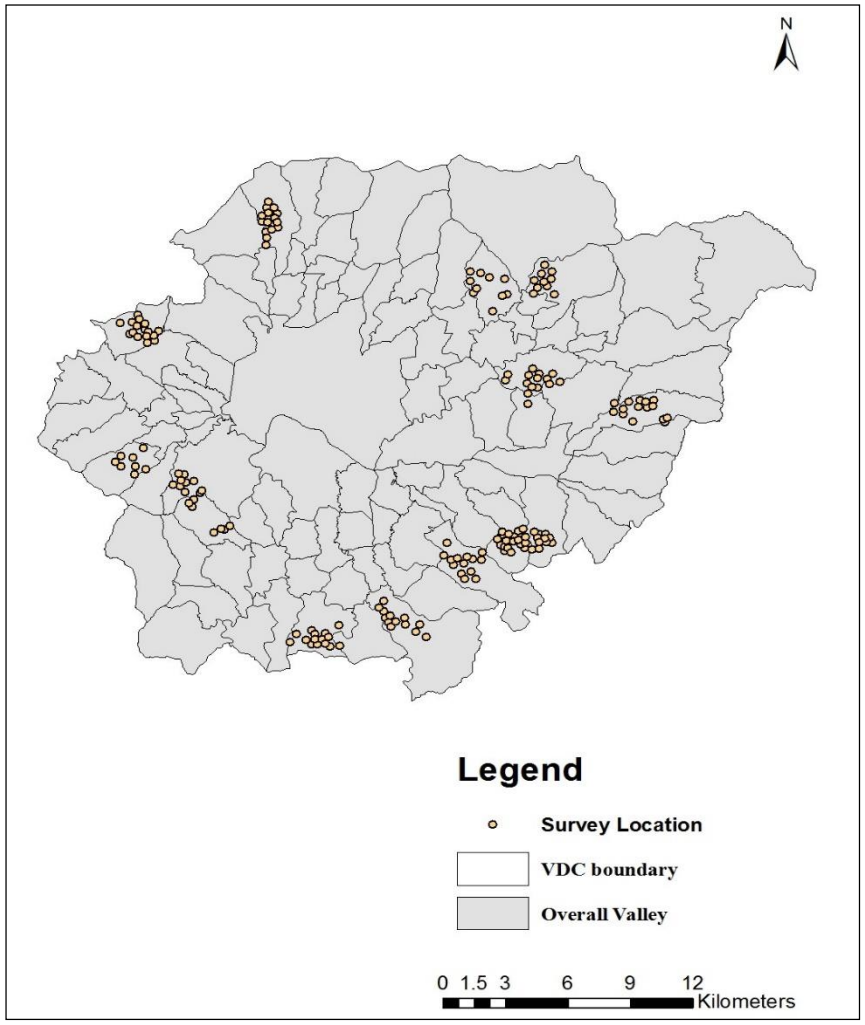


Figure 7 Location of Interview survey

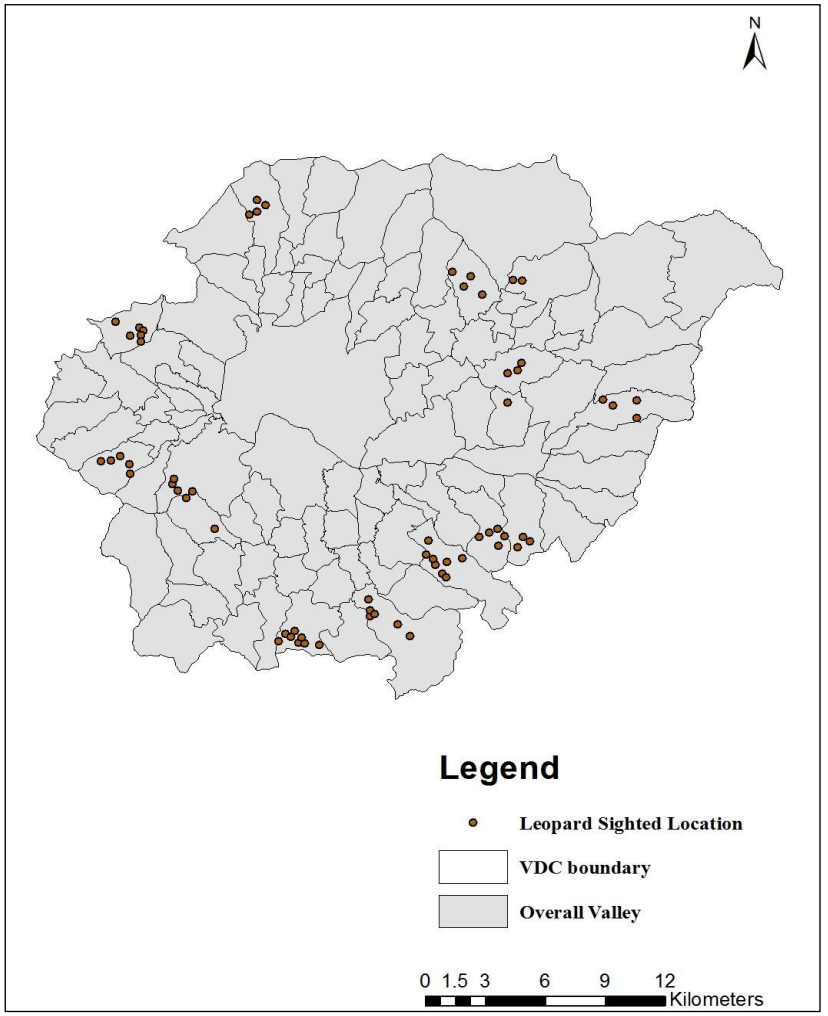
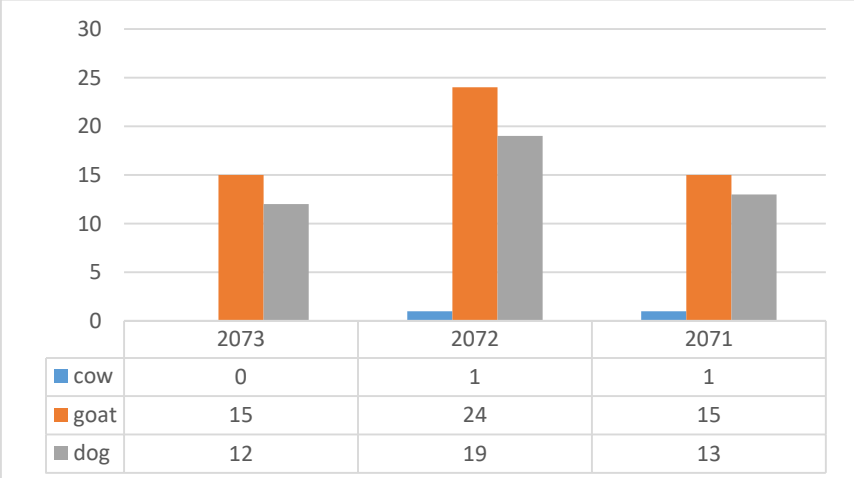


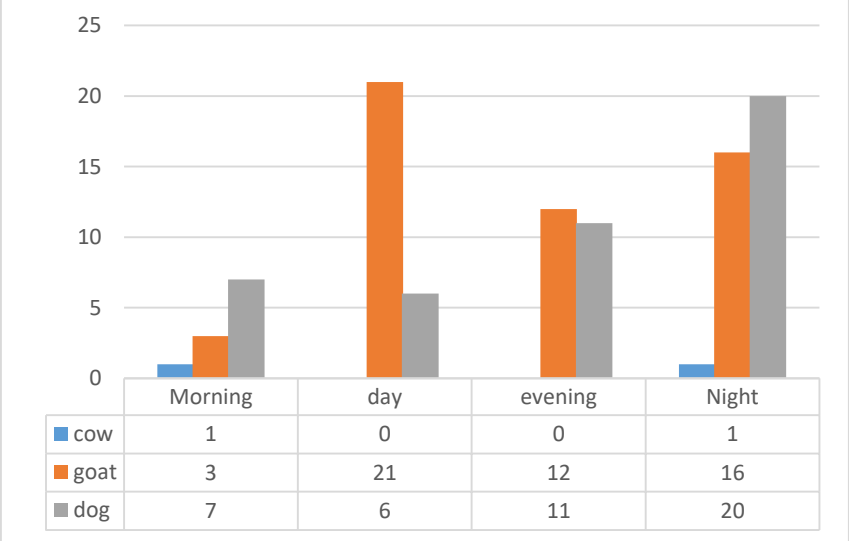
Figure 8 Leopard sighted Location

From total attack within past three year (2073, 2072, 2071 B.S) highest number of livestock depredation were recorded in the year 2072. Based on information from 126 respondents herding cattle's, 47 attacks on livestock were recorded where 14 dogs, 32 goats and 1 cow got killed. Similarly, 49 attacks on livestock were found to occur in the neighboring household of the respondents, among which 1 cow, 21 goat, and 27 dogs were depleted with 2 cows, 53 goats and 41 dogs depredation reported in total within past 3 year (figure 9). 15- 20% of depredation cases occurred during night hours however, goat depredation cases was reported to be high during day time (Figure 10).



	2073	2072	2071
cow	0	1	1
goat	15	24	15
dog	12	19	13

Figure 9 Animals depredated by leopard within past 3 year (%)



	Morning	day	evening	Night
cow	1	0	0	1
goat	3	21	12	16
dog	7	6	11	20

Figure 10 Time of Leopard attack on domestic animals (%)

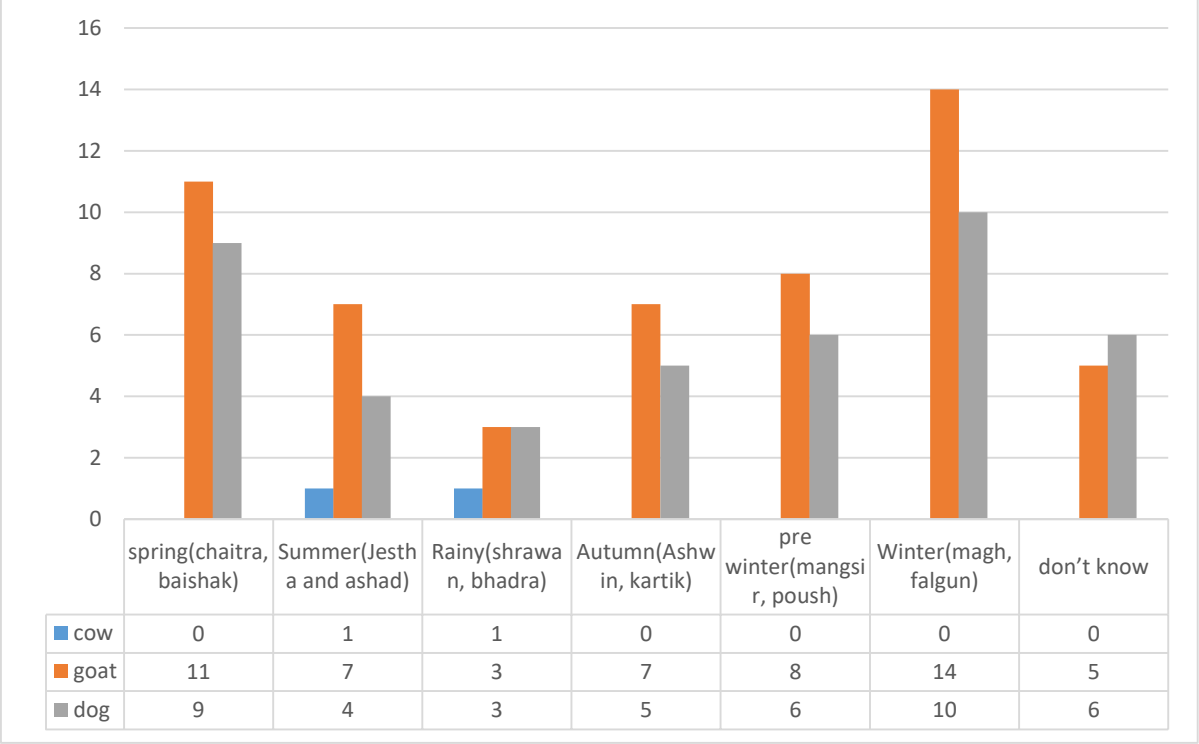


Figure 11 Season of leopard attack on domestic animals (%)

According to the data collected from various survey area regarding the goat depredation (n = 53), 44% (n = 23) depredation occurred in shed, 26 % (n = 14) in village while grazing and 30% (n = 16) in forest (Figure 12). Whereas most of the dogs who were in captivity inside the compound of the house were being attacked (Figure 13).

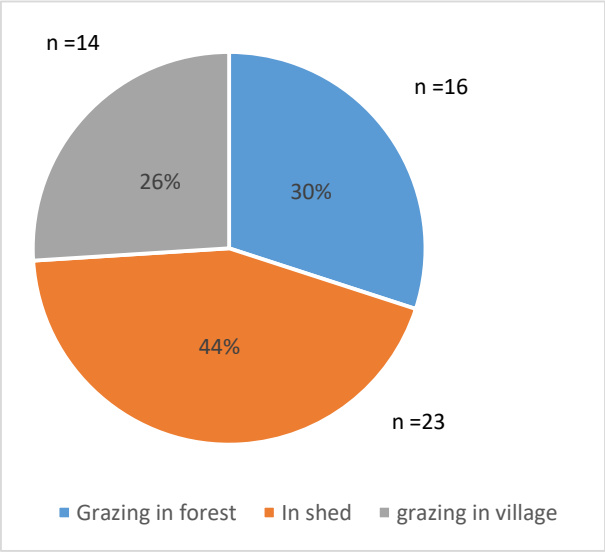


Figure 12 Attack Location for goat (%)

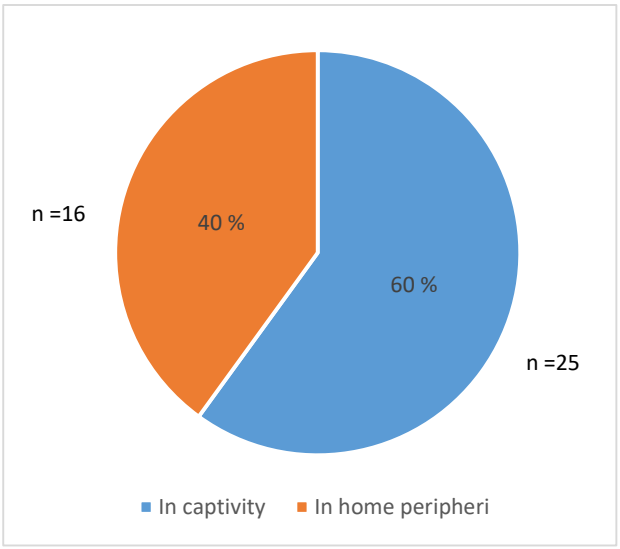


Figure 13 Attack Location for dog (%)

It was found that more livestock were taken where there wasn't a proper shed (open shed) during the absence of electricity. 23 respondents their goat was attacked inside the shed. Among them 6 responded that attack took place inside the closed shed with weak structure, 7 in open shed with just a roof and 10 in open shed respectively (Table 4).

Table 4 Proportion of attack on the basis of types of shed

S.N	**Type of shed**	**Proportion of attacks on goat (n= 23)**
1.	Closed shed with weak structure	0.26
2.	Open shed with roof	0.30
3.	Open shed	0.44

Data suggested that 24% (n = 10) of dog uplifting and 40% (n = 21) of goat depredation took place in the presence of herder or the owner where as 76% (dog) and 60% (goat) depredation occurred in the absence of the herder (Table 5). According to the survey data 35 respondent reported that the attack took place at night, out of which 43% of the attacks took place during the presence of electricity and 57 % in absence of electricity during night time (Table 6)

Table 5 Proportion of attack on the basis of herder presence

S.N	**Herder Presence**	**Proportion of attacks on dog (n = 41)**	**Proportion of attacks on goat (n = 53)**
1.	Yes	0.24	0.40
2.	No	0.76	0.60

Table 6 Proportion of attack in the presence of electricity

S.N	**Electricity presence**	**Proportion of attacks (n= 35)**
1.	Yes	0.43
2.	No	0.57

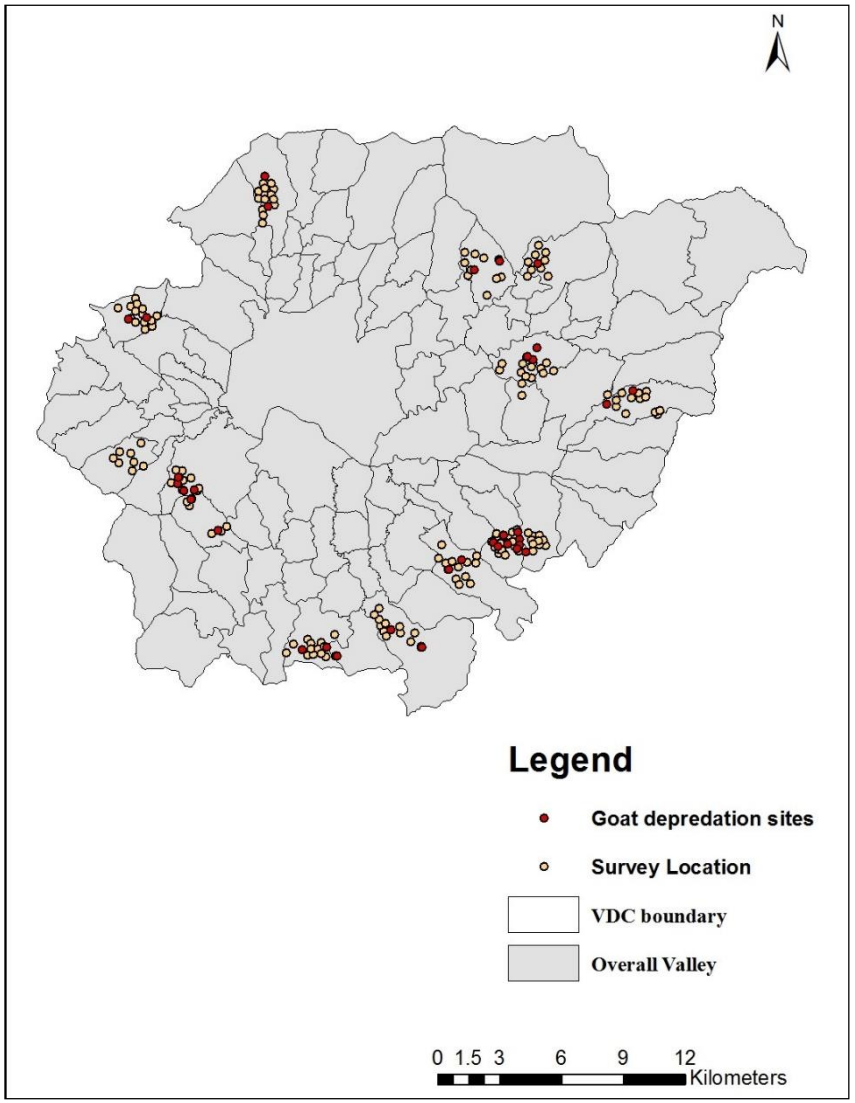


Figure 14 Location of Goat depredation sites

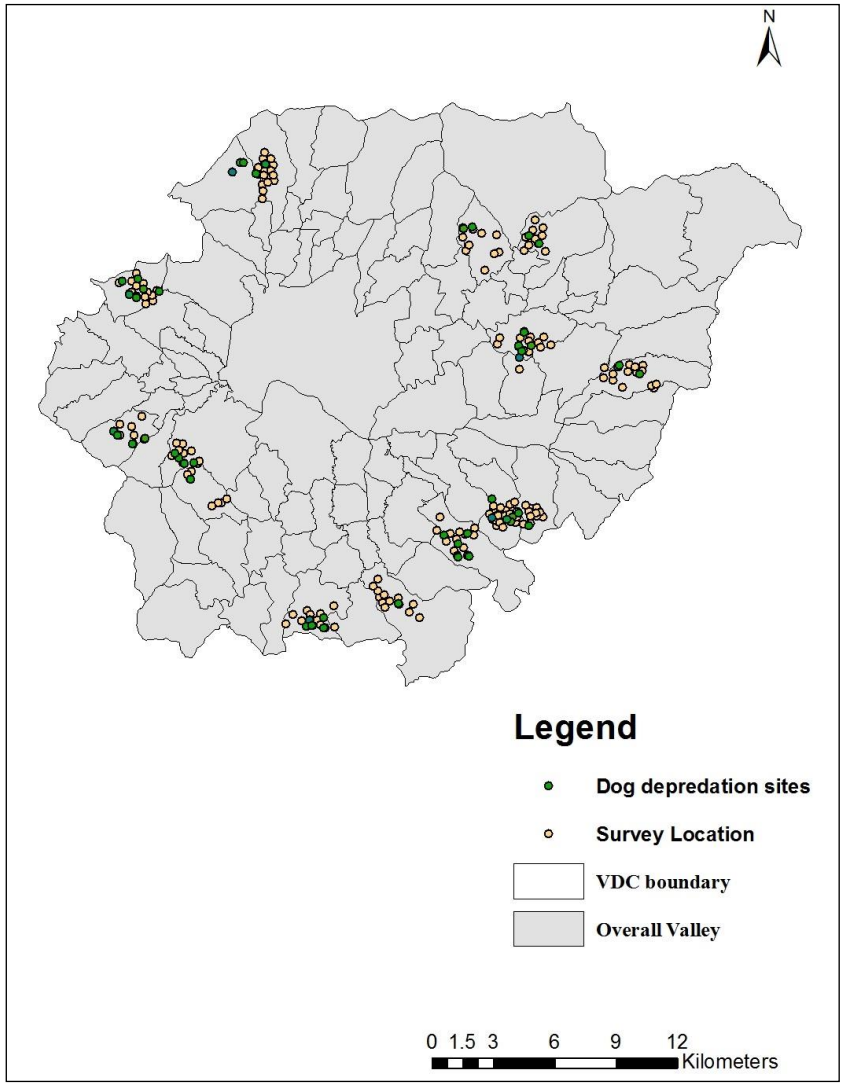


Figure 15 Location of Dog depredation sites

4.3 Number of dead leopard in Kathmandu valley

A total of 32 leopard were recorded to be dead in different sites of Kathmandu valley from year 2009 to 2016 based on the information from the district forest offices Kathmandu, Bhaktapur and Lalitpur district. Among those incidents highest number of deaths were found to occur in the year 2011 and lowest in the year 2015.

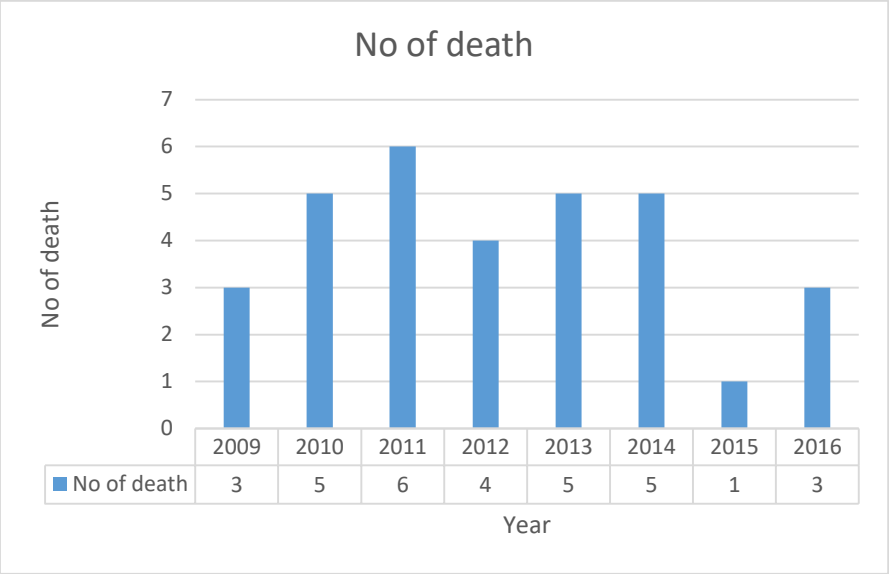


Figure 16 Number of Leopard death (2009-2016)

***(Source:** DFO Kathmandu/Bhaktapur/Lalitpur/Bhandari*

4.4 Perception of local people on leopard conservation

The respondents demonstrated positive thinking in leopard conservation, about 54 percent (n=112) liked leopard while 46% (n = 94) did not like them (Figure 17). Most of the people living near the forest area and those victimized from leopard attack didn't seems to have a positive response regarding leopard conservation. The results showed that, people tend to have knowledge about leopard being ecologically endangered species 52% (n = 107), where, 27% (n= 56) reported them being beautiful and charismatic, 7% (n = 14) responded with the leopard having religious value and 14% (n = 29) responded that leopard are the reason in developing tourism sectors in our country.

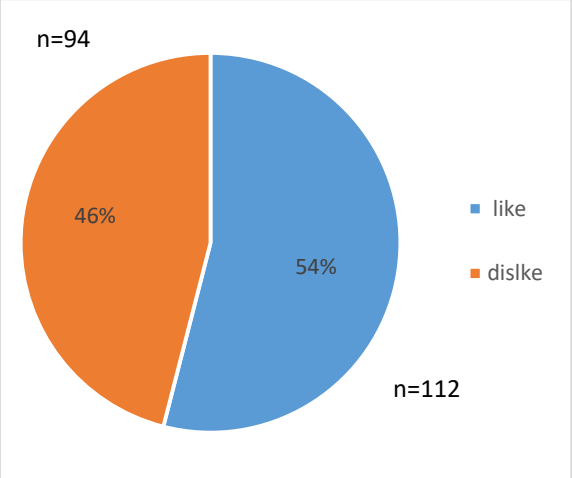


Figure 17 Perception of local people/Leopard like or dislike

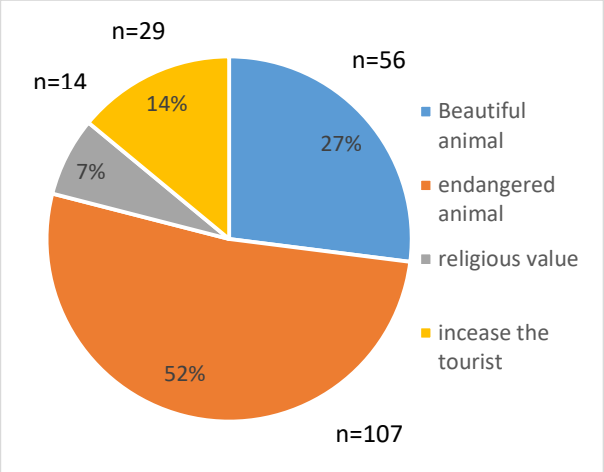


Figure 18 Perception of Local people regarding the like of Leopard

Regarding leopard conservation the comparison between perception of people (Likes and Dislikes) and their education level shows that (n = 36) high number of illiterate people doesn't seems to like leopard. As for the (n = 39) university level people most of them showed positive response in leopard conservation (Figure 19).

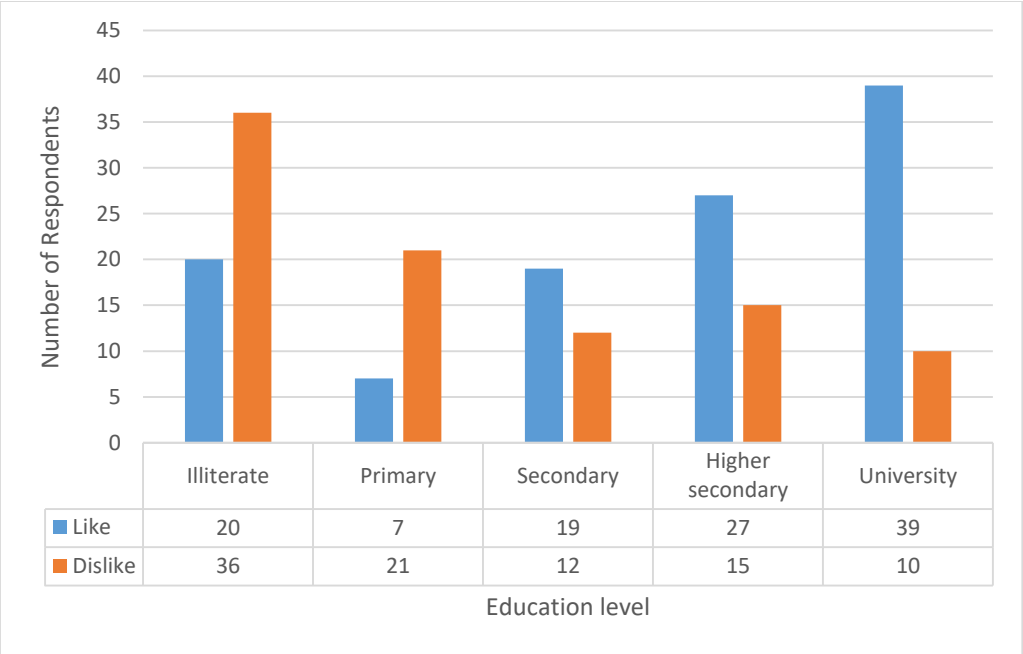


Figure 19 Perception of Local people based on their education level

Out of 94 respondents who didn't like leopard, the majority of them (53%) attributed that leopard might attacks human (children), hence they don't like them; 31% said leopard kill their livestock and 16% said both (Figure 20). Depending upon the people response, most of the people (37%, n = 77) wish to call the concerned authority to capture it and translocate to another

place where as 25% (n = 52) responded of taking precaution by themselves and few of the people wanted to kill the leopard if the number of attacks continues in the village (Figure 21).

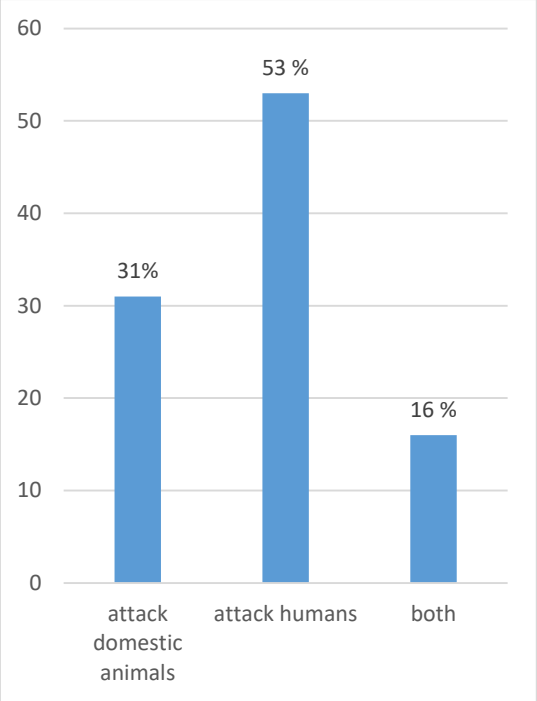


Figure 20 Perception of Local people regarding the dislike of leopard

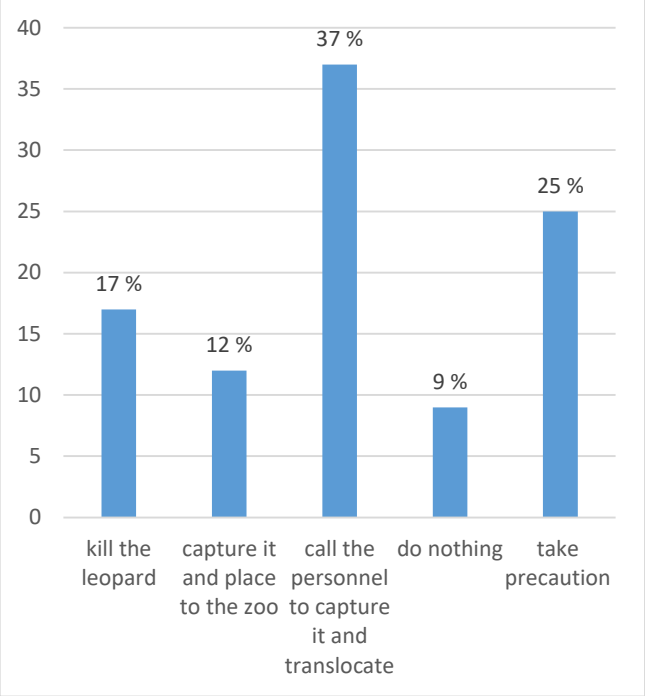


Figure 21 People perception on continuous attack or sighting of Leopard

Perception on leopard conservation was also determined using hypothesis test whether people's perception/attitude (like or dislike) were significant or insignificant based upon the education, gender and victims of leopard attack. It was found that education was significantly associated with people's perception on leopard conservation (Pearson chi-square=32.4186, df = 4, $p < 0.05$) where more people with high education supported the conservation of leopard. Similarly, perception on leopard conservation was also found to depend upon the attack (Pearson chi-square = 10.2696, df = 1, $p < 0.05$) Hence, the people who have been directly affected by the leopards had negative attitude regarding leopard conservation. Whereas, perception on leopard conservation and gender didn't show any significant difference (Pearson Chi-square = 3.5384, df = 1, $p < 0.05$) hence, the perception regarding leopard conservation was not found to be dependent on the gender of the people.

4.5 Tolerance to loss by common Leopard

To examine the tolerance level of local residents in the effort to conserve leopard, respondents were asked questions with responses as to whether they agreed or disagreed in supporting leopard conservation if one of their family members had been killed or injured by leopard or if they had lost livestock through leopard predation. More than half of the respondents (56%, n=115) were not in agreement with supporting leopard conservation if they had lost a family member or had been attacked by leopard (Figure 22). Overall, they were found to be positive in supporting leopard conservation (63%, n = 130) if they had lost only livestock (Figure 23).

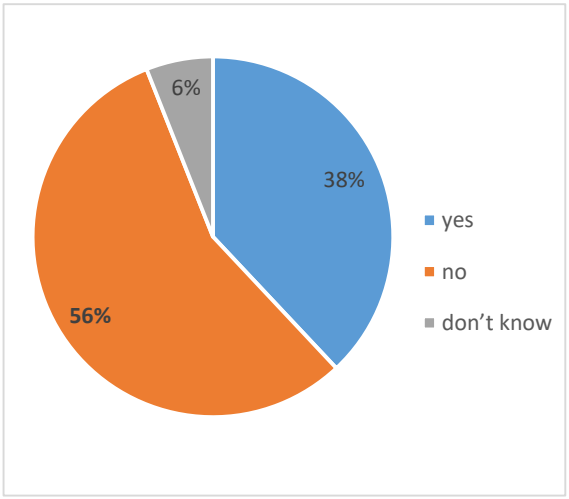


Figure 22 Tolerance of leopard attack if family member is attacked

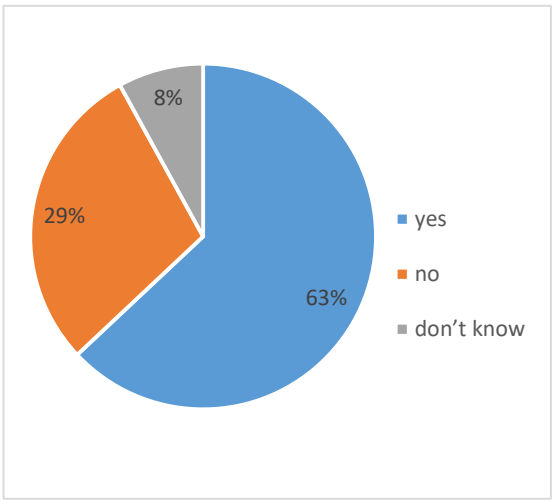


Figure 23 Tolerance of leopard attack if their livestock is only attacked

4.6 DISCUSSION

This study results into the fact that human leopard conflict exists in the study area which generally has primary consequences such as livestock depredation (dog, goat and cow) and the leopard deaths caused due to conflict between leopard and human living near the forest area. Leopard being timid animals, very few people have directly seen them in their natural habitat, but most of the people living close to the forest tend to hear and see them often (Bhandari, 2015). It was also found that people living in those areas were also primarily affected by leopard attack but there had been very few cases of humans attacked by leopard from different wards selected for this study, but attacks on dogs and other livestock such as goats were more prevalent.

Scat analysis indicated that consumption of dogs and goat were relatively higher in leopard diet as compared to wild prey (Bista, 2016). When human injury and death caused by leopard in Kathmandu valley is compared with other regions (such as Himanchal Pardesh and West-Bengal in India), the result shows that leopard attack on human in Kathmandu is not as severe as other regions (Bista, 2016). Thus presence of leopards in human landscape should not be viewed as "conflict", unless their presence invites direct threat to lives (Marker and Sivamani, 2009). Man eating animals which are serial killers and kills human deliberately should be classified as "problem animals" (Gurung, 2008).

Leopards being highly territorial animals when displaced, they have a tendency to seek out their original territory, which may be hundreds of kilometers away (Athreya, 2006). There is a general conception that Shivapuri-Naragjun NP (Northern part of the valley) has leopard population beyond its carrying capacity and therefore leopards are ranging in cities (Bista, 2016) but from this study it was found that human leopard conflict has also been prevalent not only in the northern but also in the southern part of the valley. Most of the conflict cases were found to be occurred in the areas adjoining since the human settlement over those areas are quite less in comparison to the areas closer to the central valley as well as the presence of the forest gives those predatory animal suitable cover to hunt and live (Bhattrai B. , 2009). Regarding the fact that Kathmandu being highly populated, lots of leopard sightings has occurred in recent years. There are a few ecological reasons for leopards to be found in the city and village of Kathmandu valley (Bista, 2016).

a) Amongst felids it is known that transient animals range wider in search of mate and territory (Smith, 1993).
b) Leopard could be breeding and raising cubs in human landscape (Athreya et al., 2015).
c) Few individual could be resident in human landscape (Athreya et al., 2015).

Other speculation might be that most of the households living nearby forest have started practicing the stall feeding method for their livestock's since grazing in the forest has been not allowed due to which leopard prey on stray dogs (Bista, 2016). According to Bista, (2016) lower livestock depredation and human attacks in Kathmandu is indicative that street dogs are playing important role to avoid direct interaction between leopard and people. From this study it is found that majority of the dogs depredation occurred in those household which were most held in captivity. People mentioned that home dog are also frequently attacked since they are easy to catch whereas stray dogs often live in group which makes the predation less obvious but the other study described that stray dogs are the accountable reason for the leopard attack incident raising inside the Kathmandu valley (Bista, 2016). Apart from that study done in Puma (*Puma concolor*) had shown that higher conflict occurred in areas which had lower wild prey (Polisar, 2003)

In the Kathmandu valley the translocation of leopards from their original place to another may be one of the causes of conflict due to habitat fragmentation (Bhattrai, 2015). Increasing encounter of leopards in the settlements nearby forest is due to the declining state of forest with loss in its natural prey (Athreya et al., 2007). When leopards enter the village area it may get habituated there due to the presence of accessible prey and may not to return back to their natural habitat (Athreya et al., 2007). The extent of support and participation of people in the conservation of carnivores largely depends on how they place value on these predators (Gusset, et al., 2009).The study found that the perception of people regarding leopard conservation is directly dependent upon the education level and the severity of the attacks, where educated and non-victimized people were found to be more positive in the leopard conservation than illiterate and victimized people (Bhattrai B. , 2009). Generally people living closer to the forest area have negative attitude regarding leopards since, they are more concerned of carnivores attack on their children.

CHAPTER 5
SUMMARY AND CONCLUSION

5.1 Summary

Human leopard conflict being general issue since past times is regarded as one of the major problem that conversationalist and other related institution are facing inside the Kathmandu valley. High number of Leopard attack and death has been reported within the valley in past years which is indicative sign of habitat change of the Leopard. This study generally intents to find out the current situation of Human Leopard conflict and evaluate the attitudes of the Local people regarding the leopard conservation within the study area. In order to achieve the target information the study area selected on the basis of previously conflict sites recommended by DFO of Kathmandu, Bhaktapur and Lalitpur district where random questionnaire sampling was done.

Using purposive sampling method, 14 VDC from which 27 ward closer to the nearby forest boundary inside the Kathmandu Valley were sampled (covering 5% of the total population from the selected wards). From these wards 206 respondents during March 2017 to May 2017 were interviewed out of which 38.61% were female and 61.39% were male. Data suggested that high number of sighting occurred during spring (Chaitra, Baishak) and heard during winter (Magh, Falgun) and the rate of goat depredation and dog uplifting was also quite high in the area closer to the main forest. About 15- 20% of depredation cases occurred during night hours however, goat depredation cases reported to be high in day time. Most of the cases of goat depredation was found to be occurred at shed, rather than in village while grazing in the forest due to the lack of predator proof shed and absence of electricity. Most of the domestic dog uplifting took place inside the compound of house while they were chained. Data also suggested that the dog uplifting and goat depredation was directly linked with herder presence since, high number of depredation took place in the absence of the herder.

This study indicate that the effort for the conservation is dependent upon the people attitude towards the leopard, since most of the educated people and those who lives far from the nearby forest has got the positive response towards conservation while other has got negative. It has also been found that more than half of the respondents (56%, n=115) were not in agreement with supporting leopard conservation if they had lost their family member or had been attacked by leopard.

5.2 Conclusion

The results from questionnaire and other similar studies showed the existence of the major human leopard conflict inside the Kathmandu valley. Those conflict are found to be occurring at different parts of the valley rather than in vicinity of SNNP area. It has been found that human–leopard conflicts are increasing in the Kathmandu Valley due to lack of conservation awareness, natural prey depletion, poaching and natural disaster such as earthquake along with its habitat change which is one of the important factor driving those animals to come to the human settlements. High number of leopard sighting of the leopard occurs during winter and spring season which might be the cause due to the lack of availability of food and water forcing them to travel from forest to human settlement area. The ratio of goat depredation is quite higher than domesticated dogs due to the fact that goat are easy prey than dogs. Apart from that most of goat depredation occurs inside shed rather than in other places majorly in absence of herder and electricity because higher number of people have started stall feeding since, grazing inside forest is mostly prohibited. Generally conflict arise between both human and leopard where attack on human is quite less than in comparison to the attack on livestock, however human are more affected by leopard in case of livestock depredation. Leopard conservation is primarily dependent upon the education with people of higher education category being more positive towards leopard conservation whereas majority of people have got negative perception on leopard thinking that they might attack on their children.

5.3 Recommendation

a. **The Local People should be encouraged to Follow Proper Methods of Guarding their Livestock against the Predation of the Leopards:** Local people must be encouraged to follow appropriate methods other than killing the predator to save their livestock. Proper day guarding of the livestock by cowherd in the grazing lands, proper fencing of cow sheds and not using the leopards prime habitat for the grazing purposes are a few methods which can be used in the area.

b. **Regular Monitoring of the Conflict Levels should be Carried Out by the Concerned Authorities:** The leopards can be regularly monitored with the help of various techniques such as radio collaring, sign monitoring, and so on for their dietary, spatial and ecological behavior. When these are seen nearby the settlement areas, timely action can be taken to avoid any unwanted situation that may arise. Moreover, the same technique can be used to carry out further researches on leopards.

c. **Maintain and record the data of leopard incidents:** Maintain the data /records of number of leopards trapped and rescued and the proximity of these sites where the conflict occurred in order to analyze human-leopard conflict patterns inside the Kathmandu valley.

d. **Habitat conservation of common leopard must be of major focus to reduce the human Leopard conflict in future:** Habitat conservation is one of the important strategies in conservation of animals and the reduction of conflict, thus habitat in and around of Kathmandu valley should be conserve. Similarly, the promotion of proper and effective corridor management could lessen the chances of conflict wildlife corridors would ensure that if the leopards ever lose their way, they can find their way back without being seen and thus, avoid a situation of conflict. Further research on the availability of natural prey species of common leopard habitat and also major carnivores are essential.

e. **Identify the alternative source of energy for the local people to reduce their dependency upon forest:** Local peoples are using park and some community forest for resources collection, therefore its dependency on forest should be control. Therefore, Government of Nepal and some stakeholder agency should be conduct solar energy and bio gas energy in respect to control park and community forest.

f. **Installation of solar street lamps in "Sensitive areas":** "sensitive areas" such as natural and artificial features which the leopards use during night hours to range in human settlements such as rivers, nalas, forest patches near the village etc. Those street lights are thus useful to increase the visibility during night hours thus helping the people spot the animal from safer distance and take necessary precaution measures.

G. Improvement in shed type and husbandry practice: Physical barrier such as construction of 4 retention walls and a roof can be effective measure to minimize livestock depredation. Brining change in grazing behavior of farmers would be important in reducing conflict as well.

APPENDICES

APPENDICES 1: Sampled VDC's and Wards with the number of households present

S.N.	District	VDC	Ward	Total Household
1	Lalitpur	Chapagaun	1	207
			7	354
		Godawari	6	164
			9	80
		Lamatar	1	190
			6	143
2	Bhaktapur	Bageshwori	4	103
			5	129
		Changunarayan	6	77
			7	164
		Gundu	2	114
			3	191
		Sipadol	4	200
3	Kathmandu	Bhimdhunga	5	44
			7	72
			2	81
		Chalnakhel	2	74
			7	88
		Gagal phedi	2	191
			9	35
		Kabresthali	2	135
			4	100
		Kirtipur	7	700
		Matatirtha	3	19
			8	57
		Nayapath	3	100
			8	151
	Total	**14**	**27**	**3982**

(Source: Central Bureau of Statics, 2011)

APPENDICES 2: Leopard Incidents

1. Incidents of Leopard in Kathmandu valley from December 2014 to March 2017

S.N	Date	Place, District	Status of Leopard	
1	2014/12/23	Thankot (Matatirtha CF)	Injured(rescued)	Taken to zoo
2	2014/08/08	Bhaktapur	3 cubs Rescued	Taken to zoo
3	2015/02/17	Kapan (Kathmandu)	Rescued	chased away
4	2015/06/21	Dakshinkali (Kathmandu)	Dead	
5	2015/06/28	Gokarneshwor (Kathmandu)	Rescued	Taken to SNNP
6	2015/10/31	Samakhusi (Kathmandu)	Rescued	Taken to zoo
7	2016/01/09	New baneshwor (Kathmandu)	Rescued	Taken to SNNP
8	2016/01/22	Kirtipur (Kathmandu)	Rescued	Taken to SNNP
9	2016/02/20	Suryabinayak (Bhaktapur)	Dead	
10	2016/04/20	Chandragiri (Kathmandu)	Cub rescued	Taken to zoo
11	2016/06/01	Link Marg (Kathmandu)	Rescued	Taken to SNNP
11	2016/07/22	Chandragiri (Kathmandu)	Dead	
12	2016/07/30	Dakshinkali (Kathmandu)	Dead	
13	2017/01/23	Kirtipur (Kathmandu)	Rescued	Taken to Chitwan
14	2017/02/21	Gotathar (Kathmandu)	Rescued	Taken to nearby forest
15	2017/03/25	Changunarayan (Bhaktapur)	Rescued	Taken to zoo

(Source: *DFO Kathmandu/Lalitpur/Bhaktapur)*

2. Other incidents of leopard in the Kathmandu Valley:

S.N	Place, District	Status of Leopard
1	Chobar (Kathmandu)	Dead
2	Chalnakhel (Kathmandu)	Rescued
3	Kavresthali (Kathmandu)	Dead
4	Thankot (Kathmandu)	Rescued

5	Baluwa (Kathmandu)	Dead
6	Arubari (Kathmandu)	Rescued
7	Changunarayan (Bhaktapur)	Dead
8	Balkot (Kathmandu)	Rescued
9	Tikathli (Kathmandu)	Rescued
10	Lubhu (Lalitpur)	Rescued
11	Gothatar (Kathmandu)	Death
12	Mrigasthali (Kathmandu)	Rescued
13	Swechatar (Kathmandu)	Rescued
14	Ramkot (Kathmandu)	Dead
15	Kirtipur (Kathmandu)	Rescued
16	Vimdhunga (Kathmandu)	Dead
17	Pharping (Kathmandu)	Rescued
18	Gokarna (Kathmandu)	Dead
19	Budhanilkantha (Kathmandu)	Dead
20	Gagalphedi (Kathmandu)	Dead
21	Danchhi (Kathmandu)	Rescued
22	Maharajgunj (Kathmandu)	Rescued
23	Jitpurphedi (Kathmandu)	Dead
24	Banasthali (Kathmandu)	Rescued
25	Balaju (Kathmandu)	Rescued
26	Sesnarayan (Kathmandu)	Dead
27	Pataldhonse (Kathmandu)	Dead
28	Pharping (Kathmandu)	Dead
29	Dahachowk (Kathmandu)	Rescued
30	Sallaghari (Bhaktapur)	Rescued
31	Sipadol (Bhaktapur)	Rescued
32	Jhaukhel (Bhaktapur)	Dead
33	Chhaling (Bhaktapur)	Dead
34	Jharuwarasi (Lalitpur)	Rescued
35	Godawari (Lalitpur)	Rescued

Source: *DFO Kathmandu/Lalitpur/Bhaktapur, Pokhreal*

APPENDICES 3: People Perception

1. Perception of people (like and dislike) based on their education level

Education level	Like	Dislike	Total
Illiterate	20	36	**56**
Primary	7	21	**28**
Secondary	19	12	**31**
Higher secondary	27	15	**42**
University	39	10	**49**
Total	**112**	**94**	**206**

2. Perception of people (like or dislike) based on gender

Gender	Like	Dislike	Grand Total
Male	38	44	82
Female	74	50	124
Grand Total	**112**	**94**	**206**

3. Perception of people (like or dislike) based on age group of the people

Age group	Like	Dislike	Total
12-21	17	6	23
22-31	34	16	50
32-41	23	13	36
42-51	17	22	39
52-61	12	17	29
62-71	5	14	19
72-81	4	6	10
Total	**112**	**94**	**206**

4. Human attack by leopard based on questionnaire survey

Name of victim	VDC/Municipality	ward	Attack nature
Rama Maharjan	Kirtipur	3	injured
Kali Prasad sitwal	kirtipur	7	injured
Renu basnet	Lamatar	6	Dead
Bir Man Pun	Lamatar	6	injured

APPENDICES 4: Interview Datasheet

Name……..... Age……. Gender……Male…….Female

Surname……. District/VDC……. Ward…….

Location G.P.S…….N ……E Elevation……..m

Date……. Start time…….. End time…….

1. How many members are there in your family?
   A. Male…… B. Female…… C. below 15 years old……
2. What is your family occupation?
   A. Job B. Farming C. Business D. Others…
3. What is your education level?
   University Higher Secondary Secondary Primary Illiterate
4. How much land do you have? ..... (Ropani/ anna/ Katha/ Hectare)
   Farming: Done…. Not done…… (Main crop)……..
5. Do you think there is leopard in this village? A. Yes B. No (Skip to 9)
   How did you come to know? A. Seen with own eyes B. Heard via someone
   C. Footprints D. Heard noises E. Tooth and nails marks on cattle
6. Have you seen any leopards in the past 4 years?
   A. Yes B. No (If yes, where…… GPS ……..lat……long…….. month.)
7. At what time did you see the leopard?
   A. Evening B. Morning C. Noon D. Night
8. How many times do you see leopard in a year?

	Number	**In which month mostly heard/seen**	**If seen on farmland, in which plantation**
Footprints			
See leopard			
Only hear noises			

   A. Yearly seen >1 B. Seen once in a year C. Never seen in year
9. Do you have any pets/ cattle's in your home? A. Yes B. No (Skip to Dog in 9 and then to 24)

Livestock	**2 years ago(2071)**	**1 year ago(2072)**	**Present year(2073)**

Cow, ox			
Buffalo			
Goat			
Chickens			
Dogs (100m periphery)			

10. How do you raise your cattle's?

    A. A herder goes along with cattle's into the forest B. Cattles are taken into the jungle without herder C. Fodders brought in their shed D. Nearby village area only E. Others…….

11. Has leopard ever harmed your cattle's? A. Yes B. No (skip to 24)
12. How did you find out about the predator animal? Footprints/ seen with own eyes/ teeth or nails prints/ heard noises
13. If yes, how many?

Livestock	**2 Years ago (2071)**	**1 year ago (2072)**	**Present year (2073)**
Cow, ox			
Buffalo			
Goat			
Chicken			
Dogs (100m periphery)			

14. What time did the leopard attack take place?
15. A. Evening B. Morning C. Afternoon D. Night
16. GPS location: …….. Lat …….Long
17. Where did the attack take place? A. In the forest while grazing (skip to 17) B. In the shed (skip to 18) C. In village while herding (skip to 20) D. Others
18. Were there presence of herder during attack in jungle and grazing? A. Yes B. No
19. If the attack took place in shed, what type of shed was present? A. Surrounded by walls in all 4 sides B. Only presence of roof with open space C. Kept outside without shed
20. Was there presence of lights in shed? A. Presence of light B. Absence of light
21. Why do you think leopard came up to your village for preying?

A. Less game animals in jungle B. Human encroachment C. Deforestation D. Natural disaster E. Others

22. How do raise your cattle's now? A. Grazing in forest in presence of herder B. Grazing in forest without herder C. Fodders brought in shed D. Grazing in village area E. others
23. Did you take any precaution measure during leopard attack? A. Yes B. No (skip to 24)
24. If yes, what types of measures were applied? A. Fencing the area B. keeping light bulbs in shed and homes C. electric fence D. Built walls surrounding homes and shed E. Others
25. Do you know if your neighbor's animals were also attacked?
    A. Yes (return to 13) B. No (skip to 32)

Human casualties

26. Has leopard attacked you? A. Yes B. No
27. If yes, what type of surrounding was present? A. Jungle roads B. Open roads C. Nearby river banks D. Near settlements E. In plantation field
28. GPS of the attacked location …….N …….E
29. Number of dogs in the place of attack? .....
30. When did the attack take place? A. In the jungle during collection of fodders B. Walking through the jungle roads C. Near human settlements D. During herding of cattle's in jungle E. Trying to capture leopard in jungle F. Others
31. At what time did the attack take place?
    A. Morning B. Afternoon C. Night (skip to 31)
32. What was the condition of electricity?
    A. Presence of electricity B. Absence of electricity
33. Has leopard ever attacked any of your family members? A. Yes B. No
34. If yes, then? A. Normal casualties B. Death
35. GPS of the attacked location?.....N ……E
36. Name of the victim family member?
    Name…….. Address…….
37. Details of the victim A. Age: …….. B. Gender……..
38. When did the attack take place? A. In the jungle during collection of fodders

B. Walking through the jungle roads C. Near human settlements D. During herding of cattle's in jungle E. Trying to capture leopard in jungle F. Others

39. Do you know any other victim of leopard attack?
    A. Yes (return to 33) B. No

Compensation

40. Do you know if the government compensates the victim of the leopard attack?
    A. Yes B. No
41. If you know about the government compensation, have you approached Forest department or national park for compensation? A. Yes B. No
42. Has any personnel from National Park or Forest department come to gather information?
    A. Yes B. No
43. If application was filed for compensation, did you get compensation?
    A. Yes B. No
44. For what did you get compensation? A. For livestock B. For human casualties
45. How much did it take to get compensation?
    …….Years …….months

People's attitude and their perspective in leopard conservation

46. Do you like leopard? A. Yes (Conservation) B. No (Migrate/ remove)
47. Why do you like leopard? A. Because it's good animal B. rare species C. Religious belief D. Tourisms attraction
48. Why do you dislike leopard? A. Human casualties B. Livestock casualties
49. Have you ever heard of leopards death or poaching? A. Yes B. No (skip to 55)
50. If yes, then?.....when ……..where …….how
51. If leopard attacks any of your family members, will you still be positive toward its conservation? A. Yes B. No C. I don't know
52. If leopard attacks your livestock, will you still be positive toward its conservation? A. Yes B. No C. I don't know
53. If leopard is causing terror in your village then, what would you like to do? A. Kill that leopardB. Capture and caging C. Calling responsible authority D. Set free in jungle

APPENDICES 5: Photo plates

Survey done in Kirtipur, Panga

Survey done in Machhegaun, Kathmandu

Survey done in Lalitpur, Lubhu

Survey done in Lalitpur, Lamatar

Survey done in Bhaktapur, Changunarayan

Survey done in Bhaktapur, Bajrabarahi

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BIOGRAPHICAL SKETCH

The author was born on 14th may, 1994 in Kirtipur Municipality - 10, Kathmandu, Nepal. He is elder son of Mr. Birendra Maharjan and Mrs. Ratna devi Maharjan. He completed his School Leaving Certificate (SLC) from Pushpasadan Boarding High School, Kirtipur, and Kathmandu in 2010 A.D. He received his High School degree from St. Xavier's college, Maitighar, Kathmandu in 2012 A.D. The author got an opportunity to pursue Bachelor's degree in Forestry Science (B.Sc Forestry) in merit scholarship from Agriculture and Forestry University, Faculty of Forestry, Hetauda. The author is an innovative person with keen interest in research works. He always opts for excellence and wishes to contribute to the nation through his Excellency and hard work