HUMAN WILDLIFE CONFLICT IN THE BUFFER ZONE OF CHITWAN NATIONAL PARK
(A case study of Bharatpur Metropolitan City)

Submitted By
Prashanta Adhikari
TU Regd. No: 5-2-19-577-2007
TU Examination Roll No: 35-070/72
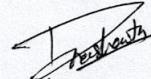Batch: 2070/72

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DECLARATION

I hereby declare that the work presented in this thesis has been done by myself, and has not been submitted elsewhere for the award of any degree. All sources of information have been specifically acknowledged by reference to the author(s) or institution(s).

Date. 2077-04-08

Signature

Prashanta Adhikari

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TRIBHUVAN UNIVERSITY
CENTRAL DEPARTMENT OF ZOOLOGY
Kirtipur, Kathmandu Nepal

RECOMENDATION

This is to recommend that the thesis entitled "**HUMAN WILDLIFE CONFLICT IN CHITWAN NATIONAL PARK (A case study of Bharatpur Metropolitan City, Chitwan, Nepal)**" has been carried out by Mr. Prashanta Adhikari for the partial fulfillment of Master's Degree of Science in Zoology with special paper "Ecology and Environment". This is his/her original work and has been carried out under my supervision. To the best of my knowledge, this thesis work has not been submitted for any other degree in any institutions.

Date: 2077-4-10.

MKChalise

....
Prof. Dr. Mukesh Kumar Chalise
Central Department of Zoology
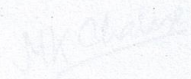Tribhuvan University
Kirtipur, Kathmandu, Nepal

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LETTER OF APPROVAL

On the recommendation of supervisor "Prof. Dr. Mukesh Kumar Chalise" this thesis submitted by Mr. Prashanta Adhikari entitled "**HUMAN WILDLIFE CONFLICT IN CHITWAN NATIONAL PARK (A case study of Bharatpur Metropolitan City, Chitwan,Nepal)**" is approved for the examination and submitted to the Tribhuvan University in partial fulfillment of the requirements for Master's Degree of Science in Zoology with special paper "Ecology and Environment".

Date.2097-04-14th

....
Prof. Dr. Tej Bahadur Thapa
Head of Department
Central Department of Zoology
Tribhuvan University
Kirtipur, Kathmandu, Nepal

TRIBHUVAN UNIVERSITY
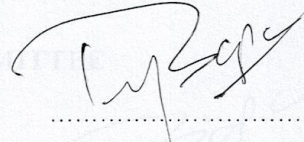**CENTRAL DEPARTMENT OF ZOOLOGY**
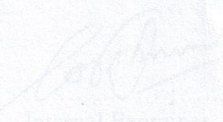Kirtipur, Kathmandu Nepal

CERTIFICATE OF ACCEPTANCE

This thesis work submitted by Mr. Prashanta Adhikarientitled"**HUMAN WILDLIFE CONFLICT IN CHITWAN NATIONAL PARK (A case study of Bharatpur Metropolitan City, Chitwan District Nepal"** has been accepted as a partial fulfillment for the requirements of Master's Degree of Science in Zoology with special paper "Ecology and Environment".

EVALUATION COMMITTEE

....
Supervisor
Prof. Dr. Mukesh Kumar Chalise

....
Head of Department
Prof. Dr. Tej Bahadur Thapa

....
External Examiner
Jhamak B. Karki, PhD

....
Internal Examiner
Laxman Khanal, PhD

Date : 2077- 07-23

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ACKNOWLEDGEMENT

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LIST OF ABBREVATION

$:Dollar

° C   :Degree Celsius

ACAP: Annapurna Conservation Area Project

BZ:Buffer Zone

CA   :Conservation Area

CDZ:Central Department of Zoology

CBS   :CentralBureau of Statistics

CITES:Convention of international Trade in Endangered Species of wild Flora
and fauna

CNP :Chitwan National Park

DNPWC:Department of National Parks and Wildlife Conservation

GCA:Gaurishanker Conservation Area

GON:Government of Nepal

ICIMOD:International Centre for Integrated Mountain Development

IUCN:International Union For Conservation of Nature and natural resources

KG:Kilogram

KNP:Khaptad National Park

 KTWR:Koshi Tappu wildlife Reserve

m:Meter

MBCA:Makalu Barun Conservation Area

NGO:Non-Governmental Organization

NTFP:Non-Timber Forest Product

PPP:Park People Program

Rs: Rupees

SNP:Shuklaphanta National Park

Sp:Species

ShNP   :Shivapuri National Park

Sq.Km   :Square Kilometer

TU:Tribhuwan University

UNDP:United Nations Development Programme

UNESCO:United Nations Educational Scientific and Cultural Organisation

VDC:Village Development Committee

ABSTRACT

The study entitled Human Wildlife Conflict in Buffer Zone of Chitwan National Park Nepal-(A case study of Bharatpur Metropolitan City) was carried out in the year 2017-2019 for the study of field problems and mitigation measures. The study area was Bharatpur Metropolitan city ward no.6,13,22,23 which lies in the western part of Chitwan National Park.Among these wards also our study focused on the border area of the chitwan national park and buffer-zone forests.250 household of four wards were selected for the survey.Research methodology(RM) used for the study was field visit,questionnaire survey.

Human wildlife conflict were observed in the area near or attached to the park.Crop and livestock depredation were the major problems found during the study period.Among wildlifes,Ninemajor faunas are regarded as the most conflict carrier. Conflict caused by Monkey was very highin every sites.The crops and livestock depredation was mainly caused due Rhino,Elephant,wild-boar,monkey,porcupine, rats and wild Birds.The major reason behind the conflict can be detected as the border encroachment by Human settlements and the grazing of livestock's Freely in the park area.

The human casualty by wildlife was mainly caused by tiger,rhino,elephant etc.The common fauna that causes huge the crops as well as human lives is elephant,tiger and rhino.The survey of 250 households showed up that there was total economic loss of Rs.22,09,270 in the area of four wards.The average loss of each household in ward no.6 is Rs.3320 and Ward no 13 is 8005.58,ward no 22 is 15560.22 and ward no 23 is Rs.12752.42.Paddy was the most affected crop in that area with the yearly loss of Rs.12,77,200.The human casualty by wildlife were found 9 several cases by Tiger,Rhino and Elephant,where two were fatal conflict.

Human wildlife conflict exists in all wards but the intensity,types and species is different.Various intervention methods were used by farmers .Thet effectiveness was found at shouting,chasing with fire and heavy lights.I recommend to use the permanent fencing in the most affected areas and to increase the sense of conservation,compensation policy should be reformed and the ratio of amount loss and compensataion paid should be increased.

1. INTRODUCTION

1.1. Background

Human-wildlife conflict refers to the interaction between wildlife and humans that results in negative effects on social, economic or cultural life of humans, on the conservation of wildlife populations, or on the environment. Human-wildlife conflict is one of the most complex challenges facing conservationists and local land users around national parks and wildlife reserves globally. This is especially the case, and worst, where people's livelihood directly depends on the forest products, agricultural activities, and other land uses in the buffer zones of the national parks as in the Chitwan National Park (Banikoiet al 2017). Globally, Human– wildlife conflict is a growing problem for communities located at the borders of protected areas (Ogra 2008). HWC takes many forms including crop or property damage, livestock predation and animal attacks on people (Awasthi 2014; Ogra and Badola 2008).Conflict arises due to crops damage by wildlife, livestock depredation, property losses, human casualty and poaching of wildlife by the people (Ayadi 2010). Human-wildlife conflict is defined as any interaction between humans and wildlife that results in negative impacts on human social, economic or cultural life, on the conservation of wildlife populations, or on the environment. Human-Wildlife Conflict or negative interaction between people and wildlife has recently become one of the fundamental aspects of wildlife management as it represents the most widespread and complex challenge currently being faced by the conservationist around the world (Ayadhi 2010; Awasthi 2014).

When people occupied or approached to the place/resources, because of the loss, degradation and fragmentation of habitats through human activities such as, logging, animal husbandry, agricultural expansion, and developmental projects, then human-wildlife conflict arises (Fernando et al2005). People lose their crops, livestock, property and sometimes their lives on the other hand animals, which are already endangered or threatened, are often killed by the people (Bhatta 2003). 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 (Ayadi 2010).

Consequently, it leads to greater contact and conflict with humans as wild animals seek to fulfill their nutritional, ecological and behavioral needs (Sukumar 1990). The rural communities with limited livelihood opportunities are often hardest hit by conflicts with wildlife. 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 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 (Naughton-Treves 1998).

Conflicts between humans and wildlife are escalating due to increasing human population, loss of natural habitats, and, in some regions, increasing wildlife population as a result of successful conservation programs. Livestock, due to their reduced escape abilities compared to wild herbivores, become especially vulnerable to predation (Nowell and Jackson 1996). Some species are rapidly losing their habitat and prey species so then they come in the interaction with human and livestock in search of food.

The rural communities with limited livelihood opportunities are often hardest hit by conflicts with wildlife. So, advocating enhancing policy that social value seems to more important along with that of conventional policies (Awasthi 2014) Interaction between people and wildlife has recently become one of the fundamental aspects of wildlife management as it represents the most widespread and complex challenge currently being faced by the conservationist around the world. As such understanding the ecological and socio-economical context of the HWC is managing wildlife population for addressing conflict problem and is prerequisite to bring about an efficient and long-term management of wildlife and its habitats. If protected area authorities fail to address the needs of the local people or to work with them to address such conflict, the conflict intensifies, becoming not only conflict between humans and wildlife, but also between humans about wildlife (Madden 2004; Awasthi 2014).

Human wildlife conflict is a serious challenge undermining the integrity of protected areas in developing counters. Protected areas and such issues as loss of livestock and completion between wildlife and livestock cannot be avoided. People reside within nearly all conservation strategies have been deployed to limit these impact but often assessed (Shapkota et al., 2014). Human wildlife conflict is one of the biggest conservation challenge throughout the world. Human wildlife conflict generated mainly by crop and livestock depredation by wildlife species have always remained a matter of dissatisfaction for the local people (Bajracharya et al., 2006).

Conflict between human and animals are major problem in many part of Nepal. The damage and destruction caused by a variety of animals to human property and sometimes human life is a real and significant danger to many human communities with the animals often killed, captured or otherwise harmed in relation those conflict are one of the main threats to the continued survival of many species. One of the main reasons for the conflict is increasing human population and continued loss of natural habitat. Crop damage is very common along the periphery of the parks and reserves in the Terai. In Chitwan National Park, human loss has increased significantly due to human tiger conflict. As a consequence a ten folds increase in human causalities due to the tiger has been reported in the buffer zone since 1988 and similar rise in livestock depredation and financial loss due to the poor people can be expected (Gurung 2008).

It is very difficult for villagers to understand why wildlife may damage their crops, while they must not kill any wild animals in return they are not convinced of the rationale of protecting forest and wildlife, which they have been utilizing thousands of years (Gautam, 1999).

This study aimed at exploring the human-wildlife conflict in terms of crop damage, livestock depredation and human casualties. Further, it has assessed the compensation perception and tolerance level of the local people to losses caused by wild animal and the roles of different stakeholders in wild animals' conservation through mitigating human-wildlife conflict. The main reason of conflicts arises was seems that between the local people and the reserve area authorities is that government laws restrict access to the park are resources in an attempt to halt natural resource utilization.Many people in the surrounding villages of the CNP depend on agricultural activities in addition to rearing livestock. The losses in the yield of crops and livestock depredation are the problems observed in the study area. Therefore, in order to identify the extent of HWC, People's attitudes towards the wild predator animals in the CNP and to make effective recommendation for reducing and mitigating HWC in study area, a detail study was carriedout.

1.2. Human wildlife conflict mitigation in Nepal

Human-wildlife conflict has direct, indirect and opportunity costs. The mitigation of HWC is an important issue in the management of biodiversity and protected area. The management techniques of wild animals are of two types; one of them is the traditional technique followed due to stopping and minimizing the conflict by controlling animal population in different ways and modern methods understanding of ecologicalandethologicalunderstandingofthewildlifeandenvironmenttoprevent or minimize conflict (Awasthi, 2014). Developing effective prevention and mitigation plans for human wildlife conflicts is a top conservation priority in many areas of the world. Understanding human-wildlife conflict (HWC) is important in many countries where solutions to escalating conflicts are urgently required. In particular, knowledge of the spatial and temporal patterns of conflict can help governments and civil organizations to design more effective mitigation plans, based on reliable forecasts and maps of conflict risks.

Practical mitigation of human-wildlife conflict is critical to the success of conservation in protected area and wildlife conservation in Nepal in general. Dozens of mechanisms and strategies have been initiated in an effort to reduce and manage human-wildlife conflicts and provide long-term solution to the prevalent resource use conflicts around and within SNP (Gautam, 1999) However, there has been an increase in the human-wildlife interface problem, with serious consequences for sustainable conservation practice.

A rather different approach to dealing with conflicts between local communities, wildlife and conservation authorities involves changing the attitudes of affected communities to wildlife and the conservation institutions (Western 1989; Adams and Hulme 2001; Mackinnon 2001; Muruthi 2005).

Potential solution to minimize conflict include electric fencing, land use planning, community based natural resource management, compensation, environmental services, ecotourism, wildlife friendly product, or in field solutions. Meanwhile, the Government

has recently promulgated the Revised Guideline(RG) 2069 (2012/13) which tries to make clearer for some issues. The Revised Guideline has made a provision of a fund at the Park where immediate relief could be provided and reimbursed from the Ministry of Finance through DNPWC.

1.3. Buffer Zone Concept

The National Park and Wildlife Conservation Act, 1973 defines Buffer zone as a specified area designated around the National Parks and Wildlife Reserves for the local peopleinordertoprovidethefacilitytoutilizetheforestproductsinsustainability.

According to the Black's Law Dictionary Buffer zone means "An area separating two different types of zones or classes/areas, which could blend with each other more easily" (Black 1990). It is the area or border adjacent to protected areas on which land use is partially restricted to give an added layer of protection to the protected area itself,which providing valued benefits to the neighboring ruralcommunities.

Buffer zone may serve two functions: Extension buffering and Socio-buffering. First one is related with the need of the protection of Buffer zone and second one is related with the villager's requirements for harvestable products and to cash crops inside the Buffer zone area. A major function of socio-buffers is to ensure that rural people don't need to seek forest and other products inside reserves (Anonymous 2003).

For the fast time, the Department of National Park and Wildlife Conservation (DNPWC)has introduced the concept of Buffer zone around the protected areas to address pertinent parks and people issues. In order to translate this concept in to reality pilot projects such as the Park People Program (PPP) has been initiated by DNPWC with the support of United Nations Development Program (UNDP) since 1995. The objective of the project is to minimize the park people conflict. The examples of illegal exploitation of forest products by the people as the evidence to it are of usual phenomenon occurred elsewhere in the parks and reserves. Those activities constitute direct threats on both the biodiversity and economic value of the protected areas (GON/BZ Development Bulletin 1995).

Buffer zone in Nepal do not necessarily include forest only, they can encompass settlements, agricultural lands, and villages, open spaces and manyotherlandsusedforms, which allows park authorities to share park income with local communities,has been introduced as a key component of the national biodiversity conservation strategy (Dewan2015).

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There are nine declared Buffer zone areas in Nepal. Khaptad National Park (KNP and Rara National Park (RNP) are proposed recently for buffer zone. Shivapuri National Park (ShNP) and Dhorpatan Hunting Reserve (DHR) are also in planning process (DNPWC/ PCP 2015).

1.4. Chitwan National Park and it's Buffer Zone

Chitwan National Park was established in 1973 as the first nationalpark of Nepal to cover remaining wild habitats of endangered wildlife species. The biological richness ofthe park is outstanding that includes 50 species of mammals,526 species of birds, 49 species of reptiles and amphibians, 120 species of fishes, over 600 plant species and much rare as well as globally endangered plant and animal species such as rhinoceros (*Rhinoceros unicornis*), Elephant (*Elephus maximus*), Tiger (*Panthera tigris*), common leopard (*Panthera pardus*), wild boar (*Sus scrofa*), spotted deer (*Axis axis*), Jackel(*Canis aureus*), wild cat (Fel_i& chaus), Python (*Python morulus*), Hare (*Lepus nigricollis*), sloth bear (*Melursus ursinus*), Gaur (*Bos gauras*), Four horned antelope(*Tetraceros quardicornis*), Spotted linsang (*Prionodon pardicolor*), Gangetic dolphin (*Platanista gangetica*), Pangolin (*Manis pentadactylus*), Sloth beer (*Melursus ursinus*).

Among the birds, Giant horn bill (*Buceros bicornis*), Black stork (*Ciconia nigra*), Sarus crane (*Grus antigone*), Bengal florican (*Haubaropsis bengalensis*) reptiles as Gharial Crocodile (*Gavialas gangeticus*), and Golden monitor lizard (*Varanus jl avescens*). Tree fern, Cycas, Screw pine and locally extinct species of Swamp deer and Wild water buffalo. Major vegetation types are: Sal forest, Tropical hardwood forest (Khair-Sissoo), Riverine forest and Grasslands. The park is the second largest home to One horned rhinoceros after Kajiranga National Park of India. Recognizing its unique biological resources of global significance, UNESCO designated CNP as a World Heritage Site in November 1984 (Budhathoki 2001).

1.5. Objectives of the Study

1.5.1. General Objective

The general objective of this study was to examine the human wildlife conflict in the area of Bharatpur Metropolitan City adjoining to CNP and its buffer zones.

1.5.2. Specific Objectives

   i.   To find out the current situation of human wildlife conflict in CNP and its Buffer zones.

  ii.   To assess the amount of crop damage and livestockdepredation.

 iii.   To explore the methods and techniques adopted by local people to reduce HWC and suggesting of a suitable compensationscheme.

1.6. Statement of the Problem

Since human-wildlife conflict has both direct and indirect costs for human beings. It is fast becoming a critical threat to the survival of many globally endangered species, in particular to large and rare mammals. The numerous cases from buffer villages of National parks and conservation areas all over the Nepal demonstrate the severity of human-wildlife conflict and in depth analysis is essential to understand the problem. Direct contact with wildlife occurs in both urban and rural areas, but it is generally more common inside and around protected areas, where wildlife population density is higher and animals often stray into adjacent cultivated fields or grazing areas and, if solution to the conflicts are not adequate, local support for conservation declines (Ayadi, 2010).And support the conservation prospects of threatened and potentially endangered species. Human-wildlife conflict is one of the main threats to the continued survival of many wildlife- species. Due to the conflicts, result from the predation on livestock and sometimes killing of human in the CNP area. Therefore, assessing the loss of human and wildlife is necessary to minimize the human wildlife conflict around National Park area.

1.7. Rationale of the Study

Human wildlife conflict is one of the major focusing parts of management issue in most of the conservation areas in recent years, unless we reduce such conflicts, effective protected area management will not be possible and thus biodiversity may not be effectively conserved. Almost all research findings conducted in protected areas of Nepal confirmed that HWC is one of the major problems. There are many research findings available illustrating human wildlife conflict which is one of the major factors creating biodiversity loss due to in harmonium relationship between park area and local people it seems in major protected areas of Nepal. The lack of scientific studies of the conflict animals seems to be a serious problem in formulating effective conflict mitigation guideline in Nepal (Awasthi, 2014). The CNP is an established protected area in Nepal but exact data on the HWC in this Park was not explored. The consequence of these

results will make delay on the formulation of management plan which is lacking in the CNP. The baseline data available during this research will help to develop management plan in CNP for long-term conservation of flora and fauna through harmonious relation between park and local people. Thus this study will come up with major human wildlife issues in the study area so that concerned authorities like, Chitwan National Park will value this major concern of conservation agenda. Human wildlife conflict is a major focus of management issue in most of the conservation areas in recent years, because unless we reduce such conflicts effective management of park areas is not possible and thus biodiversity may not be effectively conserved. Thus this study will come up with major human wild animal issues in the study area.

1.8. Limitation of the Study

This research has been conducted for the requirement of Master's degree and has it's time boundary. Every study needs sufficient time to exploreand find ground reality relating to the specific field. Some limitations faced during this study are given below;

- Behavior pattern of the wild animals could not be collected.

- Night observation could not be done.

- Financial Constriction

2. LITERATURE REVIEW

2.1. HWC in Global Context

Siddiqui and Chaudhary (1987) analyzed the forest department data and found 554 human causalities in Bangladesh for a period of 28 years between from 1956-1983.

Sangay and Verne (2008)revealed that tiger (*Pathera tiger*), common leopard (*Pathera pardus*) snow leopard (*Unica unica)* and Himayan black bear (*Ursus thibetanus*) killed 1375 verity of domestic animals (cattle horse, shep yak) where only leopard killing significantly 70% total killed in two year period (2003-2005) in Bhutan.

Mishra (1997) conducted a study in Kibber Wildlife Sanctuary, India showed livestock depredation by large carnivores such as Snow Leopard, Wolf etc. The study conducted in three villages (80 household) attributed to total of 189 (18%of total livestock holding) livestock depredation during 18 months. There villagers have been killing the Wolf though apparently not the Snow Leopard. The result showed that there was a need of immediate efforts for addressing the human-wildlife conflict.

Geisser and Reyer (2004) reported that Wild Boar populations and damages were increasing throughout Europe. Since, 1980, populations of Wild Boar (Sus scrofa) had increased over the species entire European range. This increase has led to conflicts because Wild Boars cause crop damage amounting to several million U.S. dollars every year.

Schley et al. (2008) mentioned that in many European countries suffered by Wild Boars (Sus scrofa) for crop damage. During the 10 year period in Luxembourg an area of 2586 square km in western part of Europe 13,276 cases of agriculture damage by Wild Boar was reported.

Dickman (2010) addressed the issue of human–wildlife conflict, which was one of the most critical threats facing many wildlife species, and now days the topic is receiving increasing attention from conservation biologists. Direct wildlife damage is commonly cited as the main driver of conflict, and many tools exist for reducing such damage.

Hafeez et al. (2011) studied that in the Pakistan, Hystrix indica had been identified as a serious pest of traditional as well as non-traditional crops, fruit orchards, vegetables, flowering plants and grass. Crops of economic importance such as wheat, maize, sugar cane, groundnut and melon were severely damaged in the irrigated plains andrain-feed pothohar belt. Among the vegetables, okara, pumpkin, bitter ground and onions were badly damaged. Porcupine damage was found in 41fields wheat crops out of 105 fields.

Musiane et al., 2013.Human–wildlife conflicts occur within the context of a complex social–ecological system influenced by a wide variety of social, economic and political forces. Management responses to human–wildlife conflict are based on certain assumptions and perceptions that form the mental models of this system.

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Kala and Kothari (2013) studied the livestock depredation by common leopard in Binjar wildlife sanctuary for 14 year period. The study revealed that loss of one human 1763 livestock predation and nine injuries by common leopard. The conflict between human and leopard is due to scarcity of prey and habitat destruction.

The large livestock depredators such as lion (Srivastav 1997), common leopard (Maan and Chaudhary 2000), snow leopard (*Uncia uncia*), wolf(Misha 1997) resulted a human wildlife conflict and hindered conservation efforts of these predators. Jackson (1991) estimated an average loss of US$25 per household at Qomolangma Nature Reserve due to livestock depredation by wildlife and calves were the most frequent targets of wolf depredation at Wisconsin, United States (Treves et al. 2002). Frequency of attacks to livestock increased by 22.9 percent in Spain from 1991 to 1999 (Blanco 2003).

There is growing recognition that people and wildlife can co-exist in human dominated landscapes with appropriate tools and management,public policies and societal support has been stated in annual review of environmental and resources bulletin (Nyphus J.P 2016)

2.2. In national context

2.2.1. Livestock depredation

Livestock depredation by wildlife is hazardous issue of the protected area management. Conflict between livestock owners and predators dates back 9,000 years to the time when animals were st domesticated by human it is not recent phenomenon caused by the establishment of protected areas or wildlife protection laws as commonly believed (Jackson 1998).

Tiger *(Panthera tigris),* and leopard *(Panthera pardus)* were identified as livestock depredators in Chitwan National Park (Mishra and Margaret 1991, Sharma 1991) and in Bardia National Park (Jnawali 2002).

Jackel *(Canis aureus),* Indian fox *(Vulpes vulpes),* Common Mongoose *(Herpestes* spp.) and Jungle cat *(Felis chaus)* have been reported as livestock lifter around the CNP (Uprety 1995).

Livestock depredation has led to wildlife human conflict in Dhorpatan (Kaharel 1993), Gokama (Gurung 1997) and ShNP (Gurung 2002).

Leopard, jackal, jungle cat and mongoose were identified as livestock depredating wildlife at Gokama (Gurung 1997). Snow leopard was identified as livestock depredator in LNP (Kharel 1997, Khatiwada 2004).

Leopard, jackal, wild dog *(Cuon alpinus)* and grey wolf *(Canis lupas)* in Makalu Barun Conservation Area (Jackson 1990 and Chalise 1998).

Annapurna Conservation Area (Shrestha et al. 1993), Tibetan wolf, snow leopard *(Uncia uncia),* common leopard, wild dog,jackel and the fox in SNP (Basnet1998).

According to Bhadauria and Singh (1994) the frequency of domestic livestock being killed by tiger increases during the rainy season.

Tamang and Baral (2008) studied livestock depredation by large carnivore was a serious issue and a major source of park–people conflicts in BNP during 6 year period (1993-1998). A total 442 of different animals were lost out of which Cattle were the highest contributing to 52.9% with economic loss was contributed to 47.9%, incurring the total economic loss of US$11,709.53.

Awasthi (2014) reported that in the Gaurishankar Conservation Area, Nepal local people suffered from economic loss due to the livestock depredation, crop damage. The projected total value of crop yield losses and livestock loss due to wildlife damage in study area is about Rs. 20,70,806 (US$ 21,422.5) and Rs. 13,20,495 (US$ 13,659.8) respectively during one year period. Four human were injured by Himalayan Black Bear attacks between 2010 and 2014. The main predator for livestock loss was leopard followed by Grey wolf, Jackal, Himalayan yellow throated martin, and Jungle cat and crop damage was monkey followed by porcupine, Goral, Barking deer, Jackal and Bear.

2.2.2. Crop depredation

Milton and Binney (1980) the main reason that arise conflicts between the local people and the park authorities is that government laws restricted access to the park resources in an attempt to halt natural resource utilization (Sharma and Shaw, 1993). However, the park has become a very good sources for villagers to fulfill their resources needs through entering into illegal poaching, logging and hunting which directly conflict with the parkobjectives.

Jnawali (1989) studies the case of human harassment and crop damage by greater one horned rhinoceros in Sauraha Area adjacent to CNP. The economics loss was reported Rs. 1,72,000 of which 68.6% accrued within distance of 500m. Highest economic loss 27.6% seems to be in rice.

Gautam (1999) reported heavy economic loss of Rs. 9,47,470.19 was estimated due to damage of agricultural crop by wild animal in the buffor zone area of Shukla Phanta National Park. Among the wild animal, wild elephant (*Elephas maximum*) was found to be economically serious part spas (43.29%) followed by wild bear (*sur scrofa*) which contributed loss of 28.075% and Chital (*axis axis*) cause loss of (24.05%). Among farmer suffering wild animal damage the economic loss was estimated from Rs. 731.20 to Rs. 1,346.85 per house hold/Per annum

Baral (1999) studied wild boar main conflict in BNP estimated a heavy economics lossRs.2095,341ofwhich52.73%accurredinThakurdwaraVDC and47.27%in Shivapuri. Highest economic loss (28.32%) accurred to paddy crops followed by potato (15.4%) maize (15.2%) wheat (19.80%), mustard (12,42%) and yam(7.57%).

2.2.3. Attacks to human Life

Theencounters withwildanimals aroundtheparkwere common(Nepal and Weber 1993). This included an encounter with rhinoceros inChitwanNationalPark(Jnawali 1989 and Shrestha 2000) and human injury and loss of property by elephantin Suklaphanta Wildlife Reserve (Pantle 2000). A total of 78 accidents were recorded in a period of 10 years from 1978 to 1988 (Jnawali 1989).Humancasualtiesinprotectedareas,lossofhumanlife in wildliferelatedincidentis one of the mostpainfulexperiencesfacedby park managers andconservati6nists (GON/MFSC2001).Old age,injuries,displacementand lack of prey species sometimes turn tigers and leopards in problem animalsandtheyattack human beings (Mukherjee 2003 andGON/MFSC2001). Intrusionof people into habitat of wildlife was causes of attack to human life for instance honey collectors and fisherman were victim in Sundarban Tiger Reserve (Mukherjee 2003).

Gurung (2008) reported that thirty six tigers killed 88 people during the 28 year period. The trends of human loss increased significantly. As a consequence, ten- folds increase in human casualties due to tiger has been reported in the buffer zone since 1998 and similar rise in livestock depredation and financial loss to the poor people. People who are living near the park area tend to have lowest income.

Karki and Rawat (2014) reported several incident of human casualties by leopard in recent two years, 18 human were killed and 3 injuries by leopard during (June 2011- Feb 2014) 27 month period within 7VDC The problem of human leopard conflict has researched serious level in Baitadi district of Far-western Region of Nepal.

Elphants.leopards,rhinoceros,bears and tigers are the major wildlife which involved in the case of fatalities from the year 2010-14 in Nepal,have been reported in the report.(Acharya K.P et.al 2018)

Timely identification and management of problem animals like man-eater tiger and rage elephants will reduce the human killing and injury has been reported in CNP (Lamichanne Br et.al 2018)

2.2.4. Park people relation

Sharma (1991) mentioned that following issues were responsible for conflict between Chitwan National Park (CNP) and local peoples in the research: Fire wood shortage, scarcity of fodder, shortage of grazing land, crop damage and livestock depredation by wild animals.

Adhikari (2000) reported the conflict accrued between local people and park authority. When do not get co-operation against loss of crops, property and human causalities. Many problems created due to reserves are such as crop damage, human harassment and penalty.

Allendorf (2007) stated that understanding people's beliefs and attitudes towards protected areas was a key factor to developing successful management plans for long-term conservation of those areas. Peoples negative perception about protected area were the results of various factors such as economic, social and other factors include

prohibition in extraction of wood, fodder and thatch, crop damage, livestock depredation, lack of grazing facilities for animal; and inability to kill animals when they entered the croplands.

Regmi et al. (2013) reported that it was obvious the purposed of the park did not appear to be an area of conflict between the park administration and local population but the degree of commitment to their purpose was loss stregly held by local people towards park management was negative due to mainly to the negative impacts of wildlife damage and lack of compensation. There is still a long standing conflict situation prevailing between resettles and reserve authority.

There was a negative association between the number of HEC incidents and the distance from the forest edge of the national park,plays a significant role in conflict

3. MATERIALS AND METHODS

3.1. Study Area

3.1.1. Chitwan National Park

ChitwanNationalParkislocatedbetween27°34'to27°68'Northlatitudeand83°87'to34° 74' East longitude while the Buffer zone extends further at 27° 28' to 27° 70' North latitudeand83°83'to84°77'Eastlongitude. It issituatedinNarayaniZone& referred as heart of jungle. Religiously, it is ruled by Tharu God & famous for Maize & Mustard producing area. It lies in the southern part of the mid-central administrative development region of the country and spans across portions of four districts namely Chitwan, Nawalparasi, Parsa and Makawanpur (CNP and BZ Management Plan 2007- 2011).

CNP was established under the provisions of National Parks andWildlifeConservation Act 2029 (1973) and administered under the Chitwan National Park Regulation 2030 (1974). The Act defines a National Park (IUCN Category II of Protected Area) as an area set aside for the conservation and management of thenaturalenvironmentincluding fauna, flora and landscapes; it is primarily intended to protect sites,landscapesor formation of scientific of aesthetic importance together with their associated flora and fauna. The second objective, provided it is compatible with the first, is to develop the area for tourism. Initially the park area was 544 sq. km, which was extended to 932 sq. km. in 1977. Current GPS survey, of the park boundary and GIS digitization based on 1992 topographic maps show a total park area of 1182 sq. km. (CNP and BZ Management Plan 2007-2011).
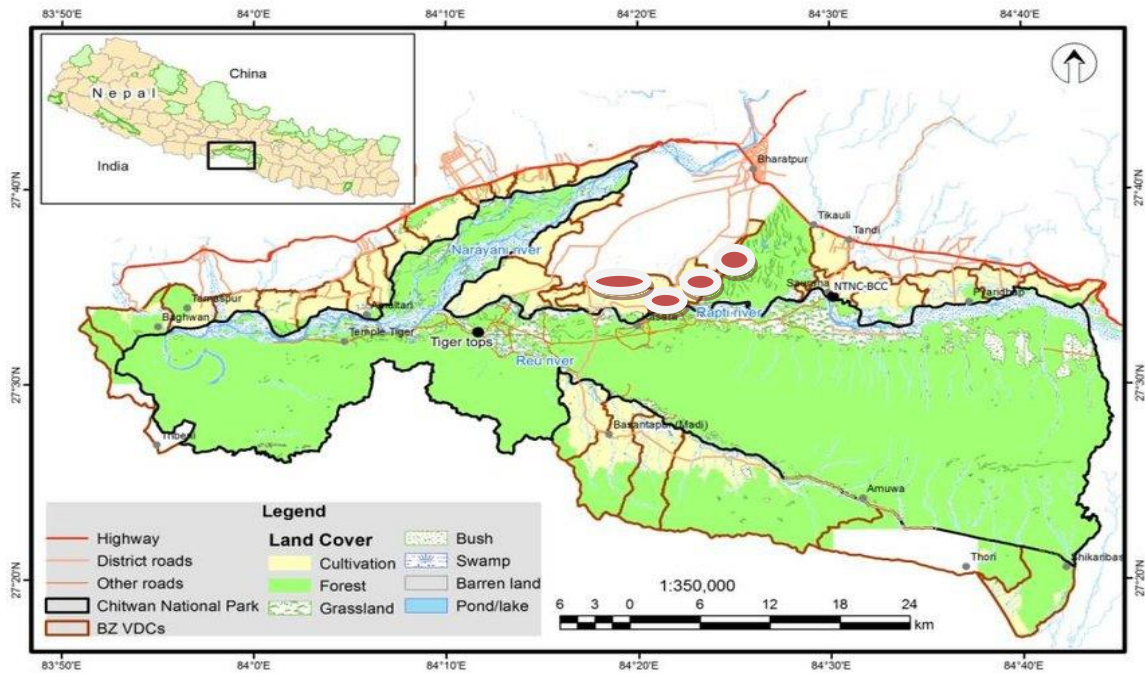
Figure 1: Map of CNP,Nepal, the black spot includes the study area.

The DNPWC brought forth the Buffer zone policy in 1993 under the fourth amendment of the National parks and Wildlife Conservation Act 1973. Subsequently, Buffer zone of CNP was declared in the same year. After the Buffer zone area was gazetted, its total area was estimated to be 750 sq.km. The current GPS survey of the Buffer zone boundary and the GIS digitization based on 1992 topographic maps show a total area of 767 sq. km (CNP and BZ Management Plan 2007-2011).

My study area is mainly the western part of chitwan national park which is touched by the Bharatpur metropolitan city ward no. 6, 13, 22 and 23 which were previously called as the Geetanagar VDC ward no.4,Patihani VDC ward no 4 and Jagatpur VDC ward no 4,5 and 7.This survey is focused on this area and total number of household survey and data analysis was done according to the local authority details provided.

Five Buffer zone CF were included in the study areas ,Belsar bufferzone community forest,Batulipokhari bufferzone community forest,Dakshinkali bufferzone community forest,Nawajoti bufferzone community forest and Ban-devi bufferzone community forest.

3.1.2. Buffer Zone Profile

1. Buffer Zone declared: 1996 A.D.

2. CNP Area: 952.63 sq KM

3. Buffer Zone Area (km2):   729.37 sq. K.M

4. Buffer Zone Community Forest: 75

5. Buffer Zone/no of local local Authority :   12

6. Buffer Zone User Group: 1781

7. Buffer Zone User Committee:	21
8. Buffer Zone included wards:	122
9. Buffer Zone Households:	59,707
10. Buffer Zone Population:	2,73,977

(Source: Chitwan National Park,2018)

The Buffer zone is an area peripheral to the park and is also regarded as a zone of impact. The Buffer zone of CNP is spread over Chitwan, Nawalparasi, Parsa and Makawanpur district covering whole or parts of 25 VDCs and 7 Municipalities having a total human population of 579,984 (Table 3.1)

The CNP is roughly 170 KM road distance from Kathmandu. To considerableextent, access to the park is affected by the season. However, it is possibleto visitmostpartof the park area throughout the year. The Buffer zone is accessible allyear round the average aerial distance of the BZ settlements from the park boundary is 3.5KM.

According to the data available in CNP, the vegetation of the reserve is tropical and sub-tropical forest types with saal *(Shorea robusta)* forest constituting about 70% of the vegetation, the forest also includes chir pine and pinus (Pinus roxburghii), Khair (Acacia catechu), Sisoo (*Dalberjia sisoo)* etc. Grasslands cover 20 percent of the Park. There are more than 50 different types of grasses, including the elephant grass (Saccharum spp), renowned for its immense height. It can grow up to 8m in height. The park is home to more than 50 mammal species, over 540 birds, and 55 amphibians and reptiles. Endangered species include one horned rhino (Rhinoceros unicornis), Royal Bengal Tiger (Panthera tigris),Wild Elephants (Elephas maximus) ,Gaur (Bos gaurus), etc.. My study area is Buffer zones in Bharatpur Metropolitan city ward no 6,13,22 and 23 attached to CNP,Chitwan in the Narayani Zone of Central Nepal. MainlyBrahmins, kshetris, and different ethnic groups mostly western Chitwan community. The main Language is Nepali,Tharu etc.

3.1.3. Climate

The dominant climatic factor in Chitwan is the southeast monsoon which normally commences around mid-June and continues until late September. But there is a marked increase in pre-monsoon rainfall during May when sporadic thunderstorms are frequent (CNP and BZ Management Plan 2007-2011). The mean annual rainfallrecordedover 2100mm,90 percentofwhichfallbetweenMayandSeptember(WWF2012).

Summer, which endures for 3 months from March to early June, is a very hot season with temperature peaking in June. The month of May of 2015wasrecordedas the hottest month of the decade when average air temperature was 39.1°c (CNPandBZ Management Plan 2007-2011).

The winter season occurs from October to February. During the winter season dry northly winds from the Himalayas and Tibetan plateau result in greatly reduced temperatures and

low relative humidity (CNP and BZ Management Plan 2007- 2011). However in 2013 to 2015 the maximum temperature was felt in June, while most cold was felt in themonthof January.

3.1.4. Flora

The terrestrial habitats include three different types of vegetation viz, Sal forest, Riverine forest and Grasslands in the park. Total area coveredby Sal and Mixedhardwoodforestin the park is 70 percent while Riverine forest covers 7 percent and grassland covers 20 percent of the area. (CNP and BZ Management Plan 2007-2011).

The terrestrial habitats in the Buffer zone are not very different from that inside the park. however, here is a high incidence of human pressure in the Buffer zone forests. The vegetation in the Buffer zone can be categorized into six broad types. These include Sal forest, riverine forest (including regeneration forests), short grasslands,tallgrasslands, bush land (shrub land) and plantation forest (CNP and BZ Management Plan 2007-2011).

According to Mishra (1982), Tamang (1982) and others, the vegetation of the Chitwan National Park are broadly classified into three major types.

➢ **Sal Forest**

Sal *(Sorea robusta)* is the principal type of vegetation in the park. About 70 percent of the park vegetation covers predominantly by the Sal forest. It occurs in almost pure stands in association with other tree species namely- i. *Terminalia tomentosa, ii.Dillenia pentagyana, iii.Syzigiun cumuni, iv. Lagerstoemia parviflora v. Phyllanthus emblica.*

➢ **Grassland**

The second type of vegetation includes the grasslands, which account about 20 percent of park vegetation. It could be found in three major areas of parks - the moist places, old agricultural sites and alluvial flood plains.

Species of *Saccharum, Narenga* and *Temeda* occur i.n moist places and form the tall grass communities. *lmperata cylindrica* is a short grass, occurring in oldagriculturalsites. On the alluvial flood plains, *Saccharum spontaneum* is found profusely in the tall and dense stands. The grassland forms diverse and complex communities with over 50 species are found there (Bruncher 1993). The *Saccharum spp.* often called the elephantgrass,can reach up to 8 meters in height. The shorter grasses such, as *lmperata* species is useful for thatch roofs.

The alluvial flood plains support a luxuriant growth of grasses interspersed with patches ofriverine forest. According to Mishra (1982), grassland can be divided into 3 types.

a. The Savanna Dhaddi: It consists of tall elephant grass rowingto6 to7m high.

b. The Old Village Khar-Jhaksi: *lmperata cylindrica* (thatch grass) is the main types of grass in this type of grassland.

c. The Riverbank Kans: After the monsoon, the elephant grass colonizes into the exposed sand bank.

Most grasses achieve their full growth by the end of the monsoon in September and maximum flowering takes place until November. The grass communities, which have evolved on the plains, are highly complex. Most of them are not influenced by human interferences, except removing by the annual burning and Khar-khadai practices.

➢ **Riverine Forest**

The riverine forests comprise 7 percent of the park vegetation and occur along the rivers, ox-bow lakes and on islands. The river forests mainly consist of Khair *(Acacia catechu),* Sissoo *(Dalbergia sissoo)* and Simal *(Bomax ceiba).* The forests are found in two association based on the stages of succession, theassociationof*Bombaxceiba*and *Trewia nudiflora* in the later stage. Forests in the later succession stage have a larger component of evergreen species. The remaining 3 percent of theforestscontainsPines with Sal and other species as associates t the Churiya range. The park is annually burnt during the annual grass - cutting period (khar khadai) by the local villagersfor the growth of the grasses which will be lushly for their livestock either for grazing or for the installed fed.

3.1.5. Fauna

The parkharborsan exceptionallydiversewildlifepopulation.Thewild animalsofthe park includesmore than 50 species of mammals,540 species of birds, 4 species ofturtle, 56speciesofbutterflies,55speciesofreptilesandamphibiansandmorethan120 species of fish (Bhattarai and Basnet 2004).

The park is especially renowned for the protection of the endangered one-homed rhinoceros *(Rhinoceros unicornis),* tiger *(Panthera tigris),* gharial crocodile *(Gavia/is gangeticus).* It also secures the population of endangered species of animals such as gaur *(Bos gaurus),* wild elephant *(Elephas maximus),* four-homed antelope *(J'etraceros quardicornis),* striped)lyena, pangolion *(Manis pentadactylus),* monitor lizard *(Varanusjlavescens),* gangetic dolphin *(Platanista gangetica),*python*(Python morulus)* etc. Some of the other animals found in the park are sambar *(Cervus unicolor),* chittal*(Axis axis),* hog deer *(Axis porcinus),* barking deer *(Muntiacus muntjack),* sloth bear *(Melursus ursinus),* indian large civet, langur, *Macaca mulatta*and wild boar *(Sus scrofa).* Gaurs are also found in the Siwalik and its foothills (Shrestha 2002).

Nepal is a paradise for ornithologists, which shelters about 863 species, that accounted to about 10 percent of the bird's species of the world. Nepal has declared 9 species of avi-fauna as the endangered bird species. Among the endangered avi-fauna, bengal floricon *(Haubaropsis bengalensis),* giant hombill *(Buceros bicornis),* black stork *(Ciconia nigra),* sarus crane *(Grus antigone),* lesser florican *(Sypheotides indica)* are reported in the park.

The common birds such as peafowl *(Pavo cristatus),* red jungle fowl *(Gallus gallus)* and different species of egrets, herons, kingfishers, fly catchers and woodpeckers are also reported from the park. There are 65 breeding bird species in which 37 have been classified as endangered or vulnerable species. The best time of bird watching in Chitwan National Park is March and December (Shrestha 2002).

Nepal has declared27 species of mammalsas the protectedspecies in 1973. Among themChitwanNationalParkconsistsofrhinoceros,wildelephant,tiger,gaur,four-hornedantelope,gangeticcdolphin,spottedlinsang*(Prionodonpardicolor),*python*(Pythonsp p),*gharial*(Gavia/isgangeticus),* yellowmonitorlizard *(Varanus jlavescens),*etc.(Maskey 2002).

There are 49 species of herpeto fauna recorded for the Chitwan National Park area. Some of them are mugger *(Crocodylus palustris),* cobra, and green pit viper. There are also record of various species of frogs and tortoises (Maskey 2002).

3.1.6. Tourism in the BZ

Tourism in Sauraha of Bacchauli VDC that lies just outside the park started during 1977with only a couple of lodges. Today, tourism in Sauraha is spread over 5 Km. with about95 hotels/lodges. In the adjoining areas of the Buffer Zone, tourism development has just started to sprmit viz, in Amaltari, Kuzouli, Meghauli, Jagatpur, Kumrose and Bhandara. The pressure of tourism is very high in the central sector of the park in Sauraha, which is causing serious socioeconomic, cultural and economical impact in the locals(Census 2011).The tourists visited about 27,000 during 2006 and 38,582 in 2009. Tourist arrival inSauraha was 48,031 and 68,342 during the same period. The averagegrowthrateof tourist arrivals in 200-6 to 2009 was about 12.6 percent. The share of touristrevenue was Rs. 46.02 million in 2006 and Rs. 69.57 million in 2009 (Census 2011).

3.1.7. Agricultural Activities

Themaincerealcropsgrownherearepaddy,maize,wheat,barleyandmillet.Oilseed production and fruits are the main cash crop enterprises. Besides soybean and lentils, locals also cultivate some tobacco. The cropping pattern is associated with two different types of landforms, namely, ghol or lowland and tandi or upland cultivation area (Nepal 1993). Rice and wheat are mainly grown on ghol land, whereas maize and oilseed are grown on tandi land. Multiple and inter-cropping are the main features of croping pattern. Various leguminous crops are intercropped with maize. Farming method is traditional,and is based on human labor and animal power. However, ther·e is increasing use oftractors for plowing; water irrigation is availableonlyin some partsof the area. Paddy,the dominant crop, is grown twice a year in some places and hasthehighestland coverage, followed by maize and oilseed (CNP-BZ 2007-2011management plan).

3.1.8. Livestock Population

The fact that livestock rearing is an integral component of the farming system is apparent from the big livestockpopulationin the area. Thereareabout146,085 heads of livestock

that includes cows (28,502), buffalo (33,407), calves (24,031),sheep and goats (60,145). Average livestockownedperhouseholdsis 4 heads,whichis lesscomparedtoformerestimate of 4.6 (Joshi 1998). Livestock rearing is directly and closely interlinked with forest resources, for their survival. The number of livestock keeping largely dependent on availability of forest resources, as traditional livestock farming isprimarilydepended upon fodder from the forests (CNP and BZ Management Plan 2007-2011).

Livestock farming in BZ has been facing several problems. Predation by wild animal,shortage of pastureland and fodder are some of the major problems. Out of the 510settlements in BZ, about 34 percent suffer from high predation and 34 percent suffer from moderate damage. Similarly, 80 percent settlements are faced with shortageof pastureland and fodder supply (SES 1999).

3.1.9. Geology and Soil

The Chitwan valley lies within the Siwalik belt and consists of thick alluvialdeposits.Both upper and middle Siwalik are found inside the park. Geologicaly, the area comprises late TertiarySiwalikformationsin the south (Churia and Someswarhills) andRaptiand Chitwanduns(innervalleys)tothenorth.Thecoreofthe siwalikconsistsmainlyof sandstone,conglomerates,quartzities,shalesandmicaceoussandstone(SoilSurveyof Chitwan Division 1968).

Geomorphologically, the area can be divided into Siwalik hills (Churia range), valley, alluvial fans, river terraces and floodplains. The valley lying within the Siwalikbelt isfilled up with thick alluvial deposits composed of boulders, cobbles, gravel, sand and silt. The fans are located on the end of the slopes where streams also enter the flat terrain. The fans are composed predominantly of sand, gravel, cobbles and boulders with a little of silt and clay. There are river terraces developed mainly by the rivers over the centuries (CNP and BZ Management Plan2007-2011).

Most of the common soils of Nepal are also found in the Chitwanvalley.The following soil types are found in both park and Buffer zone (LRMP Land system Map 1978, NTNC 1996): Brown Shallow soil, Brown Black and Red Soil, Black Soil, Brown soil, Wet Well Drained Soil, Poorly Drained Brown Soil and Well stored Dry shallow Soil (CNP and BZ Management Plan2007-2011).

3.1.10. Wetland Area in the Park and BZ

The wetlands of the park include three main river systems Narayani, Rapti,Reuand several shallow rivers and streams. Stagnant wetland types include severallakes, floodplains and marshes of various sizes. There are about 40 lakes, ponds and marshes covering about 114 Ha area inside the central sector of the park. The largest water body inside the park is Devi Tal (11 Ha), followed by Tanior Tal (10 Ha),NandanTal (9 Ha)

and Lami Tal (7 Ha). The rivers and shallow lakes supports diverse wildlife(Bhandari 1998).

The aquatic habitat of the Buffer zone includes several rivers,lakes,marshes,reservoir and canals. The major rivers of the Buffer zone includes Narayani,Rapti, Reu, BudhiRapti , Dhungre, Ichami Khola, Lothar, Manahari and Several other small rivers. Otherwater bodies are Bishazari Tal (about 100 Ha.), Devi Tal (2.6 Ha.), PandethanTal (2.1ha), Khageri canal, Bagamara Lake, Kumrose ox-bow Lake, Kathar Lake, Gaida Tal etc. They are utilized for various purposes by local communities, e.g. irrigation;fishing, animal grazing, agriculture, and many of them are significant in terms of biodiversity.

3.2. Materials

In the study,different materials were used.
   a) Binoculors
   b) Camera
   c) Measuring tape
   d) Recorder
   e) GPS

3.3. Research Methods

3.3.1. Reconnaissance Survey

Reconnaissance survey was made on the month of November 2018. During this survey period, based on the NTNC staff's recommendation a key informant discussion was made to identify the core conflicting area of Chitwan National Park, further necessary secondary information related to human wildlife conflict were collected.

3.3.2. Data Collection

The study was based upon the primary and secondary data. The primary data were collected through household questioner survey, interview with park authority and fieldobservation.

3.3.2.1.Primary data collection

Participatory rural appraisal (PRA) was applied for the collection of primary data as given below:

3.3.2.1.1. Household questionnaires' survey

A set of questionnaires were developed to collect data from local community of the selected study area. The majorities of question were in multiple choice from and were verified by the supervision to make them suitable for the field situation. The questionnaires' survey was used to collect status of human wildlife conflict in the study are, crop damage and livestock depredation the ability status of natural resources.

Household questionnaires' survey were conducted to gather information about human wildlife conflict in the CNP during the time of field survey.

3.3.2.1.2. Key informant survey

Key person interview were conducted exclusively with those who were available during household survey. The interviews were conducted to the status of human- wildlife conflict in their area, their role in mitigating the conflict and to know the causes of conflict management and their role in conflict management especially for local research, local politician interview were conducted.

3.3.2.1.3. Focus group discussion

During the field survey focus group discussion were organized forming two focus groups at ward no.6 and ward no.23. The main objective of the group discussion was to collect varieties of information regarding the status of conflict, causes of conflict, conflict management and their role in conflict management also for verification of the information collected from questionnaires survey.

3.3.2.1.4. Direct observation

Crop damage and livestock depredation were assessed through direct observation and household survey.

3.3.2.2. Secondary data collection

The secondary data were collected through different literature and journal report and work for general information data were collected through different relevant institution like WWF, NTNC, DWPWC, CDZ and Human population data was obtained from CBS for this research different website was consulted and the important document related to human wildlife conflict were downloaded from the internet. On the research related different experts were contact and various facts about HWC were collected and noted.

3.3.3. Sampling of Household Survey

Of the 29 wards, 4 were selected. From these 4 wards, approximately 8.5 % of the total households were chosen using a random selection process. These numbers were later selected using a random number table. The lists of households were achieved from the buffer zone office and ward office(local authority). The total numbers of households selected by the random selection process in each Wards represented in the following table:

Table 1: Household sampling

SN	Ward No.	Sampled Number	Total HHs	Sampling intensity %
1	Bharatpur-6(Geetanagar VDC ward no-4)	91	942	9.66
2	Bharatpur-13(Patihani VDC ward no-4)	52	395	13.16

3	Bharatpur-22(Patihani VDC ward no 9)	45	750	6.0
4	Bharatpur-23(Jagatpur VDC ward no- 1)	62	853	7.265
	Total	250	2940	8.5

Geographically, 91 (36.4%) respondents from Bharatpur-6 Devnagar, 52(20.8%) from Bharatpur-13 Ganganagar, 45(18%) from Bharatpur-22 Patihani, and 62(24.8%) from Bharatpur-23 Jagatpur were included.

Table 2: Age wise distribution of respondents

Age Group	No of respondent	Percent
18-36	58	23.2
36-54	84	33.6
54-72	96	38.4
Above 72	12	4.8
Total	250	100.0

3.3.4. Data Analysis

The quantitative data obtained from the field was first coded, then the data entry process was done using an appropriate computer package, namely "Statistical Package for Social Sciences (SPSS)", which facilitates the process of data analysis in a more precise and appropriate way (SPSS, Version 16). Simple statistics such as percentage and frequency count were used to analyze the data gathered from the household survey. Microsoft Excel was also used. The data was presented in descriptive form as well as in suitable table, pie chart and tabularform.

Crop loss calculation:

To find per household crop loss in Kg;

$$PerhouseholdlossinKg = \frac{Total\ loss\ of\ crop\ inKg}{Total\ number\ of\ surveyed\ household}$$

$$PerhouseholdlossinNRs = \frac{Total\ loss\ of\ crop\ inNRs}{Total\ number\ of\ surveyed\ household}$$

Livestock loss calculation:

$$Per\ householdl\ livestock\ holdings = \frac{Total\ number\ of\ livestock}{Total\ number\ of\ surveyed\ household}$$

$$\text{Perhouseholdlivestock loss} = \frac{\text{Total number of livestock loss}}{\textit{Total number of surveyed household}}$$

The economic values of livestock were calculated on the basis of the local market rate of the crops and livestock. To understand the relationship between the in the wildlife conservation to wise and occupation and people's knowledge in compensation to their occupational and genders was applied. Results were presented in bar diagrams, frequency tables and pie charts.

4. RESULTS

4.1. Current situation of HWC in CNP

4.1.1. Character of respondents

Out of total 250 household heads interviewed, 46.8 % were male and 53.2% female. They included 32.4% of Janajati, 26.8% of Kshetri, 21.2% of Brahmin and 19.6% of Dalit.Thetotalpopulationwas1376,themaleswere617andfemaleswere 759. The total agricultural land of those families were 2,35,431.28 Sq.m. The average agricultural land per HHs was 941.72 Sq.m.

4.1.2. Problems from wild animals

Among 250 households 217(86.6%) faced crop damage and livestock depredation problems from wild animals. The main responsible animals of crop damage were rhinoceros, chital, elephant, monkey etc. Tigers,Bear and foxes found involved in livestock depredation.

Table 3: Problem from wild animals

	Yes	No	Total
Problem from park animal N=250	86.8% (217)	13.2% (33)	100%
Cattle loss due to carnivore N=250	42%(105)	58% (145)	100%
Crop damage N=250	68.8(172)	31.2%(78)	100%
Human Casualties	2 died and 7 person injured due to different Tiger, Rhonoceros, and Bear attacks within last two years.		

4.1.3. Level of conflict

The study revealed that among 250 respondents 157(62.8%) of respondents answered that the status of human wildlife conflict in this area was high, 50(20%) of respondents answered that the conflict was moderate 39(15.6%) of respondent answered that the problem was general and 4(1.6%) did not reply for those questions.
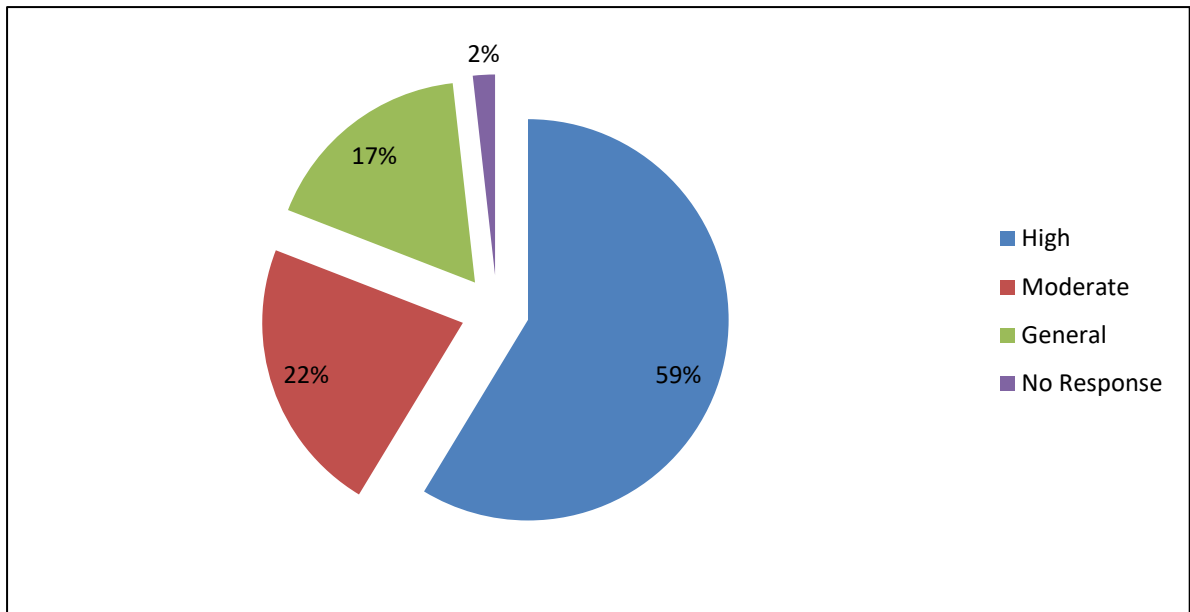
Figure 2: Level of HWC in CNP Buffer zones

4.1.4. Conflicting zone

The result showed that among 250 respondents 68 (27.2%) of respondents answered that conflict was high inside the CNP while 170 (68%) of respondents expressed that the conflict was more in border of CNP and rent respondents 12 (4.8%) were unknown where the conflict was high. The data attacking human showed that cases accrued inside the CNP.
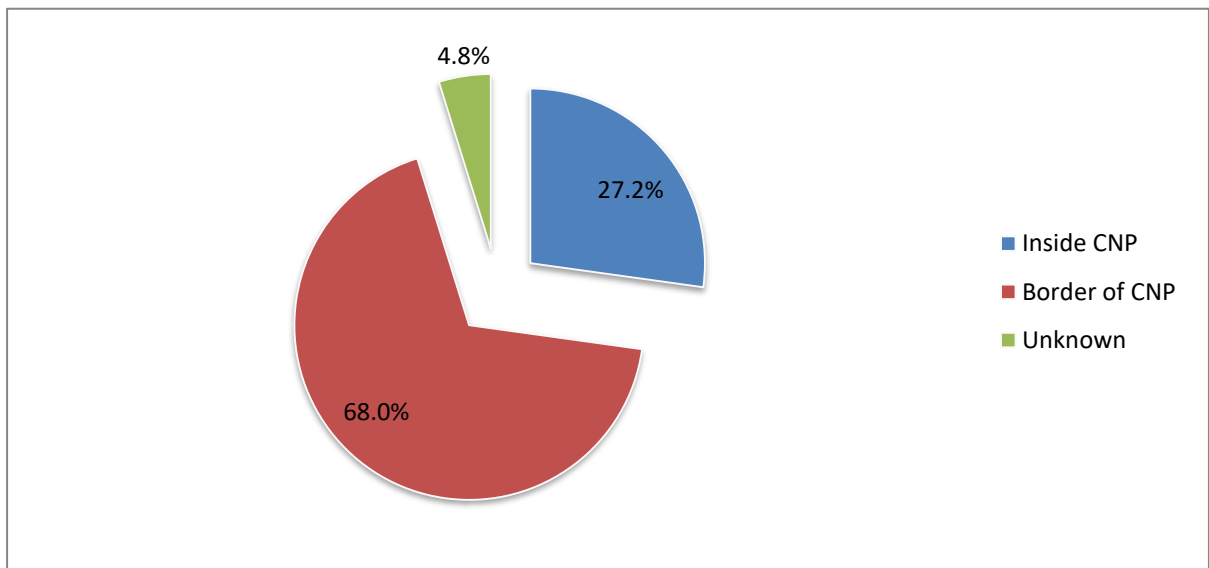
Figure 3: Proportion of conflict in NP and BZ

4.1.5. Crop damage

The major part wild animals were wild boar, monkey, elephant, barking deer crop wise major part animal are given follow:

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Table 4: Major Crop damage by animals

Name of crop	Damage responsible animals
Wheat	Wild boar, elephant, barking deer.
Paddy	Wild boar, elephant, barking deer,rhinoceros
Maize	Monkey, wild boar,rhinoceros
Potato	Monkey, wild boar
Others	Monkey, Jackal

4.2. Amount of crop damage and livestock depredation

4.2.1. Quantitative description of the crop damage in different wards

According to the table maximum crop damage found of the paddy that was equal to approximately Nrs 12,77,200 quantity per annum.Similarly potato, maize and other crops depredated by wild life in monetary value has been illustrated in the tablebelow:

Table 5: Quantitative representation of crop damage

S.N.	Name of crop	Harvested kg	Damage kg	Damage Rs.	Damage in US$	% of crop damage
1	Paddy	2,57,000	41,200	12,77,200	11403.57	57.81%
2	Wheat	1,14,000	21,700	6,29,300	5618.75	28.48%
3	Maize	86.000	7100	1,56,200	1394.64	7.07%
4	Potato	52,000	5300	95400	851.79	4.32%
5	Other			51,170	456.88	2.32%
Total				22,09,270	19725.63	100%

Source: Field Study 2019(1$=112.00Nrs)

Among different crop damaged by wild animals, paddy has become the prominent crop in 4 wards of the study area. It is Bharatpur-22, which suffer from the maximum damage, with the maximum damage of wheat, maize and potato, while maximum quantity of paddy is damaged in Bharatpur-23. (Figure 4)

Similarly, Bharatpur-22 has the maximum mean damage per household losing about NRs 15560.22 annually by a single household. And Bharatpur-23 follows the list with mean annual mean damage of NRs 12752.42 per household per annum. (Figure 5)
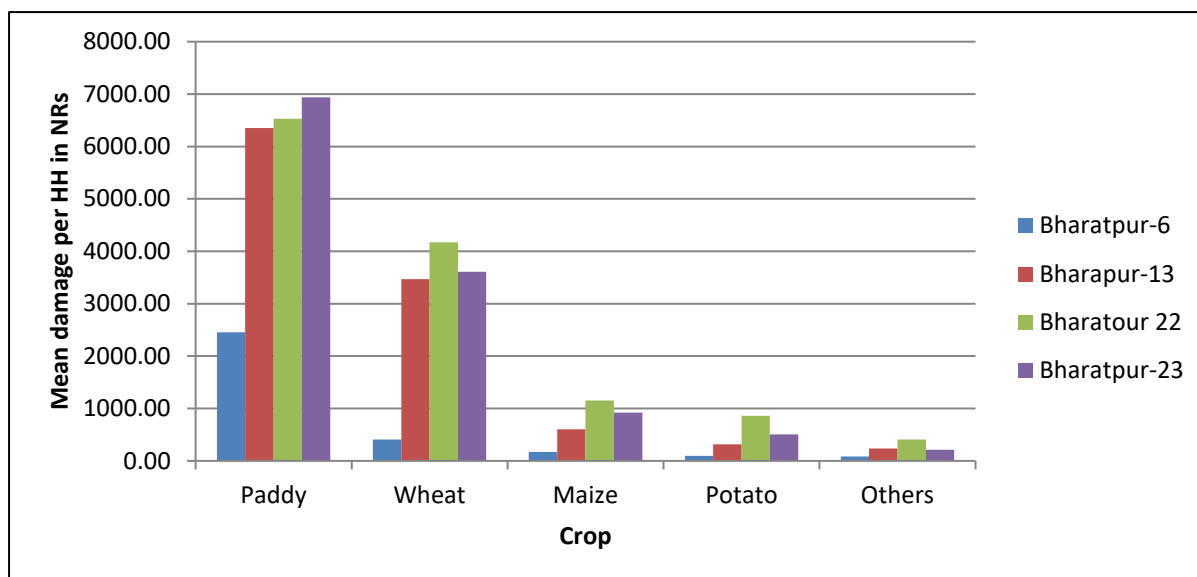
Figure 4: Comparison of mean damage of different crop (in kg) in different ward.
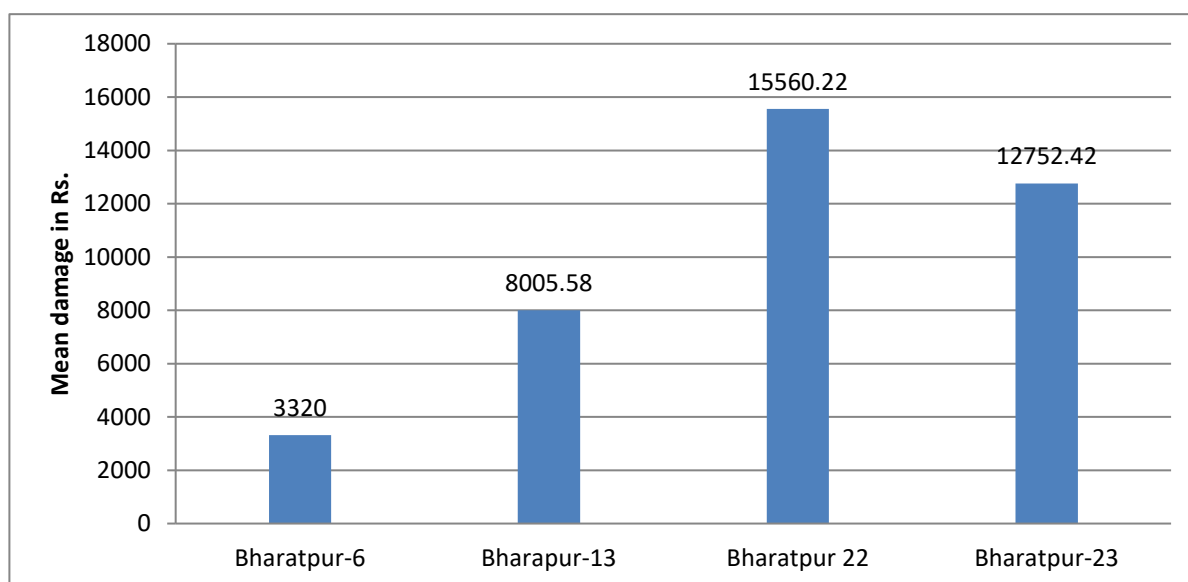
Figure 5:Ward wise total loss of crops in value(Rs)

4.2.2. Reason of wildlife visit to the crop field

This study revealed that out of 250 respondents 119(47.6%) respondents said that wild animals visited crop field because the forest doesn't have sufficient food to fulfill their requirement 43(17.2%) respondent said that wildlife entered crop field because animal liked field crop, remaining 53(21.2%) respondent indicated other cause (chasing by wild animal lack of appropriate boundary wall etc.) and 27(10.8%) respondents replied that they come to change the taste and 8(3.2%) respondent said that they were unknown for the causes of wildlife visit to the cropfield.
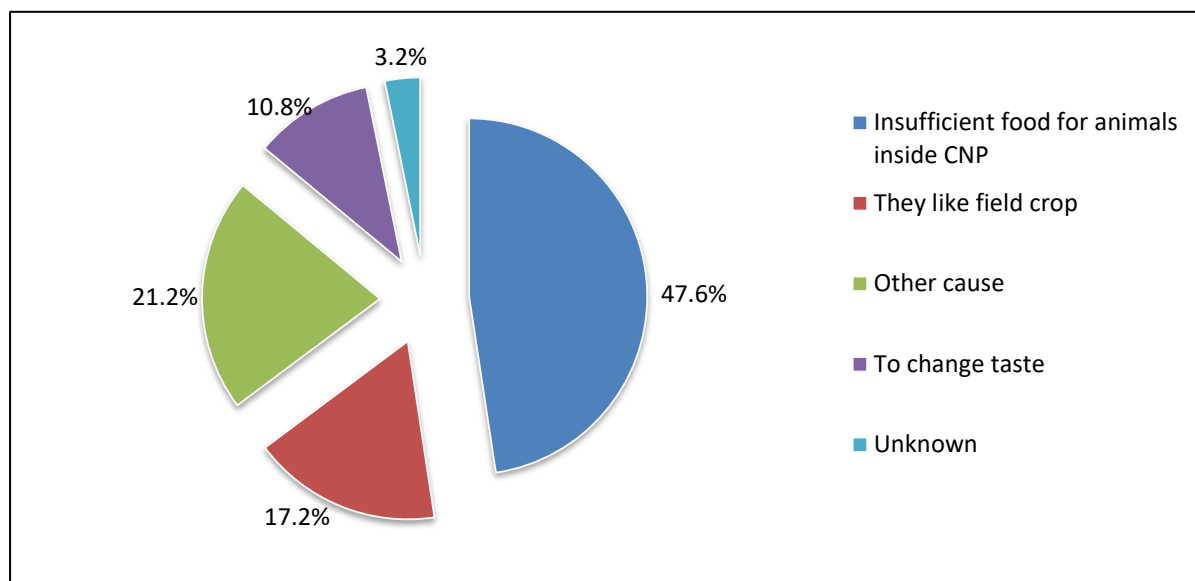
Figure 6: Reason of wildlife visit to the crop field in Buffer zones

4.2.3. Preventive measures

Preventive measures adopted by local people for crop protection and effectiveness: The local people had adopted different protective measures to divert wild animals feeding on crop and drive away to reduce the crop damage. Pest wise protective measures for different animal were made as,

- Wild boar: guarding making loud sound threating.

- Elephant :guarding making loud sound.

- Monkey :making false human structure Mukunda ,guarding, threatening.

- Deer: guarding, threatening, making loud sound

But, it wasn't significantly effective because of preventive techniques used by local people to prevent wild animals visits to crop field. So, the local's had to guard overnight on the wood constructed platform. If the farmer knew that if the wild animal were visiting to their crop field at this time they make noise to drive them away. One of the popular method of scaring wild animal was making scare crow (Mukunda) in the cropped field. Scare crow is of figure resembling a person that dressed in old cloth. It is easy to make buy few sticks and old cloths 50(25%) of the respondent made in their crop field. Similarly, making laud noise 'Ho-Ho, Ho-Ho' is an effective method in chasing wild animals.

The study revealed that out of 250 respondents 86(34.4%) Said that they adopted day night guarding at machan in group and single rotation method, crop damage 59(23.6%) respondent said that they adopted scarecrow, 43(17.2%) respondents adopted noise making by beating utensils,drum and music32(12.8%) respondents adopted noise making and remaining 30(12%) respondents adopted nothing against crop damage.

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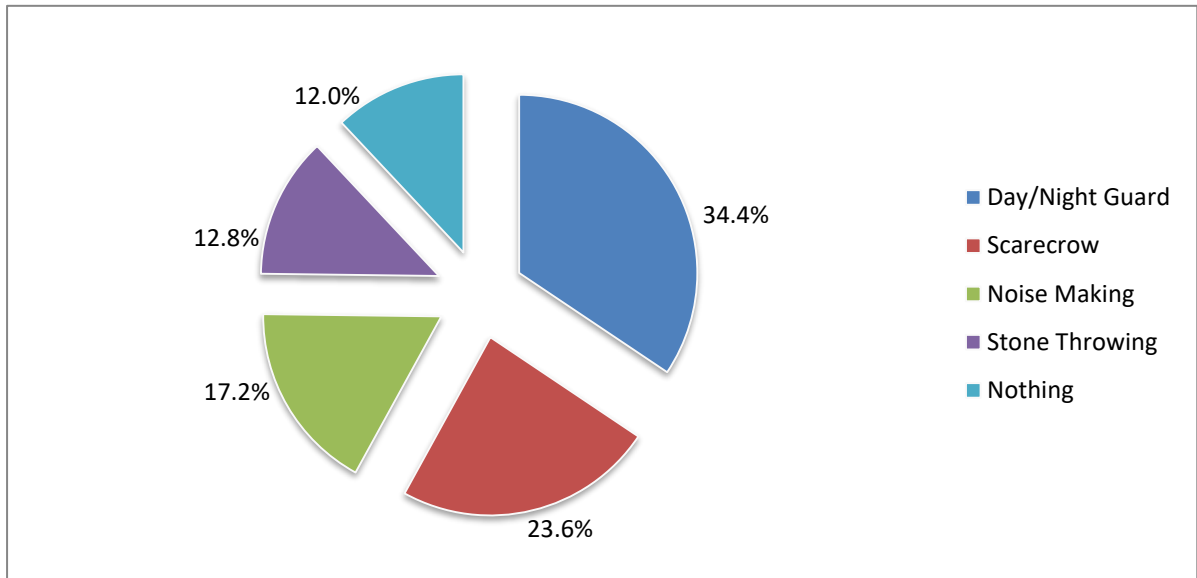
Figure 7: Preventive methods adopted by local people against crop damage (N=250)

4.2.4. Livestock Depredation

The farmer in the study area mainly depends upon the agriculture and season labour works. Among them many households keep 1-3 cows, 3 goat and (3-5) chickens and a pair of ox for plowing. The livestock depredation occur most in the spring and summer season (Chaitra to Asoj). And different crop were cultivated in this season, but loss of chicken was found in all of the season. From questionnaire's survey it was found that most of the predation by wild animal found in the rainy/summer season, various type of predator were responsible for depredation of livestock and avian stock tiger (*Pathera tigris*),Jackal (*Canis aureus*).

4.2.5. Livestock holding

Among the respondent, 215 householders (86%) held different type of livestock were buffalo (*Bos bubailis*), cow/ox (*Bos Taurus*), goat (*Capra hircus*), Pig (*Sus domisticus*), chicken (*Gallus domesticus*), cat (*Felis catus*), Dog (*Canis lupus familiaris*). Only 35(14%) respondents had no livestock (figures 8).
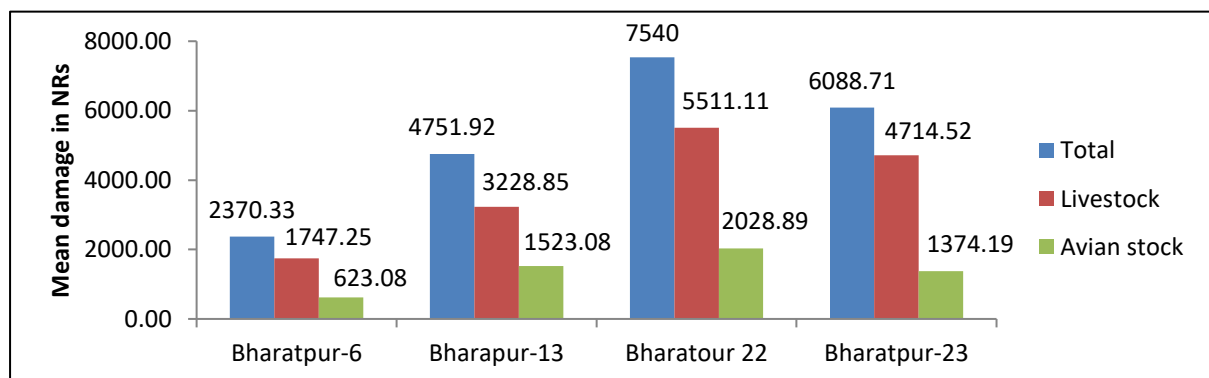
Figure 8: Livestock holding in the study area (N=250)

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4.2.6. Types of Livestock losses

The wildlife had the hardest hit for livestock depredation in the study area which included livestock like cows, buffalo, ox, goat, dog and avian stock like chicken. The total 530 livestock and avian stocks were killed during last year (43 Livestock and 487 avian stocks;including 391 Chickens, 75 Ducks, 38 goats, 2 cow/ox 2 Buffalos etc) were killed in this buffer zones connected areas. Tiger, Leopard, jackal and civet were mainly responsible for livestock depredation while sometimes Rhinoceros and Elephants also involved exceptionally. And commonly crocodiles causes the livestock depradation mainly goats during grazing at river banks.

Cow/Ox, Buffalo	Tiger/Leopard
Goat	Tiger/Leopard/Crocodile
Chicken	Jackal/Civet/Leopard

4.2.7. Economic Value of Livestockloss

Average annual economic loss from livestock depredation in total surveyed households was found to be NRs 11,79,600(10,532.14 US $). The average loss per household per annum was NRs. 4,718.4 (42.13 US $). Livestock depredation prevalence around CNP wasn't uniform. Some ward had higher economic loss than other from figure Bharatpur-22 has highest average loss of livestock per household per annum NRs 7,540 and Bharatpur-6 had lowest average loss of per household per annum was NRs 2,370.33.
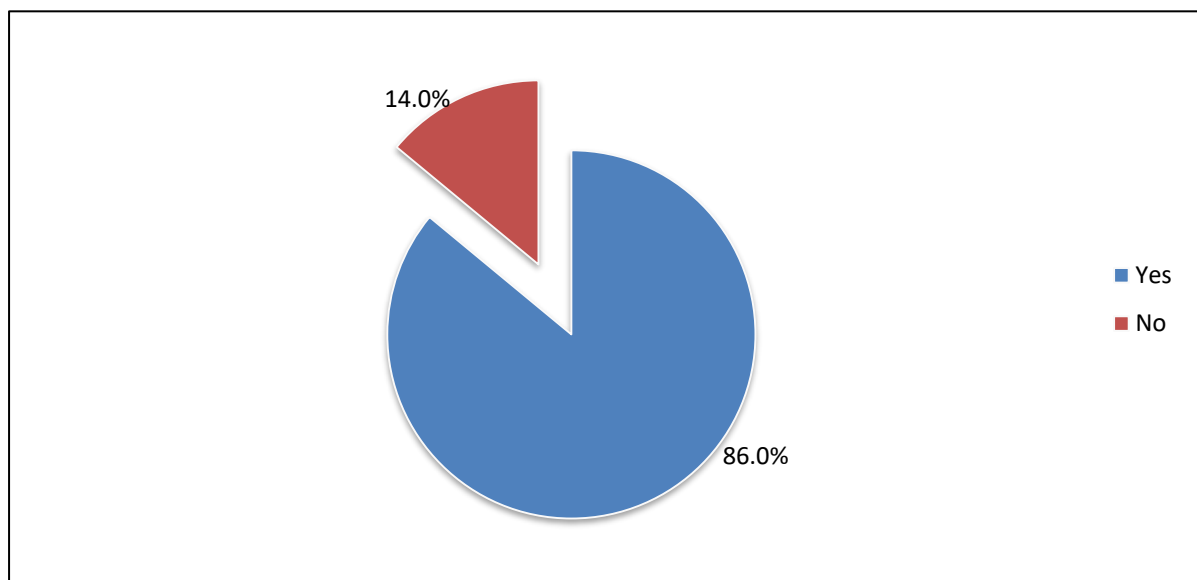
Figure 9: Ward wise livestock depredation

4.3. Preventive Measuresfor wild animal against livestock depredation

The results showed that most of the respondents in the study area had not adopted any preventive method against the livestock depredation. Out of 250 HH 203 (81.2%) respondents had not adopted any precautionary measures towards the wild animal, the

rest respondents were following different preventive measures, 14(5.6%) dog watching,5(2%) keeping cowherds, 8(3.2%) making thorny wall, 20(8%) threatening for preventive measures against the livestock depredation by wild animals (Figure 10).
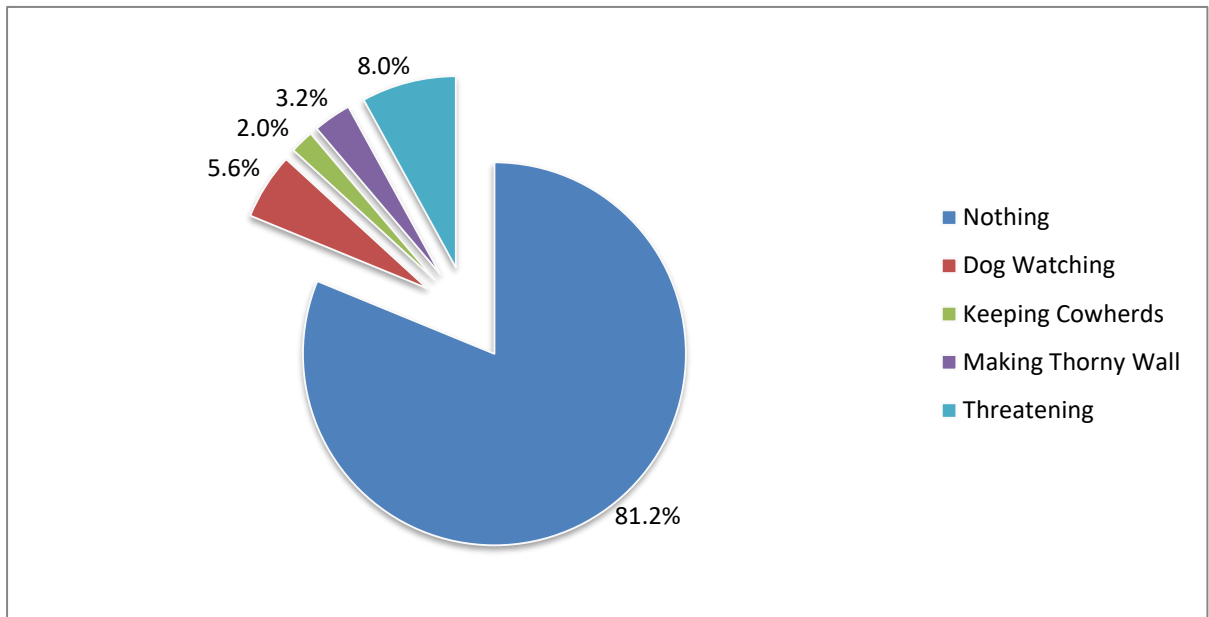
Figure 10: Preventive measures used for wild animals against livestock depredation

4.3.1. Benefit from wild animal

Among 250 respondents, 128(51.2%) of total respondents answered that the conservation of wild animals support for tourism, 29(11.6%) said biodiversity balance, 23(9.2%) did not know about the benefit from wild animals, 70(28%) answered that there is no benefit of conserving wild animals and 7(4.3%) respondent did not give any answer of this questions (Figure11).
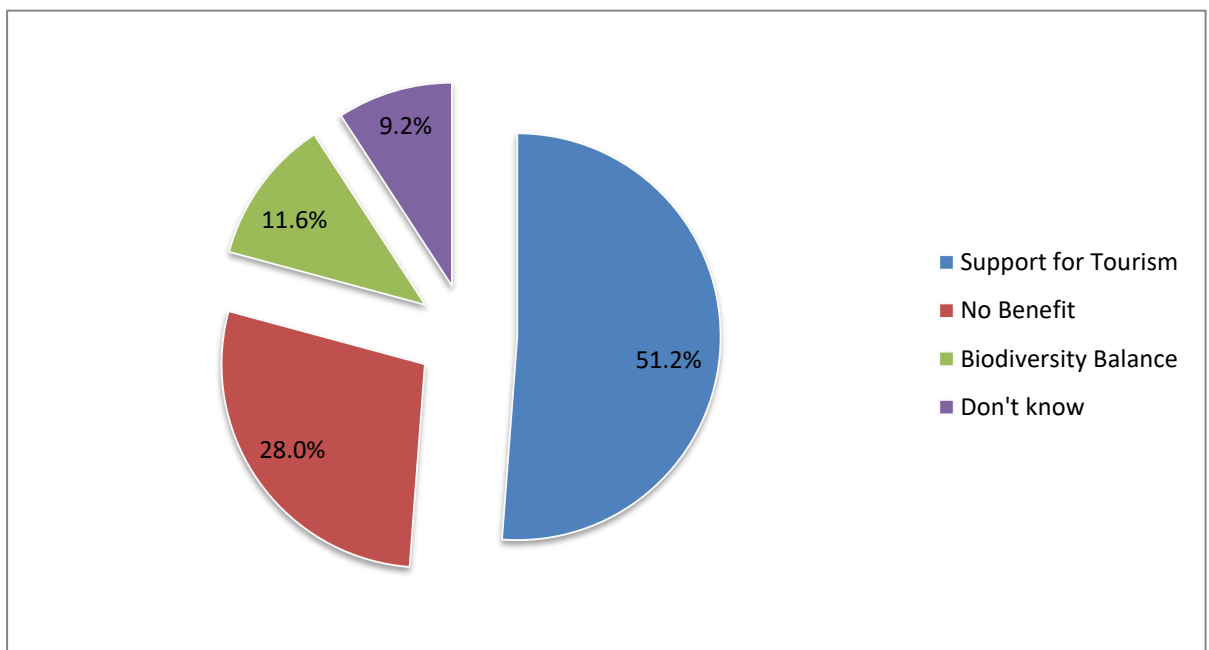
Figure 11: Benefits of wild animals

4.3.2. Compensation Scheme

More than 90% of households around the CNP area experienced crop damage and livestock depredation and were not receiving any compensation for their losses. A large number of people were unaware about benefit of present governmental compensation schemes. Among 250 respondent 185(74%) respondent know about compensation and remaining 65(26%) respondents were unaware about compensation (Figure 12). Only 80(43.24% n=185) respondent received some relief fund from the office of CNP and 105(56.76% n=185) not received any amount of compensation because animals like deer, monkey were common and damage by those animals couldn't be included in compensation (Figure 13).

Among 185 respondents almost all of the people 168(90.81%) weren't satisfied with present compensation process. And only 17(9.19%) were satisfied with the compensation (Figure 14). The main reason of dissatisfaction was lengthy compensation process 136(80.95% n=168) and 32(19.05%) due to lack of information from office of Chitwan National Park.
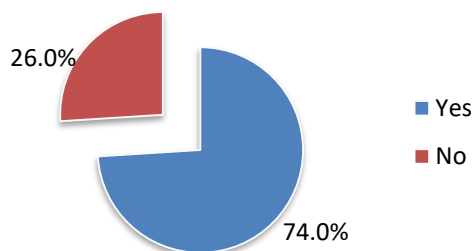
Figure 13: People knowing compensation
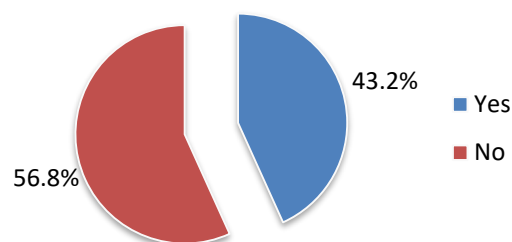
Figure 12: People receiving compensation
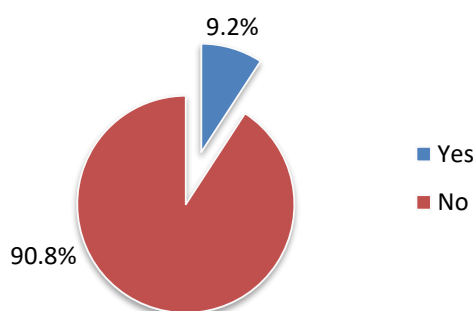
Figure 15: Satisfaction of compensation
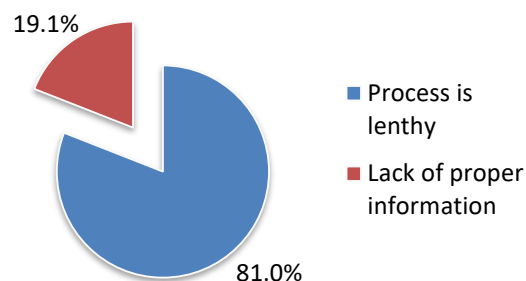
Figure 14: Reason of dissatisfaction

4.3.3. Human Casualties

In the research area nine human casualties had been taken place during two year period. Out of 9 victims, 5 were males and 4 were females,female often visit park for grass cutting and males for grass cutting, collection of fire woods,collecting fern leaves and fishing purposes. Ages of victims ranged from 17 to 68 years. The data obtained from field for human casualties from the CNP were verified through key-person interviews with BZMC member personnel and Park area conservation officer. In the study period two people died and sevenpeople were injured due to wild animal (RHINOCEROS, Elephants,Tiger and Bear) attacks. The fatal conflict was held at Bharatpur 22 and 23 (Patihani and Jagatpur) and one injured person was attacked at Bharatpur 6(Devnagar), two were at Bharatpur13(Ganganagar), three were at Bharatpur 22(Patihani),and one person was injured at Bharatpur 23(Jagatpur). Survey was carried out only in the western connected areas of CNP to Bharatpur Metropolitan city.

4.3.4. Conflict Management

Respondents showed strong dissatisfaction 230(92%) within problems of wildlife management. Only 13(5.2%) of household expressed satisfaction with the wildlife management 7(2.8%) of respondent didn't reply for this questions (Figure16).
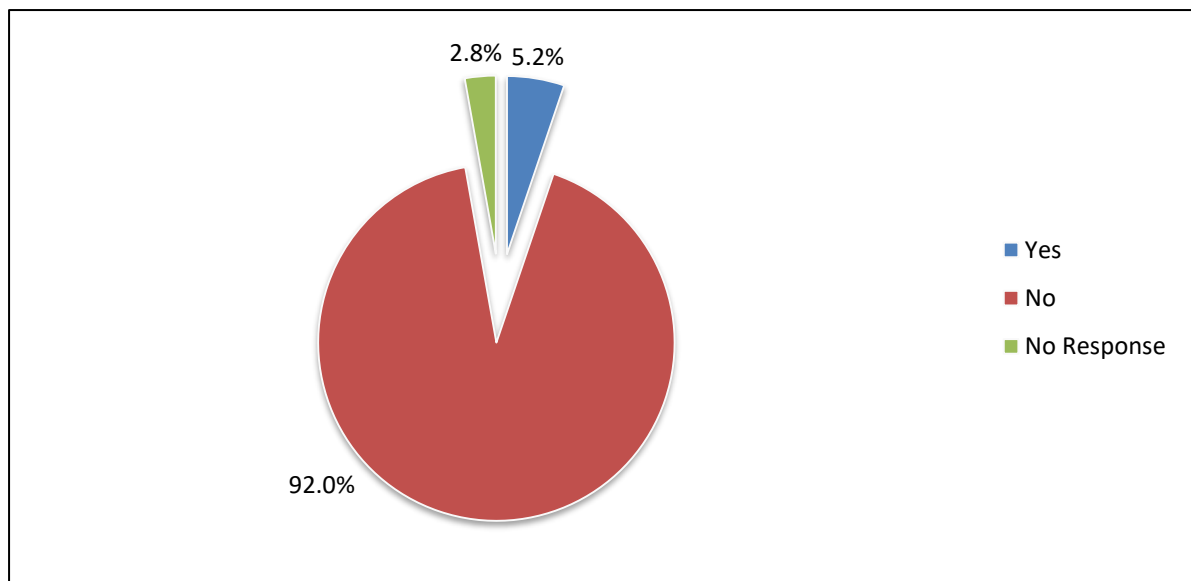
Figure 16: Satisfaction about conflict management

Concerning how to manage the problem of wild animals, 140(56%) respondents replied that there should be good and effective fencing, 68(27.2%) of respondents replied that the food for the wild animals should be managed well inside the national park, 13(5.2%) of respondent replied that they should be translocated 9(3.6%) replied that other ways should be followed for wildlife management problems and 20(8%) of them were unknown about this. (figure 16)

According to questionnaire survey, 180(72%) of the respondents said that proper compensation should be given to victim family, 29(11.6%) respondents conservation

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awareness should be given to aware local people about the benefit and behavior of wild animals and 21(8.4%) said the need of regular monitoring to make people aware of where the problem of wild animal was and 14(5.6%) respondents said that problem could be solved by other way (killing/kept in zoo) (figure 17).
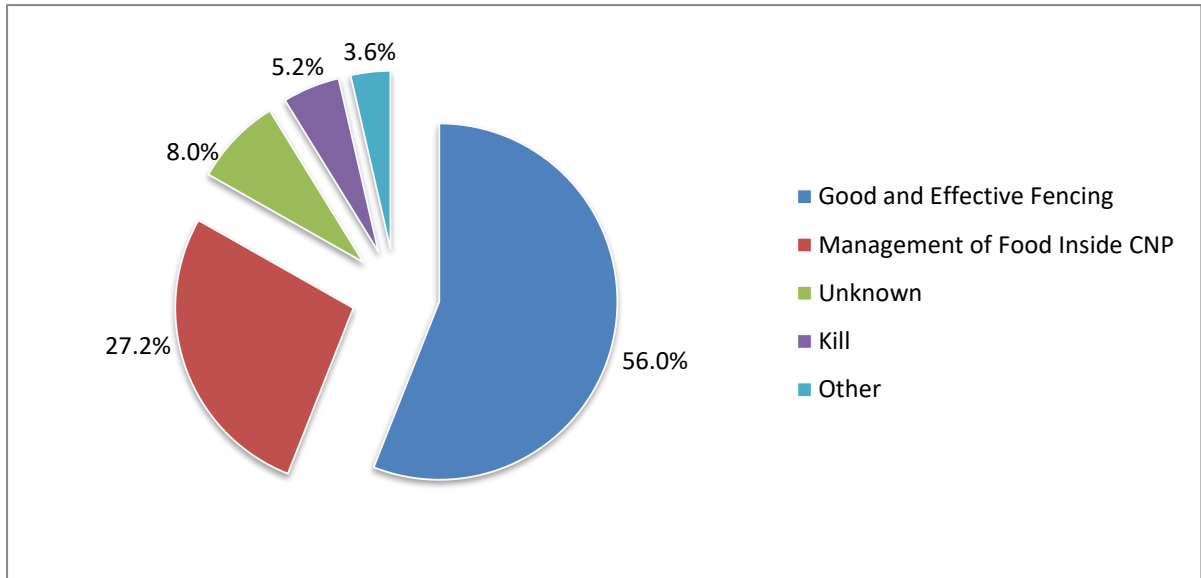
Figure 17: Management of wildlife
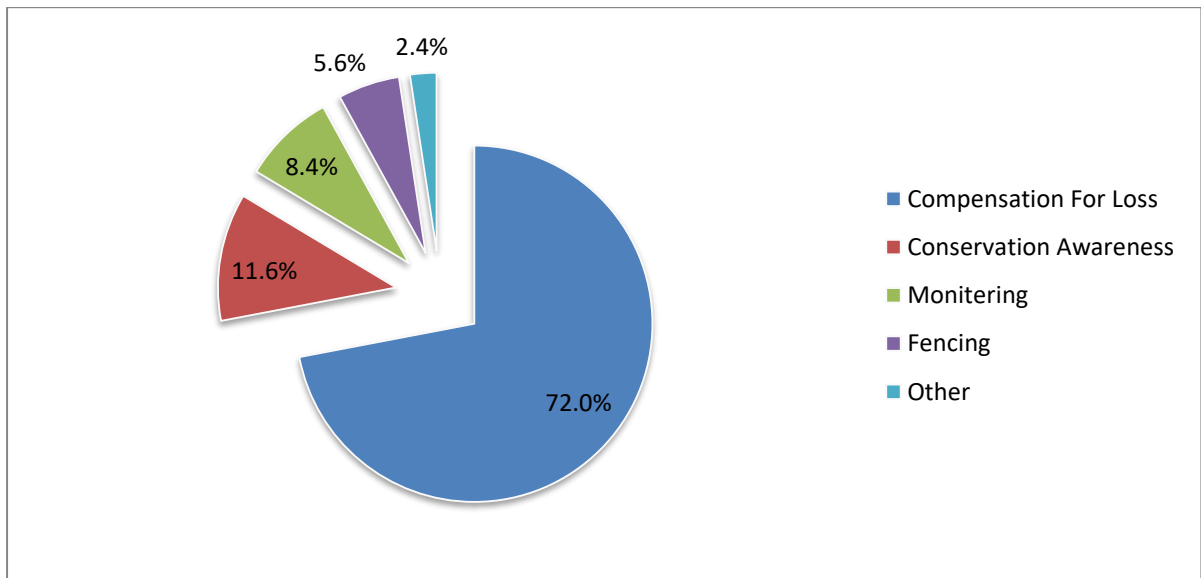
Figure 18: Conflict reduction

5. DISCUSSION

5.1. Human Wildlife Conflict in Buffer Zones of Chitwan National Park

Tentatively higher number of incidents related to human wildlife were observed in the field. Out of 250 HHS observed, 29 HSS showed a recent crop damage and livestock depredation incident in which 23 HHS showed crop damages and 6 HHS showed livestock depredation events.

From the questionnaires survey it was found that the number of wildlife animals after established of CNP had been increased similar study were found the number of wildlife species had been increased after establishment of community forest in Dang (Pokharel and Shah, 2008). The poaching and killing of wild animal were common practices before the establishment of the CNP, Similarly in Kunjo VDC Mustang district, leopard were killed before the areas was included in ACA (Ghimire, 2006) similarly the poaching and killing of wild animals were common practices before GCA include in conservation area (Awasthi, 2014).

Overall, 84.1% house hold around GCA reported experiencing some kind of conflict incident with wildlife (Awasthi, 2014). Compared the study in Nepal and India (Pokharel and Shah, 2008; Karanth et al., 2012) and this was comparatively higher than other places in the world (Dickmand, 2010). It was similarly to my finding out of 217(86.8%) respondent answered that they had problem from wild animals. However, majority of peoples were depending upon community forest for resource collection such as furniture fuel wood and grass. The local people have high dependency to the community forest in CNP which is also the prime habitat for wildlife, which makes this activity very conflict prone. It has seen in other PAS that when need of people overlap the need of wild animals, the conflict begins. Besides, crop depredation, the conflict begins, besides, crop depredation, grazing and scarcity for fodder and firewood collection were the causes for negative interaction between wild animals and local people (Poudel, 2007; Sharma 1990; Karanthetal, 2012). Therefore, necessary alternative ways to address this problem is the need of this time in CNP.

According to questionnaire near border were the major conflict zone were found (Awasthi, 2014) revealed conflict were high inside the GCA. This was similar to my finding found out of total 250 respondent 68% of respondent answered that conflict was high near the border of CNP. So finding the major conflict zone gives up the scope of human wildlife conflict and the area which need to be focused while addressing the problem of HWC management in CNP. This result has showed that inside and the border of CNP , the need of concerning authority like CNP project and other become more responsible for such conservation initiatives in the area. Identifying prime conflict zone gives advantage for any conservation program to be more effective (Karanth et al., 2012).

5.2. Crop damage and livestock depredation by wild animals

68.8% of the respondent reported that they faced crop damage problem due to Inugasion of wildlife in their agricultural land. Similar things were also found from other studies (Pokharel and shah, 2008) But 81.25% of the respondent reported that they faced problem of crop damage due to wild animal in their agricultural land (Awasthi, 2014). The possible reason are the livelihood pattern of people, where majority of local people depend upon agriculture and livestock forming and that makes vulnerable to the conflict with wildlife from the forest area. Farmers also voiced concerns about problem of wildlife and increased crop or property damage including loss of human life states in Bhutan (Wang *et al.*, 2006). It was found that wild boar, elephant, deer, monkey, rabbit, mouse are the major pest for crop damage of the studyarea.

Wild animals were responsible in all stage of crop mainly paddy, wheat, maize, potato, banana on any reason when the cropping in the field. Damage also creates serve conflict and led to substantial economic loss for villagers composition of wild animal varies depending on the type of crop and other studies have shown different wild animals have different palatability of crop varieties (Poudel, 2007) Among various wild animals monkey has highest total damage of 213 cases seems to be most destructive. The research behind monkey as a major pest animals are supported by various past studies as monkey has been seen as prominent crop raider throughout as a (Regmi *et al.,* 2013). Further, Rhesus Monkey shows the most commensally character to human and crop raiding (Aryal and Chalise, 2013). Similarly, people's perception about monkey itself is the next major problematic animal, lack of arms and no pro for killing monkey (Aryal and Chalise, 2013; Regmi *et al.*, 2013) possible reason being the maize as the primary crop and provides great palatability to main crop raider monkey in the studyarea.

Poudel (1995) found wild boar (Sus scrofa) as principal crop raider in Shivapuri National Park. Gautam (1999) identified wild elephant (Elephas maximus) wild boar (Sus scrofa) and Chital (Axis axis) as main crop raider in Shuklaphanta wild life research. Sharma (1995) found wild buffalo (Bubolos bubalisarnee) and wild boar (Sus scrofa) as main principal crop raider in KTWR. Nepal and weber (1993) found Rhino (Rhinocerous Unicornos) Chital (Axis axis) and wild boar (Sus scrofal) as principal crop raides in CNP. Adhikari (2005) identified Rhinocerous, deer and other as a major pest animal in this study on the Buffer Zone of Chiwan National Park.

Gautam (1999) identified as chital (Axis axis) become the first major pest followed by elephant and then wild bear in SNP.

It is the Bharatpur ward no.22 which suffered from highest crop loss and Bharatpur ward no.6 was lowest from crop damage. It was the Jagatpur Ghadgai area which suffered paddy and wheat of 41200 kg and 21700 kg per annum respectively. The possible reason are the jagatpur ghadgai huge damage of this study area is being near the forest area where the habitat seems to be favorable for wild animals. Wild bear, elephant and chital which are main pest of the study area.

In Bharatpur 6 Geetanagar Devnagar and Parsadhap , there was the lowest crop damage because as majority farm land were cultivated. It is the Ladhuk VDC which was suffered from highest crop loss and organ was lowest suffered. It is the Ladhuk VDC which suffered from both maize and potato damage of 5,459.8kg and 6,450kg per annum respectively (Awasthi, 2014).

A study an crop damage by rhinos done by (Jnawali, 1989) in Sauraha area and other villages shows the estimated economic loss of total of Rs. 1,70,500 for 1968.98 based on 90 household surveys in 4 villages of CNP besides the deer, boars and Parakeets also can be taken as major pest animals causing crop damage.

Gurung (2002) found a total 46,872.40 kg crop loss consisting 12,085.83kg of paddy followed by 11,531.46kg of maize 11,281.50 kg of potato 6,421.85 kg of wheat 5,199.08 kg of millet and 432.75 kg of mustard in Sunkhani VDC of SHNP. The study found the economic loss of Rs. 5,54989.31 of which the loss where 33.24% of maize 19.59% of paddy 17.35% of wheat, 16.26% of potato, 10.14% of millet and 3.39% of mustard. The estimated economic loss was 4,586.68 per household on an average.

Gautam (1999) found the loss of 9,47,470.19 in ward no. 13, 14, 15, 18 and 19 of Mahendranagar municipality adjacent to Shukla Phanta wildlife reserve. Highest economic loss 74.28% was estimated to paddy crop followed by wheat (17.08%) and maize (8.62%) among the wild animals, highest economics loss was estimated by wild animal elephants (43.29%) followed by wild animal elephants (43.29%) followed by wild boar 28.67%, chital (24.09%) The reported of economic loss was estimated from Rs. 73.20 to Rs. 1346.85 per household.

Above studies shows that there are considered loss of crop due to wildlife adjacent to the reserve and parks of Nepal. In my study also crop loss 75,300 kg was found out of 250 household among 217 household questionnaire survey. Out of the total damage of the crop paddy come to be first with 41,200 kg (57%) followed by wheat 21,700 (28.48%) maize 7100kg (7.7%) potato 5300kg (4.32%) and others 1515.25kg(2.32%) by weight.

The study shows that the total economic loss of 250 household was Rs. 2,209,270 annually out of the total loss economic loss of the paddy was 12,77,200(57.81%) follow by wheat 6,29,300(28.48%) and maize Rs. 1,56,200(7.07%) potato Rs. 95,400(4.32%) and Rs. 51,170 (2.32%) by others. The estimate economic loss was Rs. 1,164.83 per household on average.

Goat suffered the highest level of predation because reason for maximum killing of goat is that most of people leave goats for grazing in forest without any herder and people bring them back to homes at the late evening so there was herder with goats and thus they proved to be easier prey for wild animals. As compared to study, most of the day time attack occurred in the grazing land when the livestock were left unattached (Koirala et al., 2012) As compared to the study in ACA, the highest losses to predation were incurred by chicken amounting 48.3% and 47.2% of the total loss in 2009 and 2010 respectively this was due to frequent predation by jackal (Koirala et al., 2012).

The annual average income loss from livestock depredation in the SNP to be NRs. 11,79,600(10,532.14 US $). The estimated average annual monetary loss for a household in the CNP was NRs 4,718.4 (42.13 US $). The substantial economic losses due to livestock depredation by wildlife observed in the study have been reported in many studies.

While comparing livestock and avian stock loss in different wards, Patihani (Ward no.22) suffered from more livestock loss and avian loss in my study.

Leopard had been found the major predator in the study area for livestock depredation similarly, 3 studies of human carnivore conflict in Bhutan and Pakistan reported Leopard to be the main predator of livestock (Wang and Macdahald, 2006: Sangay and vernes, 2008) in Nepal Ghimire(2006) reported a, trend of increasing damage by leopard after establishment of the ACAP office in mustang with the local people ranking common leopard as the main part of livestock depredation.

(Awasthi, 2014) reported 89.8% livestock killed by leopard found the major predation in the GCA contributing NR 4,38,500 economic loss by leopard only.

Gurung (2002) reported total economic loss of livestock was Rs. 48355 and average loss was Rs. 399.02 per household. The main predator were leopard, wild cat, Jackel and common mongoose in Shivapuri National Park.

Gautam (1999) reported that two person were killed by male elephant during her field in SNP Cheetri (2013) reported that 6 human attacked by black bear from 2005 to 2012 within manaslu conservation area similarly Awasthi (2014) also reported 4 local people were injured by wild animal attack by Himalayan black bear from 2010-2014. Gurung (2002) also reported a human casualties in Sunkoshi VDC in Shivapuri National Park during his study.

In the study it was known through people and reserve staffs interview that the event of human casualty by wildlife had been increased in recent year from the study area it was found that 9 were altogether accident occurred in Bhratpur 6,13,22,23. Among them 2 people were killed by rhino and 7 were seriously injured during last two years which is similar to the results of (Lamichhane Br. 2018) that the identification of problem animals like man eater tiger and rage elephant will reduce the human killing and injuries.

5.3. Methods and techniques adopted by local people to reduce human wildlife conflict and compensation schemes

Among the respondents 68% of households around CNP area experience problems created by wild animals such as crop damage and livestock depredation and are not reciting any compensation for their losses many of respondents (26%) were unaware about compensation. This was due to lack of appropriate education and lack of information flow from the concerning authority was one of the problem of the study area as compared to other study, lack of communication about the actual policy language intent and scope combined with villagers deepening sense of victimization exacerbates

the more broadly defined problem of 'People-park' conflicts that characterize countless PA community around the world (Orga and Badula2008).

Similarly, most of the people were not satisfied with present compensation and major reason includes the compensation process is lengthy (95.12%) out of dissatisfaction respondent similar thing found in GCA (Awasthi, 2014).

The provision of compensation included only damage by animal that are endangers other animal like monkey beer species were common and the damage by these animals has not included in the compensation schemes.

Unlike in India (Madhusudhan, 2003; Ogra and Badola 2008) there is no corruption and comparatively no long bureaucratic process to endure. Three cases were rejecter for the compensation because the different reason like not being covered by the compensation scheme, incomplete document, delay reporting to CNP etc. as compared to the study in India (Kumar, 2011) similarly in the GCA (Awasthi, 2014).

Only a single technique is not effective to control the wild animal various types of techniques such as machan guarding, chasing with fire, shouting, drumming, fencing etc. in multiferous ways are much more effective in the study area to prevent the crop in some extent in more effective area. The local people were using five traditional means of controlling crop depredation and their effectiveness in different for different crop similar observation were revealed by other authors (Chalise, 2001; Bhandari, 2008; Awasthi, 2014).

Local communities were highly unsatisfied with the present practice of the HWC management in CNP. Further this way supplementary with the result which showed that majority of respondents shower strong dissatisfaction (90.81%) over the wild animal management in CNP as compared to study in PWR 61% of the respondent had no opinion or held negative attitude towards the protected area (Thapa, 2014) Awasthi, 2014) reported 95.5% of the respondent are not satisfied with the wild animal management in the GCA which was similar to this study.

Further one of the popular method was making loud noise Ho, Ho, HOHO were partially effective method in chasing wild animals as compared with the study conducted (Poudel, 2007; Shrestha, 2012)

In different case,(Ogra and Badola, 2008) compensation of losses is a fundamental strategy to reduce the human wildlife conflict through the increased tolerance level of the community towards wildlife. (Gurung et al 2000: Nghus and Titson 2004: Bhattarai and Fischer:2014; Awasthi 2014) suggested that conservation education can charge the attitude and behavior of people and increase the tolerance of losses or as a tool to reduce human-wildlife conflict. Similarly, majority of the respondent in this study period 180(72%) answered that compensation for losses will reduced the conflict as followed 29(11.6%) said conservation awareness 21(8.4%) by monitoring alarming and 14(5.6%) by fencing and 6(2.4%) suggested other ways.

6. CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Crop damage, livestock depredation and human injuries were the major types of damage. Major causes of conflict were grazing inside or near the national park, lack of fence, resource collection, poaching/ killing and habitat disturbance. Among 250 respondents 217 (86.8%) peoples tackles with wildlife problem and rest 33(13.2%) respondents do not have any problem. Among them 51 HHs loss their goat by wild attack followed by 13 HHs cows, 3 HHs ox, 2 HHs buffalo and 73 HHs lost their avian stock due to wild animals. Almost all of the respondents answered that the problem of crop damage and livestock depredation increasing after establishment of CNP. The number of wild animals increased after establishment of CNP.

The livestock depredation rate is high in the study area the causes of livestock depredation might be associated with grazing of livestock inside or near the forest where wild animals are present.

Damage to crop was high in CNP by wild boar, chital, Rhinoceros and elephant there were 9 as leopard, Rhinoceros, wild boar, chital, civet, elephant, jackal, bears and monkey are problematic species in CNP.

Human casualties were also noticed during my study period. Total of 9 people, among them two people died byRhinoceros attack and 7 people were injured. People enter in the forest to collect forest resources like drifting wood, grass, vegetables etc. they are heavily dependent on forest for their livelihood.

The study estimated the total economic loss of crop NRs 22,09,270 and NRs. 12,752.42 per household per annum similarly total of NRs. 11,89,600 and NRs. 4,718.4 per household per annum livestock damage. Comparatively in Patihani(Belsar Community forest) both crop and livestock damage was found to be higher than other study areas.

Local people were practicing direct method as noise making, drumming, stone throwing, scarecrow and day night guard to control the depredation but these methods are only partially successful to chase wild animals. Many people in this area are poor and they depend upon the agriculture so monetary compensation and material support should be increased for tolerance level of local people towards the wild animal conservation. It is concluded that the problem of human and wild animal conflict in the study area is in increasing order, the livestock depredation rate and crop damage of the study area are also increased, many of respondent are unknown about compensation scheme. So, all the people being affected by the national park need to be provided compensation and also awareness about compensation schemes towards the loss.

The survey revealed that loss due to rhino, wild boar and elephant were a major point of human wildlife conflict in the CNP. So, it was an urgent priority to develop management

practices that access the problem both for the sustainability of the local economy and reserve animal in the CNP.

6.2. Recommendations

Change Crop Plantation: Crop depredation by wildlife also depends upon the taste of crop plant. The food habit of the wildlife should be thoroughly studied and local villagers should be encouraged to grow unpalatable,less preamble crops likemustard.

The local people should be trained for proper strategy against crop raiding: Around the CNP people should be highly encouraged to follow appropriate methods so as to save their crops and livestock from predators. Proper day guarding of the crop field and livestock herd, proper fencing of Cows, Goat, and Chicken sheds etc should be carried out.

Regular monitoring of human-wildlife conflict: The conflict arises between human and wildlife must be monitored regularly, if possible within short time interval period. This could help in making the concerned authorities well aware of the extent of human-wildlife conflict level and assist in making some special arrangement to reduce the conflict in the CNP.

Habitat conservation: The habitat disturbance of wild animal in this area due to flooding of rapti river and narayani river forced human settlements to move towards wildlife habiata that results in livestock depredation. Therefore deforestation and encroachments of the wild animals' habitat must be discouraged from concerned authority.

Supporting alternative cultivation: To apply biological methods in controlling thewildanimalsshouldbeeffectivetocontrolcropdepredation.Thefoodhabitatof the wild animal should be studied and local people be encouraged to the other varieties of crops and changed the varieties of crop so that crop damage should be decreased some extent caused by crop damage was high in this area. Monkey and Porcupine are mainly responsible for crop damage and almost people are said that those species must be killed to savecultivation.

Livestock insurance and basket fund for immediate relief: Receiving Compensation process the concerning authority should shorten the compensation process and also implement effective compensation mechanism for crop damage and livestock depredation. The livestock depredation record should be more accurately maintained, accurate compensation claim should be verified by an experts so responsible predator species can be identified and the payment of compensation delay and lengthy process should be avoided; the payment should be prompt by simplifying the verification process. To launch livestock insurance system in collaboration withconservation agencies, local conservation management committee would be a good method for compensation. Establishment of a basket fund for immediate relief to a victim's family would be advantageous and should be part of local and central GoNpolicy.

Shifiting human settlements to suitable places: People living adjacent to the park boundary (ward no.22 in Patihani-Ghadhgai) are heavily affected .Similarly presence of people very close to the wildlife habitat causes a certain annoyance to the animals. For the sake of both of them, it is better not to permit human habitation very close to such areas. Therefore, those who live at the proximity of the core area should be shifted to other suitable places.

Translocation of over populated species,Fencing and Using Monitoring Devices: The translocation of most populated animals having most conflict with the general public also could be the solution for the Conflict Reduction like Deer and Aggressive elephants herds.

Electric and Permanent Fencing in the conflict prone Areas: The Management of electric fencing and Permanent walls construction in the most conflict holding geographical areas can be carried out.

Radio-collar for the Specific Conflict holding species like Elephant ,Rhino and tiger so that we can monitor about the movement for those species and controlling them,we also can manage the advanced GIS system for the conflict reduction also

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APPENDIX I

Questionnaires survey for households

Name of the respondent ………………………………. Age …………

Sex…………..

Ward No………………. Village ……………….. Rural Municipality/Municipality/Sub-metropolitan/Metropolitan…………………..

Distance from CNP………………..

1. How much land do youhave?

   ……………………………….

2. Do you have any problems from park animals? Yes. ……No……

3. If yes, what kind of problem do youhave?

   a. Cropdamage

   b. Cattle loss due to carnivores (whichcarnivores……….….)

   c. Humancausalities

   d. Housedestroy

4. Do you notice that the number of wild animals has changed since (CNP) interventaion?

   a. Increasing ……….

   b. Decreasing ………..

   c. Sameas past…

   d. DoNot know………..

5. Is there any poaching/killing in yourarea? Yes……No…….

6. What about thehabitat?

   Disturbed …….. Undisturbed…………

7. What might be causes of disturbances?

   Poaching …….. Killing………. Habitat degradation………. Other specific……..

8. Where does the human wildlife conflict (wildlife attacking human) occur more frequently?

   a. Inside theCNP

   b. Outside theCNP.

   c. Boarder ofCNP.

9. When do they usually visit thefield?

   At night……. At day time……… Any time………

10. How often theycome?

Every night……… Every week ……..1/2 per month…… Occasionally……..

11. What are the major crop that you are cultivating? During lastYear?

Name of the crop	Damage in kg	Local rate
Paddy		
Wheat		
Potato		
Sugarcane		
Banana		
Pulses		
Other specific		

12. Which animals mostly damage your crop in which season and stage? Name ofthe animal   crop   season stage

………………..   ………   …………..   ……….

………………..   ………….   …………..   …………

13. Do you think crop damage problem is increasing every year after establishment CNP?

Yes ………. No…….

14. Why do park animals came out to the field in youropinion?

    a. To change thetaste

    b. They like the fieldcrop

    c. Habitatdestruction

    d. Otherspecific

15. Do you have livestock? Yes …..No…….

16. Where do you take to graze them?

    Inside the park …….. outside park ……… Border of park………

17. Where do you go for the resourcecollection?

    From own land ………. From PA………..Both……….

18. What are the wild animals found in thearea?

    RHINOCEROS…… Leopard…. Elephant…… Wild boar …… Porcupine…………

    Blue bull…….Barking deer……. Spotted deer …………. Jackal………. Fox…..

Indian Civet……….. Monkey……….. Jungle cat ………… Fishing Cat ……….

Etc.

19. Any of the people wounded/attacked or killed by wildlife in the previousyear? No…..Yes…..   Name …….. age…… when………….Where………

    Agriculture field……… village…… name of the animal…….

20. How does the animal attacked theman?

    …………………………………………………………………

21. What are the livestock that are killed/wounded by wildlife in the previous year? Please write the number and localPrice.

Name of the animal	Wounded	Killed	Local rate
Cow			
Goat			
Chicken			
Pigeon			
Buffalo			
Sheep			
Others			

22. What are the precautionary measures that you are adopting to minimize the wildlifedamage?

    Shouting………. Electric fencing………. Beating Drum………

    Firing/lighting……..

23. Have you noticed any changes after CNP intervention? If yes what are they?

24. Do you know about the compensation? Yes………No……..

25. Production   of   crop   is   sufficient/insufficient   during   the   year? Sufficient…………Insufficient………..

26. Do you receive any (relief fund) compensation or medical help from concerning authorities?

    Yes……….. No…….

27. Are you satisfied with the amount of compensation? Yes ………..No….

28. If not, why?

    a.   It is tolengthy

    b.   Weak informationflow

    c. Only timespending.

29. Are you satisfied with problem of wild animal management? Yes…….No……..

30. If no, what should be the problem wildlife managementstrategy?

    a. Good and effectivebarrier

    b. Inside the park they should manage them forfood

    c. Othercauses

31. Have you seen dead wild animal? Yes…….No…..

32. The extent of human wildlife conflict is high in the area? Yes……No…..

33. How can we minimize the human wildlifeconflict?

    a. Conservationeducation

    b. Compensation ofloss

    c. monitoring

    d. good and effective barrier

APPENDIX II

Questionnaires to the Park authorities

1. What types of human wildlife conflict occurs in thisarea?

    a. Cropdamage   b.human causalities   c. house destroy d.others.

2. What is the effect of the people who live near by thereserve?

    a. Cutting grass b. stole firewood c. Livestock Grazing d. killing livestock. d. breaking fence

3. Why do people do illegal activities inside thereserve?

    a. Poor economy b. occupation   c.Illiterate.

4. How are those conflictsminimized?

………………………………………………

5. What measures can be adopted to increase tolerance of local people to loss by wildlife?

    a. Conservationeducation

    b. Timely monetary compensation againstlosses

    c. Others

6. Do you have any record of revenge killing of wild animals? please give details(no. … where …when…..)

    …………………………………………………………

7. What types of punishments are given for illegalwork?

    a. Arresting andseizing

    b. Convincing

    c. Punishment

    d. Others

8. How can poaching/killing inside the reserve can becontrolled?

    …………………………………………………………

9. What steps have been taken to confine wildlife within the reserveboundaries?

    ....

10. How can the competition between wild animals and domestic livestock belifted?

    …………………………………………………………

11. How can wild animals be conserved in a betterway?

    …………………………………………………………

APEENDIX III

Unit conversion

Wheat1maan   = 40kg

Paddy 1maan = 40kg

Bigha = 20 kattha

1kattha = 20 Dhur

20 Dhur= 338.62 Sq.mt

1 muri= 20 Pathi

Paddy =1 Pathi=3 kg

Maize=1 pathi=3.5 kg

According to the crop production in field

Wheat in 1 kattha = 3maan

Paddy in 1 kattha = 5maan

Source : Local Respondents

APPENDIX IV

Local rates of different crops

Crops	Market rate per Kg. (Rs)
Wheat	29
Paddy	31
Maize	22
Potato	18

APPENDIX V

English, Scientific and Local names of the speceis

Scientific Name	English Name	Local Name
Lepus ruficaudatus	Rufous-tailed Hare	Kharayo
Lutra perspicillata	Smooth Coated Otter	Oth
Herpestes auropunctatus	Small Mongoose	Nyauri
Felis chaus	Jungle Cat	Ban Biralo
Felis viverrina	Fishing Cat	Ban Biralo
Canis aureus	Jackal	Syal
Vulpes benglensis	Indian fox	Phyauro
Pteropus giganteus	Indian Flyong Fox	Chamero
Axis axis	Spotted Deer	Chital
Axis porcinus	Hog Deer	Laguna
Boselophus tragocamelus	Blue bull	Nilgai
Sus scrofa	Wild Boar	Bandel
Bos gaurus	Gaur	Gaur
Panthera pardus	Leopard	Chituwa
Platanista gangetica	Gangetic Dolphin	Saus
Macaca mullata	Rhesus Macaque	Rato Bandar
Elephas maximus	Asiatic Elephant	Haati
Viverricula indica	Small Indian Civet	Rasse

Source: CNP

APPENDIX VI

Crop loss in Ward no 6

S.N.	Name of the crop	Damage KG	Damage RS	Damage US $
1	Paddy	7196.8	223100	1991.96
2	Wheat	1285.9	37290	332.95
3	Maize	710.9	15640	139.64
4	Potato	483.3	8700	77.68
5	Others	238.46	7390	65.98
	Total	9915.36	292120	2608.21

APPENDIX VII

Crop loss in Ward no 13

S.N.	Name of the crop	Damage KG	Damage RS	Damage US $
1	Paddy	10654.8	330300	2949.11
2	Wheat	6224.8	180520	1611.79
3	Maize	1431.8	31500	281.25
4	Potato	921.1	16580	148.04
5	Others	399.67	12390	110.63
	Total	19632.27	571290	5100.80

APPENDIX VIII

Crop loss in Ward no 22

S.N.	Name of the crop	Damage KG	Damage RS	Damage US $
1	Paddy	9474.2	293700	2622.32
2	Wheat	6475.5	187790	1676.70
3	Maize	2357.3	51860	463.04
4	Potato	2145.6	38620	344.82
5	Others	1013.89	18240	162.86
	Total	21466.39	590210	5269.73

APPENDIX IX

Crop loss in Ward no 23

S.N.	Name of the crop	Damage KG	Damage RS	Damage US $
1	Paddy	13874.2	430100	3840.18
2	Wheat	7713.8	223700	1997.32
3	Maize	2600.0	57200	510.71
4	Potato	1750.0	31500	281.25
5	Others	424.33	13150	117.41
	Total	26362.33	755650	6746.88