STATUS OF WILDLIFE CRIME IN DANG DISTRICT, WESTERN NEPAL

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Submitted to:

Central Department of Zoology

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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).

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This is to recommend that the thesis entitled **"STATUS OF WILDLIFE CRIME IN DANG DISTRICT, WESTERN NEPAL"** has been carried out by **Shankar Rijal** for the partial fulfillment of Master's Degree of Science in Zoology with special paper Ecology. This is his 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.

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This thesis work submitted by **Shankar Rijal** entitled "**STATUS OF WILDLIFE CRIME IN DANG DISTRICT, WESTERN NEPAL**" has been acceptance as a partial fulfillment for the requirements of Master's Degree of Science in Zoology with special paper ecology.

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ABBREVIATION

HCC	:	Human Carnivore Conflict
HWC	:	Human Wildlife Conflict
NGOs	:	Non-Government Organizations
WCN	:	Wildlife Conservation Nepal
WWF	:	World Wildlife Fund
BCN	:	Bird Conservation Nepal
CITES	:	Convention on International Treaty in Endangered Species of Wild Fauna and Flora
GIS	:	Geographical Information System
CBOs	:	Community Based Organizations
WCS	:	Wildlife Conservation Society
CBS	:	Central Bureau of Statistics
IUCN	:	International Union for Conservation of Nature
DNPWC	:	Department of National Parks and Wildlife Conservation
MoFAGA	:	Ministry of Federal Affairs and General Administration
LC	:	Least Concern
NT	:	Near Threatened
VU	:	Vulnerable
EN	:	Endangered
CR	:	Critically Endangered

ABSTRACT

Illegal wildlife crime and trade is one of the major challenges for conservation of wildlife globally. Many researches and reports revealed that an extent of illegal trade is expanding despite of various national and international laws, treaties and conventions to control wildlife crime. This study provides general overview of wildlife crime such as status and factors influencing illegal wildlife crime, trend of poaching and probable solutions to decrease wildlife crime. Semi-structured questionnaires survey, focus group discussions and informal interactions were employed for primary data and secondary data were collected from the concerned governmental organizations, published and unpublished reports. Total 15 cases were registered and 26 wildlife parts were seized from 2070 to 2075 B.S in District Forest Office, Dang and the temporal trend of wildlife crime cases found increasing from past two years. 211 respondents were asked questions related to wildlife crime using stratified and purposive sampling method. This study found that illegal wildlife crime exists in Dang district at least on the basis of seized wildlife parts and cases registered in District Forest Office. Human wildlife conflict, lack of awareness, poor monitoring of forest area, no benefits to local people from conservation etc. were key factors for the involvement of local people in wildlife crime. Effective programs with coexistence, strict implementation of laws and development of community forest as conservation area is needed in order to decrease wildlife crime and trade.

1. INTRODUCTION

1.1. Background

The crime of wildlife for subsistence and trade is a serious threat to conservation. Several endangered species such as Asian big cats, elephants and rhinoceros are at the verge of extinction if the current trend of wildlife is not retarded. The illegal wildlife trade is among the leading causes for rapid wildlife species decline worldwide (Murray *et al.*, 2008). Human misuse of biotic assets is causing debasement of the natural surroundings of numerous species, bringing about their fast decay and eradication (Primack *et al.*, 2002). Around 10-20% of all vertebrate and plant species are in danger of elimination throughout the following couple of decades (IUCN, 2005). Untamed life chasing for subsistence and business purposes constitutes a noteworthy risk to animal varieties survival (WCS and TRAFFIC 2004). In Southeast Asia, illicit exchange natural life surpasses billons of US dollars every year (Deeks, 2006).

Illegal wildlife trade is a global conservation challenge (Wyler and Sheikh, 2013; Brown and Davies, 2014). Many charismatic species including tiger (*Panthera tigris)*, rhinoceros (*Rhinoceros unicornis.)* and snow leopard (*Uncia uncia)* are threatened with extinction (Baille *et al.*, 2004). For instance wild tigers numbered over 100,000 a century ago now reduced to a few hundred surviving individuals (Banks *et al*., 2006). Similarly, number of rhinoceros has been reduced more than 90% since the beginning of 20^{th} (SIRI, 2015). Illegal wild animals hunting of economically and ecologically valuable wildlife population is emerging as threat across African savannas. Due to the cryptic nature of illegal crime little information exist on the driver of wild animals meat industry (Mathew *et al*., 2018). Jaguars (*Panthera onca)* and pumas (*Puma concolar)* are declining across most of their range, generally because of hunting and habitat loss (Currier *et al.*, 1983; Sanderson *et al*., 2002; Zeller, 2007). The impact of habitat loss is easier to evaluate than hunting because latter occurs secretively and it is thus difficult to obtain reliable estimates of crime pressure (Smith, 1976; Chetkiewich and Raygorodetsky, 1999). Since 2007, poaching of wildlife and in particularly the poaching of White Rhinos, Black Rhinos and African Elephants has been at the forefront of the conservation battle in Southern Africa (Ferreira *et al.,* 2014). The combination of increasing demand of Rhino horn and ivory as well as high black market prices in Asian markets (especially in Vietnam and China) has fueled increase in poaching (Ferreira *et al*., 2014).

Crime for trade of animal parts is a major threat to wildlife, across the tropics (Bennett *et al*., 2002, Milner-Gulland *et al.,* 2003). Local communities living in the vicinity of forest depend on the native wildlife for food, trade, cultural purpose and income (Robinson and Redford, 1991; Fa *et al.,* 1995). With growing human population increased accessibility to remote forests and adoption of modern crime methods and guns, the problem of crime has become severe. In many places species are being extracted far above sustainable limits (Hill *et al*., 1997; Hart, 2002) because of market demand of wild meat (Fa *et al*., 1995; Apaza *et al.,* 2002). In areas where crime is prevalent, wildlife populations have severely declined in biomass and there have been changes in the relative abundance of age classes (Peres, 2000). The Asiatic black bear (*Ursus thibetanus)* and the Sun bear (*Helarctos malayanus)* are endemic in Cambodia and populations are estimated to have declined throughout their ranges due to widespread illegal killing of bears and trade in parts (Elizabeth Oneita Davis *et al.,* 2019). Illegal crime of Ungulates can reduce the prey base of carnivores, which can increase human-carnivore conflict through livestock depredation (Mahmood Soofi *et al*., 2018). Wildlife in Himalayan region is suffering from illegal crime and trade even after China has enforced the China Wildlife Protection law (Yi-Ming *et al*., 2000).

Similarly, Nepal cannot be exception to this situation. A number of large infrastructure project including new roads provides new access and results in increased land clearing and wildlife crime (Sharma *et al.,* 2018). . Nepal has been known as transit for illegal wildlife trade and a source of some of the illegally traded species such as rhino horns, tiger, leopard pelts and pangolin scales. The incident of poaching and smuggling of wild animals have been in the rise in the northern part of Chure forest recent years. As a result endangered wildlife including Wild boar, Deer, Blue bull, Wild rooster and Kalij pheasant are facing threats (The Kathmandu Post, April 1st 2018). Nepal is facing persistent challenge in combating the illegal trade in wildlife, which is demanding a multifaceted solution (Brown and Davies, 2014). However, conservation effort in the country has a promising prospect for success in restoring some flagship wildlife species such as Bengal tiger (*Panthera tigris)* and Greater one horned rhino (*Rhinoceros unicornis*) (WWF, 2014). Enforcement agencies have accelerated their field activities across the country and have been successful in number of seizures and arrests related to the illegal trade of wildlife (DNPWC, 2014). Despite various efforts to control wildlife crime, such crime still exists sporadically and low volume in the country.

1.2. Policy and legislation

State policy under the Constitution of Nepal stresses that "conservation, augmentation and sustainable use of forests, wildlife, birds, plants and biodiversity shall be done by reducing threats from industrial and physical development". Now, Constitution of Nepal has limited the judicial power of Chief Conservation Officer and DFO dealing wildlife crime up to one year of imprisonment, which previously was from 5 to 15 years. Now, any wildlife crime cases having more than one year of imprisonment need to be filled in the District Court. The forest policy 2071 BS (2015) emphasizes on landscape level conservation and management for sustainable development and environmental balance including transnational biological corridor and control poaching, illegal felling of forests, uncontrolled forest fire, and invasive species through mobilizing multi-sectoral approach. The National Biodiversity Strategy and Action Plan 2014 also has identified wildlife crime, encroachment, invasion by alien species, and stone, gravel and sand mining as some of the major threats to dwindling wild flora and fauna in the country.

Recently, International Trade in Endangered Wildlife and Plants Control Act, 2073 BS (2017) has been enacted for effective CITES implementation in Nepal. The Act is focused on regulating the CITES provisions effectively. It has also provisioned gifting of wild animals to a country for enhancing better relationship, creation of fund and formation of a National Coordination Committee for Endangered Wildlife and Plants. The Committee's main role shall be to assist and coordinate its implementation and to recommend the government on policy, legislations and institutional development matters for effective CITES implementation.

Meanwhile, both Forest Act, 2049 BS (1993) and National parks and Wildlife conservation Act, 2029 BS (1973) has been amended in 2016 and 2017 respectively. Preparation of Operational Plans for different forest management modalities, payment for environmental services, relief support for wildlife damage and establishment of wildlife rescue center are some of the new provisions in the forest act. Similarly, 3 declaration and management of biological corridor, management of zoological park, providing relief support for wildlife damage, and establishment of rescue center and security arrangement of protected areas are some of the new provisions of the amended NPWC Act, 2029 BS (1973).

Very recently, Wildlife Damage Relief Support Guideline 2069 BS (Statement 2075) has been amended for the third time. There are clear procedures, criteria and ceiling for the

payment of compensation to wildlife victims. While deciding on payments, besides other documents claim assessment committee under the coordination of park officer will also asses medical bills in case of human injury and market values in case of livestock and crop losses. The amount provisioned in the current compensation guidelines are as follows:

- In case of death victim, family will get Rs 10,00,000 as compensation.
- In case of serious injury (loss of body parts, disability etc) a victim will get maximum Rs 2, 00,000.
- In case of livestock loss, a family will get maximum Rs 30,000.
- In case of destruction of stored grains, a family will get maximum Rs 10,000.
- In case of destruction of building a family will get maximum Rs 10,000.

There are 27 mammals, 9 birds and 3 reptiles declared as protected wildlife species under National park and Wildlife conservation act 1973.

1.3. Objectives

General objective

To determine the status, challenges and solutions of wildlife crime in Dang district, Western Nepal.

Specific objectives

- To determine the status and trend of wildlife crime practice in Dang district.
- To determine the factors influencing for wildlife crime in Dang district.

1.4. Significance of the study

Most of the researches on wildlife are focused on the protected areas and adjacent areas such as buffer zones and corridors. The research about the status of wildlife in unprotected areas is lacking. A part of forests of Dang included into Banke National Park, but most of the forest of Dang is under the management of division forest office. This research was focused on wildlife crime in Dang district outside the protected area, providing baseline information on it. It can be helpful to gain understanding about the weakness in the legal system and weakness in the programs conducted on wildlife conservation by NGOs and INGOs. Loopholes in law implementation during handling of wildlife crime cases can be highlighted for further improvement.

1.5. Limitation of the study

- The data are based on people's perception.
- The study is site specific and generalization is not possible.

2. LITERATURE REVIEW

Illegal wildlife crime and their trade is big hurdle for conservation of wildlife globally. Despite of various national and international laws, treaties and effort, many researches show the practice of crime and trade in protected and unprotected area. Still many cases are not getting limelight but many researches had published data on it.

2.1 Status and factors influencing for wildlife crime

Many factors are responsible for illegal wildlife crime in national and worldwide scenario. Many researches clarify direct and indirect factors are linked to explore towards crime perception. People's attraction towards wildlife crime focused on high market value of bush meat (Sapai Min, 2015; Bhattarai et al., 2016; Chang et al., 2018; Lubilo and hebinck, 2019), medicinal value (Pokhrel et al., 2008; K.C. and Kharel, 2011; Ferreira et al. 2014), wildlife conflict (Inskip and Zimmerman, 2009; Paudel and Kindleman, 2012; Soofi et al., 2018), lack of awareness (Stell et al., 2012; Travers et al., 2019).

Yi-ming *et al*. (2000), dozens of wildlife species have been killed for illegal wildlife trade. The actual number of wildlife species may increase because the mentioned species are only based on evidence of successful seizures. It is obvious that the number of the species and volume of illegal wildlife trade is higher than those confiscated, but these numbers are exceedingly difficult to estimate.

Li Yi *et al.* (2000), The Himalayan region of China with its rich biodiversity used to be important for crime and collecting of medicinal plants. Wildlife of Himalayan region of China is suffering from illegal crime of Giant panda, Tibetan antelope and trade even after China has enforced the China Wildlife Protection law (CWPL). First the CWPL is still imperfect especially concerning illegal trade and smuggling across border. Second CWPL is not fully enforced. Third infrastructure in many natural reserves is undeveloped and human resources is lacking. Furthermore national legislation is often not fully enforced in areas that are inhabited mainly by tribal and minority communities.

Pokharel *et al*. (2008) and KC and Kharel (2011), Wildlife is killed mainly for its body parts which have high market value. The wildlife parts are used for different purposes such as traditional medicine, costume, food and faith and ritual activities. Bones of tiger

and leopard, horns of rhino, gall bladder of bears, musk and pangolin scales, are used for oriental traditional medicines while skins and wool for fur products and clothing.

Inskip and Zimmerman (2009), Wild cat species are commonly killed in Nepal and are mainly illegally trade in Kathmandu. Wild cat species are commonly killed in retaliation for livestock depredation or attacks on human.

Aiyadurai *et al.* (2011), Food is found as the main reason for crime followed by money, rituals, interest in crime and retaliatory killing of crop raiding animals. Cash income is also important reason for crime.

Paudel and Kindllmann (2012), Forest landscapes in the mid hills of western Nepal are not adequately conserved within a protected area network. The species and ecosystem of these human dominated landscapes are highly endangered. Data on spatial structure of 3 endangered mountains ungulates, the presence of these species is determined by the level of human disturbance and habitat requirements. The species preferring flat areas covered by dense forest are exposed to more intensive human disturbances and even an adaptation to rugged areas does not imply less human disturbance. Abundance of all species studied declined with the number of villages in the vicinity and increased with distance to nearest village.

Stell *et al*. (2012), Awareness and attitudes related to wildlife crime practices among local communities in the western part of Serengeti National Park, Tanzania was examined. The extend of awareness of these practices and attitudes towards them were significantly affected by age, gender and level of education with limited awareness observed among women and those with higher education levels. The relatively extensive awareness of illegal crime practices probably reflects community member's involvement in illegal wildlife use.

Sapai Min (2015), the items observed at the survey site included animal skins, whole animals and body parts, primarily for use in traditional medicine and for decoration; live animals were on sale to be kept as pets and wild meat for food.

Bhattarai *et al.* (2016), 48 people were interviewed from communities around Bardia National Park in Nepal, including ex-hunters and protected area management professionals. In the past crime was primarily for the purpose of obtaining meat for household consumption. Since, the introduction of road network in the region, opportunities to sell wild meat at highway markets have developed. The purported medicinal properties of wild meat were also cited as a driver for illegal hunting. Gun

(mostly made locally by hand) and dogs are reported to be commonly used. Protected areas mangers indicated that illegal crime problems in the study area are associated with lack of presence of park authorities, remoteness, underdevelopment and poverty of the Community.

Rosaleen *et al*. (2016), From the review of academic and policy literature on illegal poaching and crime they concluded that people hunt illegally because of poverty or lack alternative livelihood strategies. However, there has been little attempt to develop a richer understanding of the motivations behind contemporary illegal crime.

Sharma *et al*., (2018), Biodiversity is declining at an unprecedented rate with infrastructure development being one of the leading causes. New infrastructure such as roads, provide new access and results in increased land clearing and wildlife crime. Their finding reveals that there is currently large spatial heterogeneity in habitat quality across the landscape as a result of current anthropogenic threats that 3 areas of particular could have up to 40% reduction in habitat quality as a result of unplanned infrastructures.

Chang *et al*. (2018), Respondents viewed crime as a form of recreation not as an economic livelihood and reported that they would not stop hunting in response to marked declines in expected catch. The motivation for crime and its implications for the ecological consequences of crime have been understudied relative to subsistence and profit crime.

Soofi *et al*. (2018), Illegal crime of ungulates can reduce the prey base of carnivores, which can increase human carnivores conflict (HCC) through livestock depredation. The depredation increased up to by 4 times with an increase in the illegal crime of Ungulates by one sign significantly.

Ferreira *et al*. (2014) published an article about the wildlife trade in South Africa. Rhino horn has been used in traditional Asian medicine; however the recent spike in demand has been driven by an increasing desire for rhino horn as a status symbol in Vietnam. The combination of increasing demand and high black market prices for rhino horn in Asian markets has fueled an escalation in rhino poaching since 2007, particularly in South Africa. This situation has in turn resulted in greatly increased rhino protection costs, loss in confidence by the private sector in rhinos, loss of revenue to conservation authorities and reduced rhino population growth rates.

Rogan *et al*. (2018), conducted interviews with bush meat hunters and heads of rural households about crime activities, rural livelihoods, attitudes towards wildlife and market

characteristics of illegal bush meat. Results revealed that compared to non-hunter households illegal hunter households lived in closer proximity to wildlife were more likely to farm crops and more often received income from formal employment by at least one household member. Bush meat hunting was positively correlated with livestock wealth but not associated with household income. Bush meat hunting in Botswana is generally supplemental to household core income sources rather than essential for subsistence.

Lubilo and Hebinck (2019) investigate on local hunting and community based natural resource management in Namibia. They argue that poaching and illegal crime are inadequate concepts for understanding why local forms of crime persist despite their being banned and criminalized. A poacher poaches because a set of institutional rules recognizes and identifies him or her as such. The conservation policies and specifically the creation of environmental subjects, conservancy's distributional politics and a contrasting ontological foundation of community based conservation play key role in explaining the continuity of crime. More space is needed to situate local hunters and their hunting practices and motivations in the broader conservation discourse and policies.

Travers *et al*. (2019) investigate the drivers and prevalence of wildlife crime in communities surrounding two National parks in Uganda by applying a set of novel techniques. Although poverty is often assumed to be a key driver of wildlife crime, they shows that better off households as well as those that suffer from human wildlife conflict and those that do not receive any benefits from the parks tourism revenue-sharing are more likely to be involved in certain types of wildlife crime especially illegal crime. The interventions predicted to have the greatest impact on reducing mitigating damage caused by wildlife and generating financial benefits for park adjacent households.

2.2. Temporal trend of poaching

Yi-ming *et al*. (2000) found that dozens of wildlife species have been killed for illegal wildlife trade. The actual number of wildlife species may increase because the mentioned species are only based on evidence of successful seizures. It is obvious that the number of the species and volume of illegal wildlife trade is higher than those confiscated, but these numbers are exceedingly difficult to estimate.

Elildo (2010) surveyed the Tapajos-Arapiuns Extractive Reserve in Brazilian Amazonia to investigate hunting of jaguars and pumas. They interviewed 115 people in 45 villages

in 2007-2008 and recorded number of jaguars and pumas killed and the circumstances associated with each killing. At least 32 jaguars and 22 pumas were killed in Reserve within last 10 years.

Poudel (2012), Hunting is widespread throughout the region but the intensity of crime is greater close to the northern edge of the National Park which is associated with the relative abundance there of wild life. Crime immediate periphery of the National Park is increasing. The crime of common and protective species suggests that it is both for subsistence and trade.

The Himalayan Times, September 7, 2015 published news about wild life poaching in Kalikot district. The brunt of the illegal crime of wildlife has fallen upon the endangered musk deer for its valuable musk pod in Kalikot district. Musk deer which was found abundantly in the jungle and meadows of the high mountain belt in the district once upon a time have become rare sight these days.

Dangol (2015), the information on 167 wildlife crime cases of seizures and arrests in the Kathmandu Valley from 2003 to 2013 was compiled. He found significant increase in seizures and arrests between 2003AD to 2013AD in Kathmandu Valley.

GeldenHuysk (2016), South Africa has by far the largest population of Rhinos in the world and is an incredibly important country for Rhino Conservation. From 2007-2014 South Africa experienced an exponential rise in rhino poaching a growth over 9000%.

The Kathmandu Post, April 1, 2018, published news about Poaching rising in Chure area. Incident of Poaching and Smuggling of Wild animals have been on the rise in northern part of Chure forest in recent years. According to conservationists, poachers use musket to kill animals. Poachers are killing wildboars, deer and blue bulls in day time and wild rooster, Kalij pheasants at night according to local people. On November 7, 2017 police arrested a poacher with muskets in Chure area. According to District Police Office, Siraha, Poachers are using muskets to kill animals on the pretext of protecting their crops. At least 24 wild animals were killed after being hit by vehicles in the Pathalaiya-Amlekhganj road section along the Tribhuvan Highway in four months.

The Himalayan Times, July 12, 2017, published news about rise in wildlife poaching. As the end of current fiscal in just a few days away police had arrested 107 suspects including 10 foreigners with body parts of 47 endangered animals in Kathmandu (2016-2017), the highest in the past five fiscals. The number of people arrested with animal

body parts in the fiscals 2015/16, 2015/14, 2014/15 and 2013/14 stood at 105, 71, 93 and 64 respectively.

2.3. Solutions to decrease wildlife Crime

Aryal *et al.* (2015), DHR (Dhorpatan Hunting Reserve) the only hunting reserve in Nepal is famous for trophy hunting since 1987.Blue Sheep and Himalayan tahr trophy hunting has generated economic benefits through generation of local employment and direct income of $364072 during last 5 years. Government revenue collected from 2007/08 to 2011/12 totaled $18372.

Geldenhuys, K. (2016), Throughout Africa and rest of the world for conservation efforts to be succeeding local communities living in or near protected areas must and should be involved in conservation management decisions. Local communities must be benefitted from conservation. The COI (Committee of Inquiry) agreed there is an urgent need to improve both socio-economic conditions of rural communities, neighboring protected areas and their environment for strong mutual partnerships around natural resource and management and benefits. The COI suggested that minimum requirement of community like water, waste sanitations, energy, roads, transport and health services should be fulfilled for conservation of wildlife.

Sharma *et al.* (2018), GIS based methodology could be used to conduct studies in data for poor developing countries where rapid infrastructure development across ecological sites are ongoing in order to make society, policy makers and development planners aware.

Roe (2019), the dearth of evidence on effectiveness of community based strategies to tackle IWT may not be any worse than the evidence of effectiveness of other approaches. Nevertheless, it presents a major conceptual and technical barrier to the uptake of community engagement approaches as well as hampering efforts to encourage national governments to implement the commitments they made through the high level policy forms. Out of 19 case studies most of them were effective, whereas four cases were partially effective. The effectiveness varied overtime or was site specific. There are examples of successful approaches to engaging communities in tackling illegal wildlife trade. These need to be scaled up and scaled out, learning from experience and adapting approaches to fit specific challenges. But core principle remains the same, communities need to be central not peripheral to conservation efforts.

Policy and legislation

The constitution of Nepal stresses that, “conservation, augmentation and sustainable use of forests, wildlife, birds, plants and biodiversity shall be done by reducing threats from industrial and physical development.’’ The forest policy 2071B.S emphasis on landscape level conservation and management for sustainable development and environment balance and also control poaching. The National biodiversity strategy and Action Plan 2014 also identified wildlife crime. Recently International Trade in Endangered Wildlife and Plants Control Act, 2073B.S has been enacted for effective CITIES implementation in Nepal. Meanwhile both Forest Act, 2049B.S (1992) and National Parks and Wildlife Conservation Act, 2029B.S (1973) has been amended in 2016 and 2017 respectively.

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3. MATERIALS AND METHODS

3.1. Study Area

Dang district is located in Inner Terai of Lumbini province, Nepal. Dang has an area of 2,955 km^2, lies at the latitude of 27˚37’ to 28˚39’ North and longitude 82˚2’ to 82˚54’ East. This district is in the height of 213m to 2058m from sea level. The maximum and minimum temperatures of this district are around 34˚c and 14˚c respectively and rainfall averages more than 130mm annually. Climate is tropical in this district. Dang district has two valleys Dang and Deoukhuri in which Dang is the largest valley of Asia. This district is connected with Banke National Park and it’s buffer zone in the west, Arghakachi and Kapilbastu in the east, Rolpa and Pyuthan in the North and Uttarpradesh of India in the South. It has two mountain range Churiya and Mahabharat range.

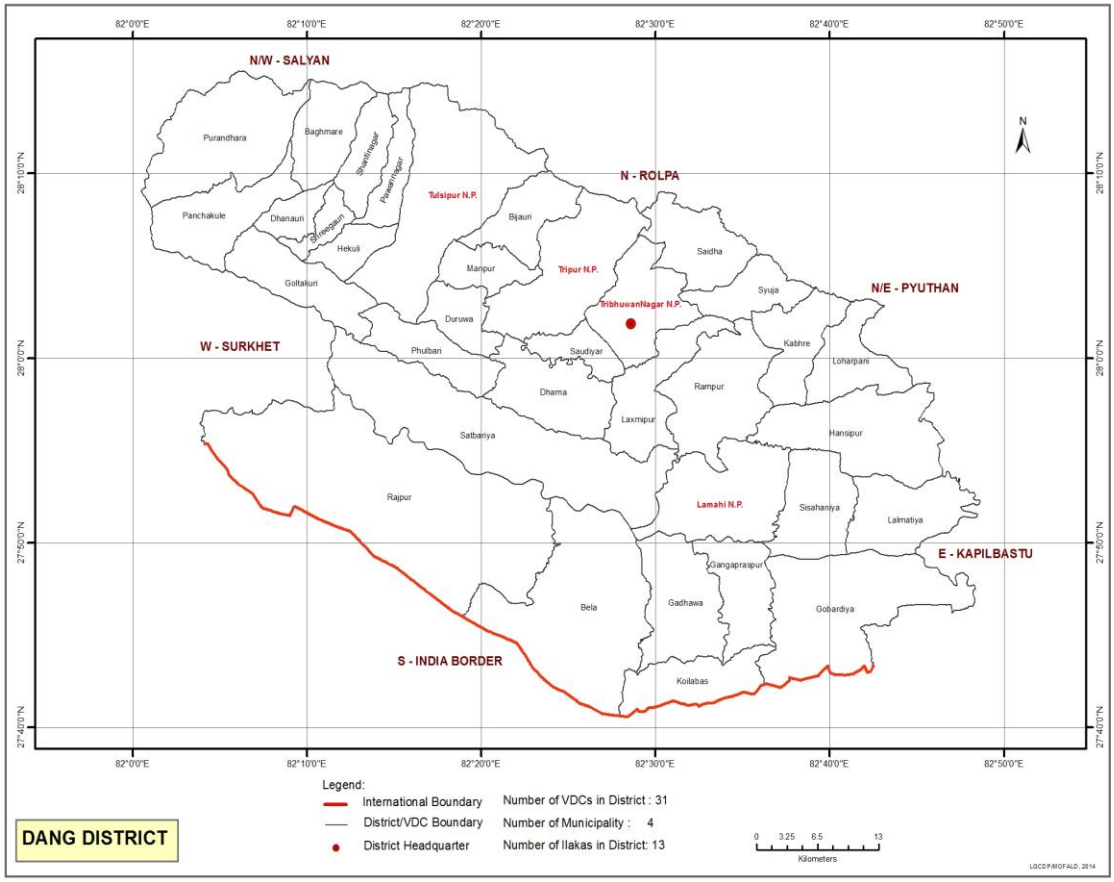

Figure 1: Map of Dang district (MoFAGA)

3.1.1. Socioeconomy

The total population of dang district is 5,52,583 in which urban population is 20.71% and rural population is 79.29%. The population of female is 2,91,534 (52.77%) and the population of male is 2,61,059 (47.23%) (CBS, 2011). There are 1,16 425 houses with 4.75 average individual per house. The population density is 187 and population growth rate is 1.78% of this district. The major group of this district is Tharu (29.71%) and other group are Chhetri (24.9%), Magar (13.6%), Brahamin (10.24%), Kami (6.68%), Sanyasi (2.33%), Sarki (1.89%), Kumal (1.73%), Yadav (1.47%) and other has less than 1%. The literacy rate of this district is 70.32% in which female literacy rate is 62.78% and male literacy rate is 78.88% (CBS, 2011).

3.1.2. Land use status

Total area of Dang district is 29,555 km^2. Area covered by forest is 1926.82 km^2 whereas area covered by other herbs and shrubs is 80.43 km^2. Area covered by agricultural region is 691.5 km^2 (Forest research and conservation department, 2015).

3.1.3. Types and status of natural forest

Dang district consists of Siwalik, Bhabar, Churey and Mahabharat range. There are differences in topography according to geology, soil texture and climate so, the flora and fauna are also diverse. Two third of the total area is covered with forest. A research conducted by forestry department on 2012 showed that the area of forest has increased (around 1700 hectare) in comparison to 1990. In 2015, Forest Research and Investigation Department published that, in Dang the total area covered by forest is 2007.25 km^2 which is 67.91% of the total area. The forest is mainly spread at the upper and lower area of Chure at Dang and Deukhuri valley whereas few at the plain area in between. There are mainly 6 types of forest found in this district. They are:

a) Mixed Sal Forest
b) Pure Sal Forest
c) Mixed Khair Forest
d) Mixed Sisso Forest
e) Chir Pine Forest

Source: (DFO, Dang, annual report 2074/75)

3.1.4. Uses of forest

Forest of Dang District is mainly used for collection of timber and firewood. Woods are used as furniture in house whereas the remaining timbers after used by members of community forest are sold in the market. Grass and fallen leaves are used by local people. National Forests are located in the remote area so forest resources are used randomly. According to informal study the 90% need of firewood and 75% need of grass are found fulfilled from forest.

3.1.5. Forest management type

Forest Type	**Area**
1. National forest (including block forest)	94, 888.26 hectare
2. Community forest	1, 05, 546.02 hectare
3. Religious forest	152.52 hectare
4. Private forest	138.2 hectare

3.1.6. Fauna

Dang conquered by large area of forest and land. So this is residence of large number of animals as mammals, birds, reptiles etc (Annex 3). It also could be considered as valley of Striped Hyena. Many major animals like Leopard, Bengal tiger, Four horned antelope, Sloth bear etc (DFO Annual report 2074/75).

3.2. Research methods

3.2.1. Sampling selection

Stratified and Purposive sampling methods were used respectively for selecting respondents from different research sites. Ten major strata; Babai, Shantinagar, Dangisaran, Ghorahi, Tulsipur, Lamahi, Banglachuli, Rajpur, Rapti and Gadawa were made based on political boundary. Respondents were selected purposively based on the principle that judgment about, which will be the most useful or representative to provide required information for this study (Zabbie, 1999).

3.2.2. Questionnaire survey with general public

The semi-structured questions related to wildlife crime was prepare and asked with general public to determine status, factors and consequences. To obtain information in accordance with the objectives of the research topic questionnaire interviews was carried out with natural resource managers and sampled households within the local communities and households. The interview process ensured the encouragement of greater responsiveness on sensitive issues and used to probe ambiguous responses through clarification of the questions.

3.2.3. Consultations/meetings/interactions

People's participatory consultations/interactions was carried out at local (community forests users group, forest guards, herders, community organizations etc.) to understand the current HWC issues, strategies to resolve and challenges of the study area.

3.2.4. Focus group discussion

The area for the Focus Group Discussions (FGD) was chosen indiscriminately. The FGD is a helpful method for getting subjective data, which can be utilized to assess environments in situations where their condition is indeterminate (Yamada et al. 2004). It is a group based association, constituted for preservation and manageable gathering of backwoods items (timber, kindling) from an assigned territory. The members were official individuals, forest watchmen and clients. Semi-organized inquiries were utilized as a part of request to structure the dialog.

3.2.5. Collection of secondary sources of information

The total number of cases registered (2068 to 2075) related to wildlife crime and data of seized wildlife parts from DFO and WCN was collected to determine the various possible aspects of crime in the study area. As such sources help to know the past scenarios for developing new ideas for future.

4. Results

4.1. Socioeconomic characteristics of respondents

4.1.1. Sex

Among 211 respondents 88(41.7%) were female and 123(58.3%) were male. There is strong association (χ^2 =71.295, p<0.05) between hunting practice and sex of the hunters and male are found more involved in the crime activities than female.

4.1.2. Education

The education status of respondents was classified into 4 categories according to Nepal government i.e. Basic, Secondary, Higher and Uneducated. Out of 211 respondents in questionnaire survey uneducated and secondary respondents found to be most (33.6%). Chi square test shows that there is strong association (χ^2=38.728, P< 0.05) between wildlife crime and education level and people having basic and secondary level education are more involved in wildlife crime.

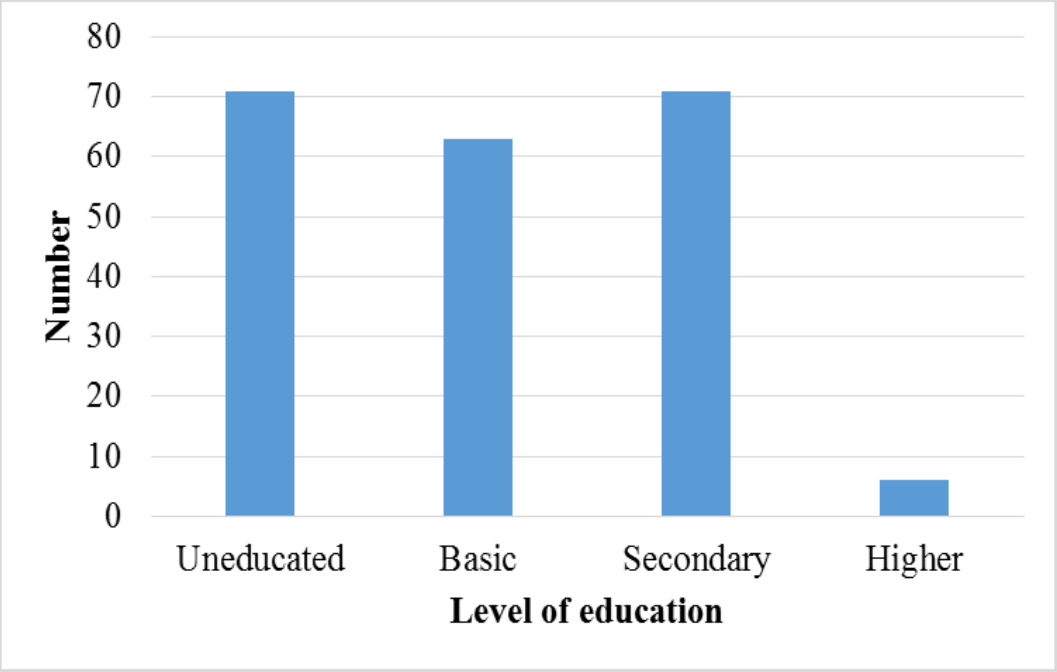

Figure 2: Education status of the respondent

4.1.3. Occupation

Out of 211 respondents 100(47.4%) were engaged in agriculture, 52(24.6%) were employed, 59(28%) depend upon remittance.

4.1.4. Residential status

The residential status of respondents was classified into two group i.e. Migrated and residential. Out of 211 respondents 60(28.45%) were migrated and 151(71.6%) respondents were residential.

4.1.5. Economic wellbeing

The economic wellbeing of the respondents was classified into 4 categories on the basis of community forest constitution. Out of 211 respondents majority of them were found medium (57.8%) than other categories (Figure 3). Chi square test shows that there is no significant association (χ^2=6.133, P>0.05) between yearly income and crime practice and people having medium income are found more involved in crime practice.

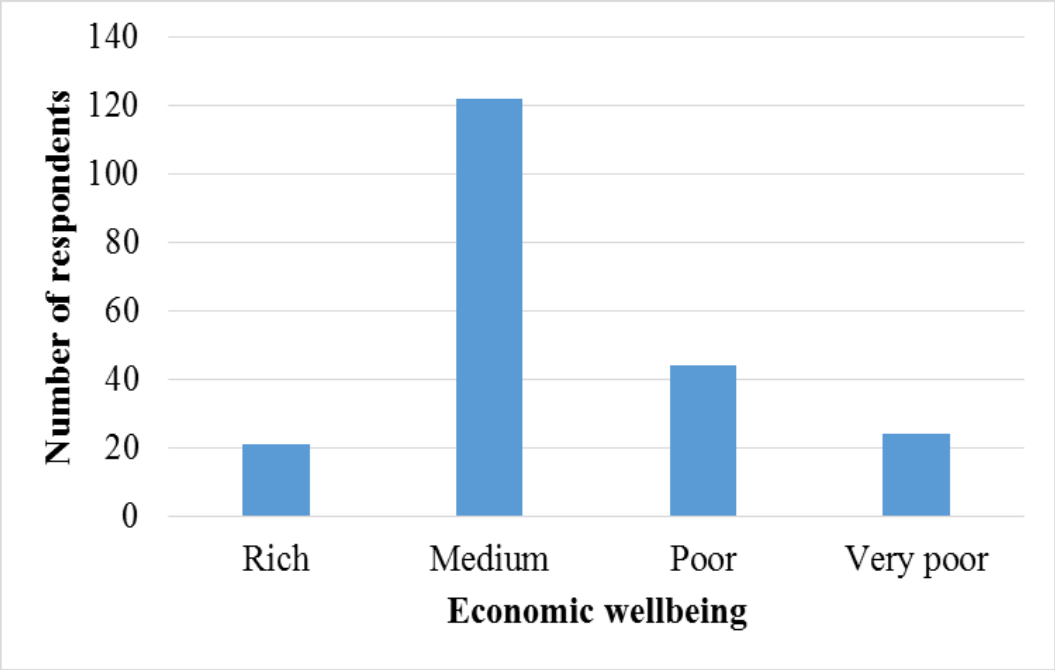

Figure 3: Economic wellbeing status of respondents

4.1.4. Age category of respondents

The age of respondents was classified into 3 categories according to CBS. Out of 211 respondents 9(4.3%) were young, 92(43.6%) were adult and 110(52.1%) respondents were senior people. The non-parametric chi square test shows that there is significant association (χ^2 =6.122, P<0.05) between age and crime practice. Adult and senior people are involved in crime than young.

4.2. Respondents visit into forest and encounter with wild animals

4.2.1. Respondents visit into forest

Respondents were asked how frequently they visit the forest. Out of 211 respondents 73(34.6%) answered frequently and 138(65.4%) respondents answered occasionally.

4.2.2. Purpose of visiting forest

Respondents were asked for what purpose they used to visit the forest. Purpose of visiting forest for grass and fire woods found maximum (84%) than grazing (7%), visiting (5%) and timber (4%) (Figure 4). However, the statistics shows that there is no significant association between hunters mobility to forests and crime activities (χ^2=1.197, P>0.05).

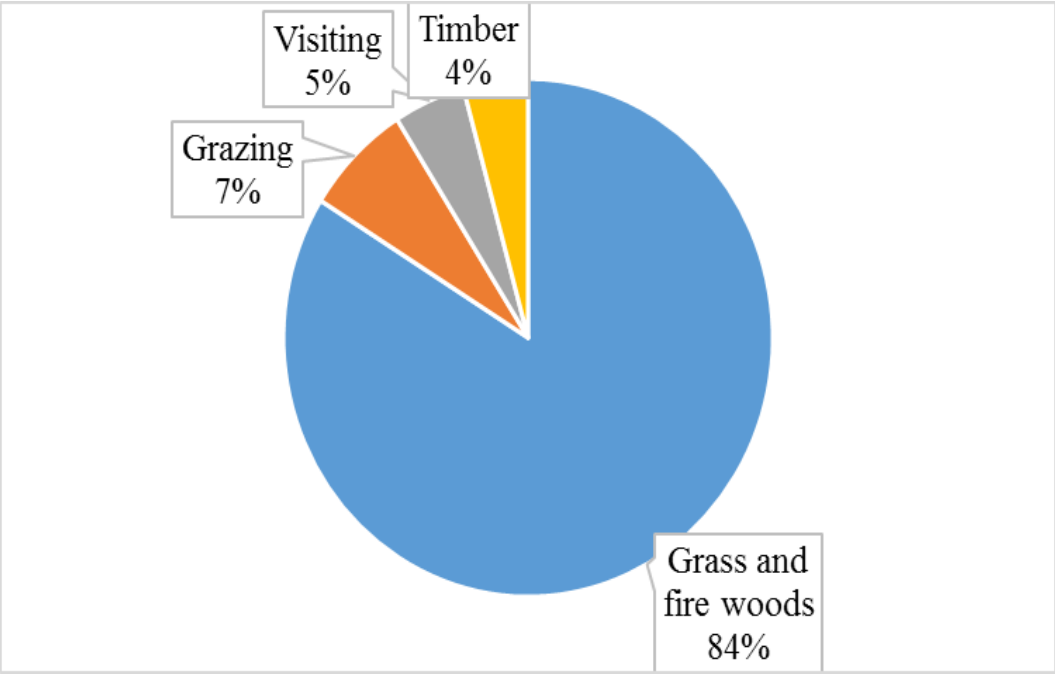

Figure 4: Respondents visiting forest for different purposes

4.2.3. Encounter with wild animals

Respondents were asked how frequently they encounter wild animals during forest visit now and then. Most of the respondents replied there are fewer animals now and also encountered less. But some respondents also said that wild boar and porcupine are encountered frequently now.

4.2.4. Reasons for decline in number of animals

Respondents were asked about their opinion on the reason behind decline in number of animals where habitat destruction (28.4%) and hunting (26.1%) found more (Figure 5).

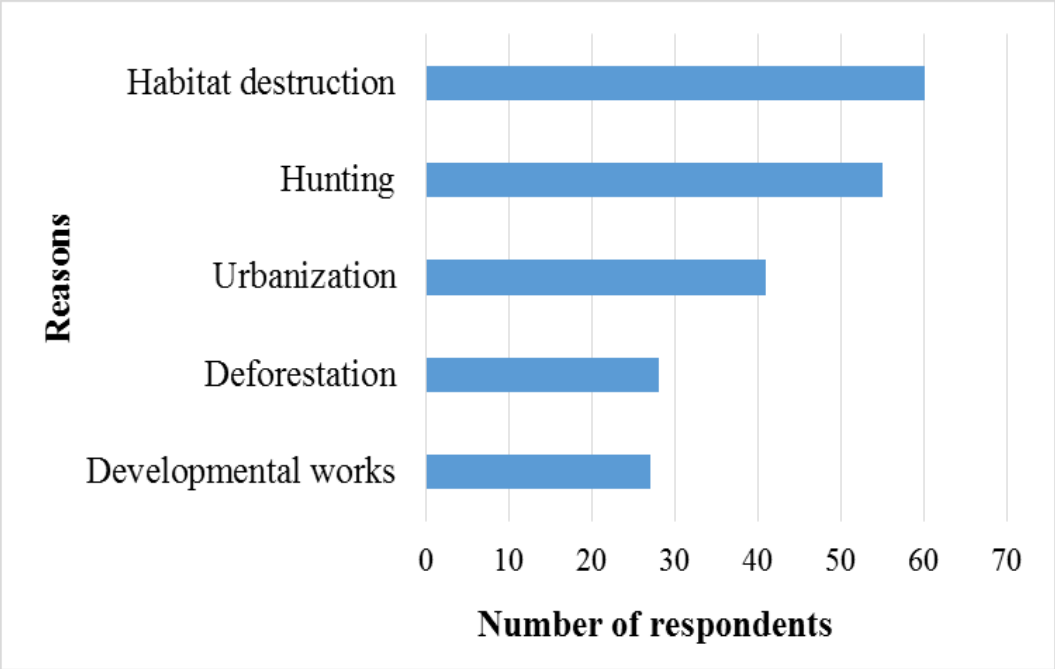

Figure 5: Reasons for decline in number of animals according to respondents

4.3. Respondents knowledge about wildlife crime

4.3.1. Knowledge about Poaching

Respondents were asked either they know about poaching or not. Out of 211 respondents 93(44.1%) replied don't know and 118(55.9%) replied Yes.

4.3.2. Reasons for involvement in wildlife crime

Result shows that 31.8% were involved in wildlife crime because of conflict whereas 24.25% were involved for meat. Out of the 77 respondents who were involved in crime, 67 of them were involved because of HWC (Figure 6). Statistics depicts that there is strong association between crime and HWC (χ^2=5.02, P<0.05).

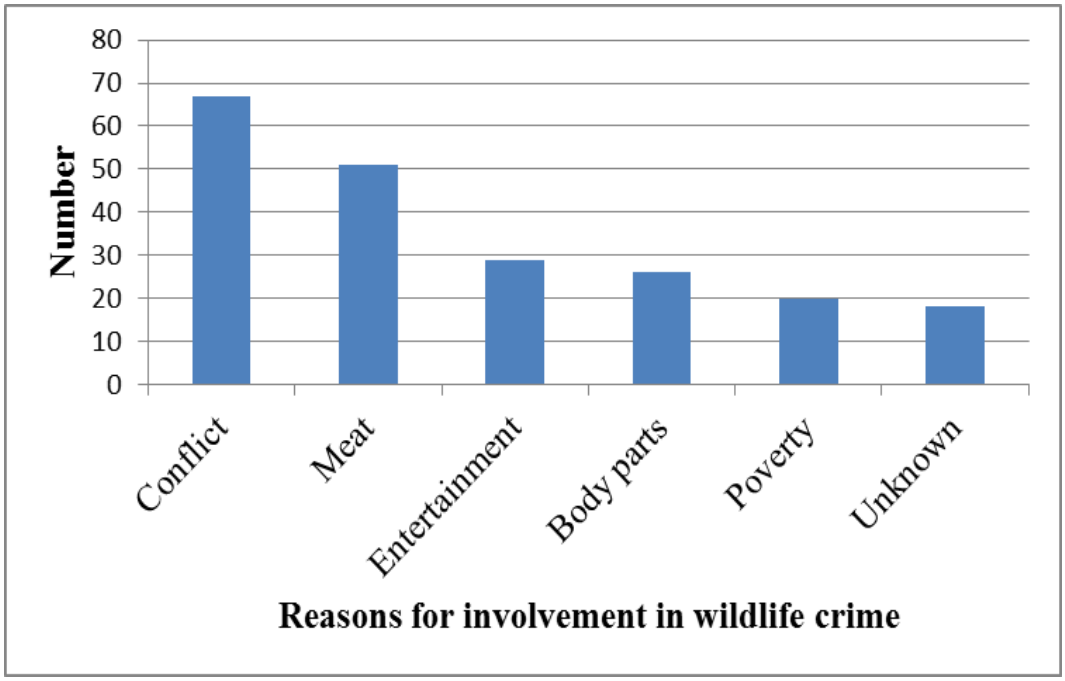

Figure 6: Reason for involvement in wildlife crime

4.3.3. Methods of hunting

According to respondents, methods used for wildlife hunting are gun, homemade weapons and live trap. Among them live trap method found common in this area.

4.4. Trends of crime

4.4.1. Involvement of respondents in wildlife crime

Among 211 respondents, 77(63.5%) were involved in wildlife crime whereas 134(36.5%) were not involved in such crime.

4.4.2. Targeted species for hunting

Northern red muntjac, Wild boar, Indian hare, Indian crested porcupine, Monitor lizard and kalij pheasant are found most targeted species for hunting in this study area(Figure 7).

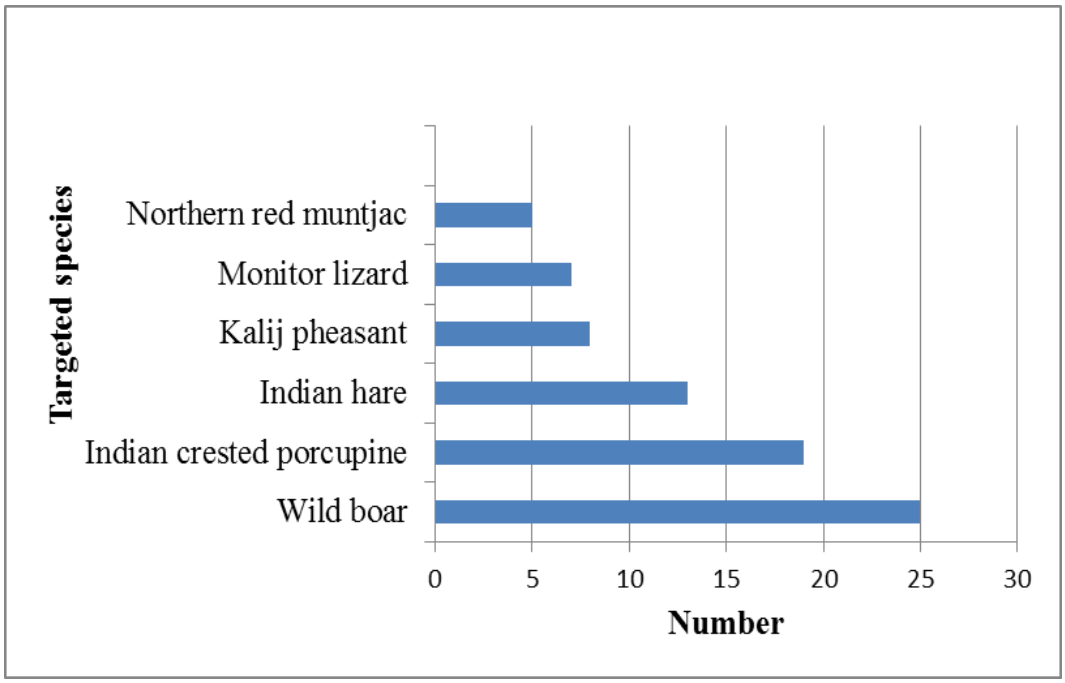

Figure 7: Targeted species for hunting by the respondent

4.2.3. Status of wildlife crime

Respondents were asked either the wildlife crime is increasing or decreasing. Out of 211 respondents 67 replied decreasing, 62 replied no idea and 82 respondents replied same as before.

4.3. Secondary data

Secondary data was collected from DFO, Dang and WCN. The data of number of cases registered and seized wildlife parts from 2070 to 2075 was collected from DFO and WCN which gives the following results:

4.3.1. Wildlife crime cases according to class

Total 15 crime cases were registered from 2070 to 2075 in DFO, Dang. Out of 15 cases, 13 cases are related with mammals, 1 case is related with bird and 1 case is related with reptile.

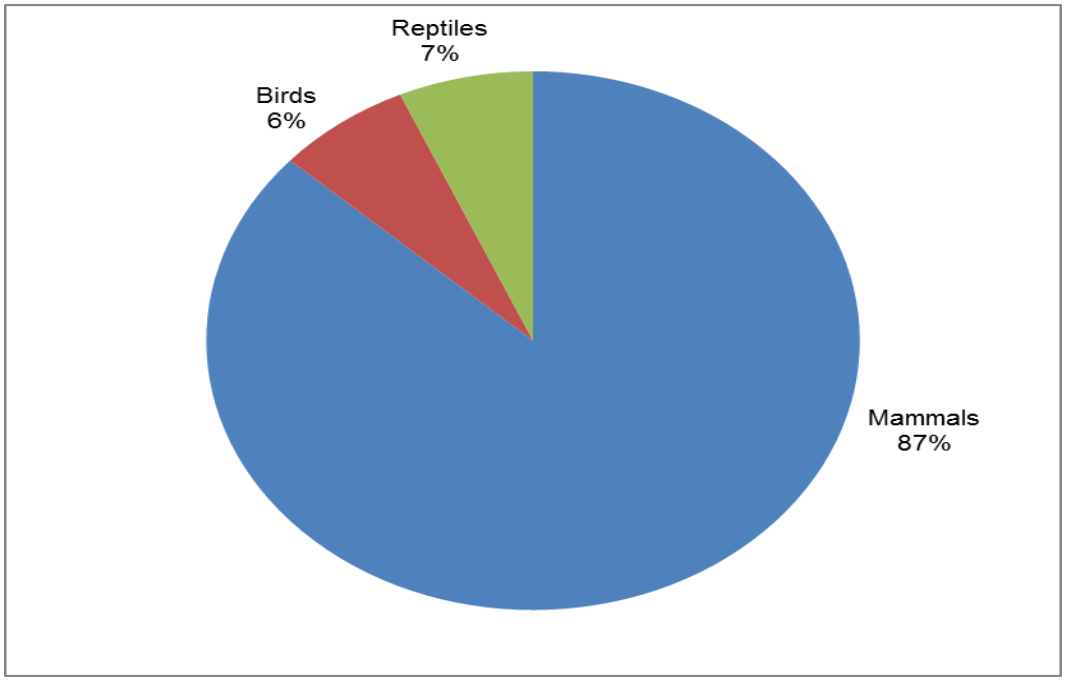

Figure 8: Wildlife crimes on the basis of class

4.3.2. Temporal trend of wildlife crime cases

The temporal trend of wildlife crime cases from 2070 to 2075 found uniform but in increasing order in last two years.

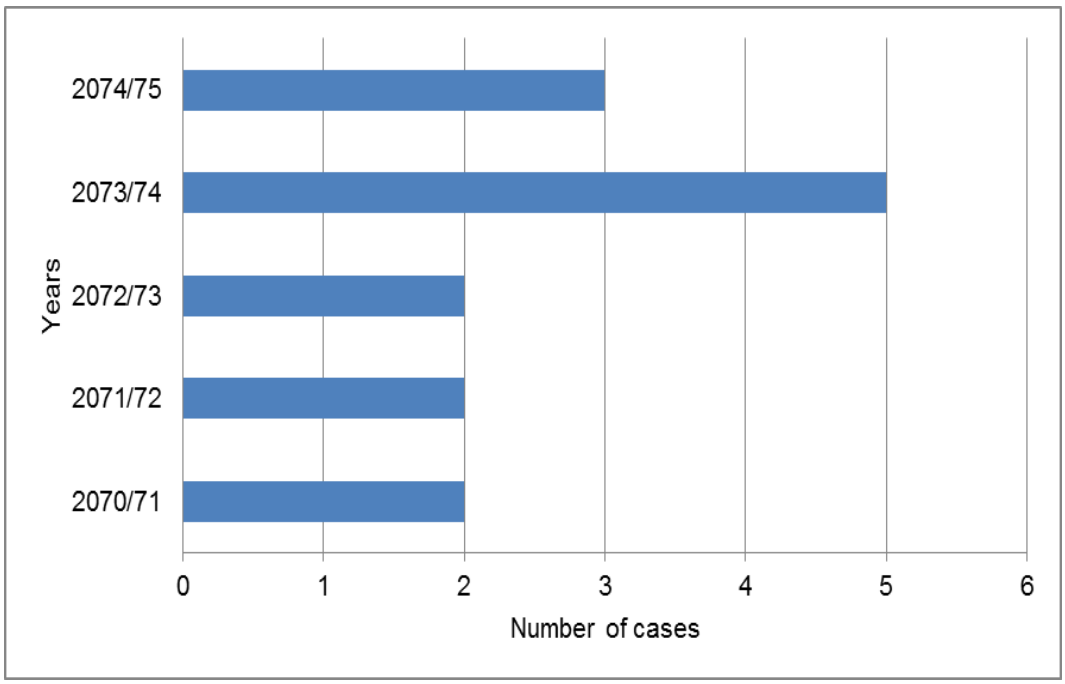

Figure 9: Temporal trend of wildlife crime cases

4.3.3. Seized wildlife parts

Total 26 wildlife parts were seized from 2070 to 2075 B.S. Among seized parts skin of leopard and meat of barking deer was found most (Table 1).

Table 1: Seized wildlife parts

S.N.	Animals	Seized parts	Number of cases	Number of seized parts
1.	Leopard	Skin	4(26.66%)	8(30.76%)
2.	Barking deer	Meat	2(13.33%)	7(26.92%)
3.	Wild boar	Meat	1(6.66%)	3(11.53%)
4.	Hyena	Skin	1(6.66%)	2(7.69%)
5.	Vulture	Bones	1(6.66%)	1(3.84%)
6.	Turtle	Shell	1(6.66%)	1(3.84%)
7.	Fox	Skin	1(6.66%)	1(3.84%)
8.	Snow leopard	Skin	1(6.66%)	1(3.84%)
9.	Red Panda	Skin	2(13.33%)	2(7.69%)

4.4. People's perception towards wildlife crime

The semi structured questions related to wildlife crime were asked to general public and hunters. According to them, although wildlife crime has been decreased in comparison to past but crime exists at low volume throughout the district. According to them, there is very weak monitoring of government for protection of wildlife in unprotected areas. The introduction of road network made easy for hunters. According to local community forest user hunting of common animals is not cared in community forest as result common animals are also rarely seen now days in community forest. Participants said conflict is also the major reason for crime. In order to protect their crops and livestock they are forced to involve in crime. Most of the participants agreed to protect the wildlife but effective programs that is beneficial to both community and wildlife is lacking. Interactions\Meetings were carried out to understand crime practice (Community forest users group, forest guard, community organization). Most of the participants agreed wildlife crime exists in the unprotected areas of Dang district and community forests are more focused in conservation of forest than wildlife. Forest guard of community forest

said, trap for kalij, porcupine and wild boar are frequently found in the forest area. So involvement of local people in wildlife crime has become a challenge for protection of wildlife. Monitoring forest is done at day time frequently but crime practice is found at night time. According to them, lack of manpower is the problem for efficient monitoring and monitoring of forest by DFO is done rarely. Participant suggested that efficient programs should be conducted to reduce HWC and local people should be in priority in order to conserve the wildlife. Questions related to wildlife crime were also asked to the official of DFO. According to DFO official, DFO compromise after research in the community forest as a result local people uses community forest for grazing, plantation of medicinal plants etc which increases the chance of wildlife crime and directly affect the wildlife. According to him researches about the number of wildlife is lacking in unprotected areas that shows unprotected areas are not focused on conservation of wildlife. Various programs have been conducted regarding to decrease HWC and wildlife management. He accepted these programs are limited in paper due to possible conflict between DFO and local people. Monitoring in remote areas has become challenge for protection of wildlife. Respondents and participants suggested establishment of national parks, legal hunting of animals like wild boar, conduction of programs beneficial to local people, providing employment to local people and involvement of local people in conservation of wildlife can reduce the illegal wildlife crime in unprotected areas.

5. Discussion

Illegal wildlife crime and trade in Dang district exists at least according to records of seizures and arrests between 2070 to 2075B.S. The act of poaching and smuggling of wild animals in recent years has been rising in an alarming rate (The Kathmandu Post, 2019). There is decline in the number of endangered musk deer due to illegal hunting for its valuable musk pod in Kalikot district (The Himalayan Times, 2015). Although the crime is widespread throughout the region, there is greater in northern part of Bardiya National Park because of the more number of wild animals in this part (Poudel, 2012). In the Kathmandu valley, 167 wildlife crime cases of seizures and arrests were compiled from 2003 to 2013 (Dangol, 2015). From western part of Nepal 12 incidents with arrest of 2 dozen people with tiger parts was reported (Shahi, 2016). From 2007 to 2014 South Africa experienced an exponential rise in rhino poaching a growth over 9000% (Geldenhuys, 2016). 32 jaguars and 22 pumas were killed in Tapajos Arapiuns Extractive Reserve within last 10 years (Elido, 2010). Wildlife trade is one of the major factor of illegal crime and the definite number may rise because records given regarding to wildlife crime are only based on evidence of successful seizures (Yi-ming *et al.,* 2000).

Illegal wildlife crime has become a worldwide challenge for the conservation of wildlife. Various researches show that wildlife crime has become the major threat for wild animals. The trend of wildlife crime is increasing or same as before although various laws and acts are introduced regarding to wildlife crime. Illegal crime has become serious problem in the protected areas and outside. Dang district is covered by buffer zone of Banke National Park and a large area of nonprotected areas that harbors various species of wildlife facing the illegal crime and poaching. In this research respondents were asked about the trend of wildlife hunting. Result shows that illegal hunting is widespread in unprotected areas of Dang district and according to respondents near forest area gunshot sound is heard occasionally which prove prevalence of illegal hunting and the data of DFO, Dang that shows number of cases registered regarding to wildlife crime is in increasing order from 2070 to 2075 B.S

The number of wildlife species may increase because mentioned species are only based on evidence of successful seizures (Yi-Ming *et al*., 2000). The data of DFO is based on successful seizures so there may be more number of species involved in wildlife crime. In this research involvement of respondents in wildlife crime was determined and 63.5%

respondents replied that they were involved in crime that shows wildlife crime is widespread along the district which cannot be determined by successful seizures only.

Wild animals are killed mainly for its body parts which have high market value. The wildlife parts are used for different purposes such as traditional medicine, costume, food and faith and

ritual activities. Bones of tiger and leopard, horns of rhino, gallbladder of bears and pangolin scales are used for oriental traditional medicines while skins and wool for products and clothing (Chapagain and Dhakal, 2008; Dinestein, 2003; Pokharel *et. al.,* 2008 and K.C and Kharel, 2011). In this research 12.3% of respondents replied they hunt wild animals for body parts which have traditional value and high market value. From 2070 to 2075 B.S, 26 wildlife parts including skin, scales and bone were seized. Rosen and Smith (2010) have also reported that, globally from 1996 to 2008 most of the wildlife seized parts were skins, pelts and furs of tigers and leopards. Hunting of deer as well as other common wildlife occasionally for bush meat in rural and hilly areas is taken as common customary right (Nepal and Weber, 1995). But this custom might have gone local consumption and now for sale. In this research 24.2% of the respondents replied they hunt wild animals for meat which have high market value. Poor people kill wild animals to satisfy their basic needs. So, poverty is seen as the main cause of unlawful wildlife crime (Mackenzie *et al.*, 2016; IUCN, 2015). Local people who live near the forest depend on wildlife for food trade and income (Robinson and Redford, 1991; Fa *et al.,* 1995). In many places species are being extracted for above sustainable limits (Hill *et al.*, 1997; Hant, 2002). Poverty, high economic benefit with minimum effort, unemployment, deficiency of strict policies and sunken penalty charges are considered as major factor which influences poaching (Thapa, 2018). Poverty is taken as major driving force for illegal wildlife crime. People are not involved in wildlife crime only because of poverty but also for enjoyment (Chang, 2018). In this research 13.7% of the respondents were involved in wildlife crime for entertainment. Chi square test shows that there is no strong association between yearly income and crime practice (χ^2=6.133, P<0.05). In this research people having medium income are found more involved in wildlife crime. On the basis of answers of respondents wildlife parts have high market value and are fast source of income that motivates illegal wildlife crime. People were involved in illegal crime especially for the approach of obtaining meat for household consumption but after the development of road network opportunity to sell bush meat at highway market have

developed (Bhattarai *et al.*, 2016). The development of new infrastructures like road provide new approach and results increase in wildlife crime and land clearing (Sharma *et al*., 2018). Infrastructures development mainly the road network has become easy for poachers to sell the wildlife parts in the market. In context of study area road networks are being developed in the forest area also that can increase the crime activities.

Those people who are involved in wildlife crime especially illegal crime are from the households which are suffering from Human Wildlife Conflict and those who are not benefitted from park and tourism revenue sharing (Travers *et al*., 2019). There is high probability of involvement in wildlife crime nearer to the settlement of wildlife habitat (Sharma *et al*., 2014). The involvement of household in illegal crime is found in those household with large farm than small farm (Shively, 2002). Wild cat species are generally killed because of their violent attack to livestock and human being (Inskip and Zimmermann, 2009). There is reduction in prey base of carnivores due to illegal crime of ungulates which may increase human carnivore conflict (Soofi *et al*., 2018). Bush meat crime which is one of the key drivers of illegal crime is positively correlated with livestock wealth but not associated with household income (Rogan *et al*., 2016). Wild animal species richness decrease with the number of village vicinity and increase with distance to nearest village (Paudel and Kindlmann, 2012). These researches show that Human Wildlife Conflict (HWC) is one of the most critical threats facing by many species today. In my research also Chi square test shows that there is strong association between crime and HWC (χ^2=5.02, P<0.05). Respondents and participants in interactions also cited the damage of crops, livestock by wildlife enforce them to involve in illegal wildlife crime. In this research wild boar, porcupines are found most targeted species for crime which are responsible for destruction of crops.

Dozens of wildlife species have been killed for illegal wildlife trade. It is obvious that number of the species and volume of illegal wildlife trade is higher than those confiscated but these numbers are exceeding difficult to estimate (Li et al., 2000). Many species are found involved in the illegal wildlife trade. This indicates that the level of illegal trade is increasing moderately (Dangol, 2015). So it is hard to predict the trend of wildlife crime in future. In this research on the basis of successful seizures by DFO the trend of wildlife crime is found increasing. Every year wildlife parts are found seized by DFO that shows the presence of illegal wildlife crime and that will remain in future also unless effective and local people oriented programs that leads to coexistence are not conducted. Despite

various efforts to control wildlife crime, various researches shows that such crime still exists sporadically and low volume in the country.

Directly and indirectly there are many agencies involved in controlling illegal wildlife crime and trade across the country. Some non-government organizations (NGOs) such as WCN, WWF, and National Trust for Nature Conservation, BCN etc had also helped Nepal Police and DFO with sharing of field intelligence and wildlife rescue. The cabinet decisions have formed different committees in 2010 such as National Tiger Conservation Committee under the chair of Prime Minister and a National Wildlife crime control Coordination Committee under the chair of Minister of Forest and Soil Conservation (DNPWC, 2014). Nepal has been party of CITIES since 1975 demonstrating commitment toward stemming illegal wildlife trade nationally and internationally. Similarly, Government of Nepal has formulated National Park and Wildlife Conservation (NPWC) Act 1973, focusing on protected areas in the country but also containing provisions with intend to control wildlife crime in the country. Forest Act 1993 primarily regulates the management, extraction of and trade in timber and other forest products. However, it also mentions the protection of forest biodiversity which includes wildlife (HMG/MFSC, 2002). NPWC Act 1973 has designated Nepal Police and Forest Officials as authorities to arrest wildlife crime offenders and to search for and seize evidence outside the protected areas. The practice of animal trade highlights a problem with its implementation rather than laws pertaining to wildlife offenses (Bhuju *et al.*, 2009). The law enforcement should be made effective to fight against illegal wildlife trade globally and solid legal basis is crucial for it (Vasquez, 2003). This research shows that despite of many rules, act against illegal wildlife crime and trade, wildlife crime still exists throughout the study area. According to respondents and participants wildlife conservation programs are limited in the protected areas and adjacent areas. Nonprotected areas especially community forests are focused on the conservation of forest than wildlife. Crime of common wild animals like rabbit, porcupine etc. are not cared which are not actually common as said in my study area. DFO Ranger Nabraj Kandel said community forest's programs are focused on the benefits of the community like forest area opened for local people for grazing, planting medicinal plants in forest etc. that directly increases the wildlife crime and destruction of wild animal's habitat. This also has become the challenge for implementation of laws against wildlife crime. DFO Ranger indicated that illegal crime in the study area are associated with a lack of presence of park authorities, remoteness and

underdevelopment of the community that has also become the challenge for implementation of laws against illegal wildlife crime and trade.

The wildlife population have seriously dropped in biomass where illegal crime of wild animals exist that results changes in the relative abundance of age classes (Peres, 20000). The information on crime pattern and key drivers of illegal crime is required to control wildlife crime (Bennett *et al.*, 2000). The information about crime in Asia is limited (Corlett, 2007) and largely restricted to trade (Banks et. al, 2006) whereas in Africa and South America there are data on crime for livelihood by indigenous communities (Robinson and Redford, 1991). It has become clear that wildlife crime is the key factor for declining the wild animals. Researches regarding to the wildlife crime and motivations for wildlife crime is lacking. From this research I found that researches regarding to the factors of wildlife crime and effective programs to the local people those who are involved in crime for subsistence is necessary in order to control illegal wild animal's crime.

Many researches show that unlawful wildlife trade is arranged by effective networks. Local poachers to intermediary and international smugglers are involved in this network (CNP, 2012). It shows that illegal wildlife crime can be controlled only if the wildlife trade is stopped. Wildlife parts from local people to international market are sold through networks. So, it is necessary to co-operate with other countries and to be alert in the border area in order to control poaching.

Those that do not receive any benefits from the parks tourism revenue, sharing are more likely to be involved in certain types of wildlife crime especially illegal crime (Henry Travers *et al*., 2019). Hunting of wild animals is not only for subsistence but also for recreation and they would not stop crime in response to mark declines in expected catch (Chang, 2018). People are unknown about crime laws except near protected areas (Aiyadurai *et al*., 2014). More priority is needed to locate local hunters and hunting practices and motivations in the broader conservation discourse and policies (Lubilo and Hebinck, 2019). Conservation programs can be success if awareness level and positive attitude towards the species is developed in local people (Basnet, 2011).

Households near or in the protected areas must and should be involved in conservation management decisions (Geldenhuys, 2016). The COI (Committee of Inquiry) suggested that minimum requirement of community like water, waste sanitation; energy, roads, transport and health services should be fulfilled for conservation of wildlife. Communities

nearer to the protected area need to be central not peripheral in conservation programs (Roe and Booker, 2019). Various researches show that wildlife crime cannot be controlled unless local people are involved in conservation and are not benefitted. In this research most of the participants of interactions program suggested local people should be in priority regarding to HWC problem and fulfillment of basic needs in order to control illegal crime. Various awareness programs regarding to wildlife conservation in the study area are lacking or very rare that is very important for wildlife conservation. Skills development training for local community members might reduce dependency of local people on wildlife parts for household consumption and source of income. China has implemented 'China Wildlife Protection Law' to control illegal wildlife crime. But wildlife of Himalayan region are still suffering from illegal crime and trade (Li *et al*., 2000). Nepal is also facing poor implementation laws and rules against wildlife crime that is also key factor for illegal crime and trade of wildlife parts. So, it is necessary fully enforcement of laws to control illegal wildlife crime and trade.

Trophy crime has generated economic benefits through generation of local employment and many sources of income in Dhorpatan Crime Reserve (DHR), the only famous hunting reserve in Nepal (Aryal *et al*., 2015). Trophy hunting has become huge and growing industry in many parts of Africa and also has become most profitable form of consumption wildlife utilization (Child, 2000). In this study area also after scientific study and researches if trophy hunting is practiced definitely it will reduce illegal wildlife crime and will improve the economic status of local communities.

In poor developing countries GIS based methodology can be used to the study of wildlife where there is rapid infrastructure development across ecological sites (Sharma *et al*., 2018). The prediction of HWC, identifying conflict hotspots and setting priorities for targeted conservation actions can reduce wildlife crime (Khorozyan*et al*., 2015). So, use of modern technology in this study area in order to control wildlife crime can be effective solution.

6. Conclusion and Recommendations

This study has found that wildlife crime exists in Dang district. The total area covered by forest is 67.9% of the total area of Dang that harbors various species of animals which are facing illegal hunting as a major threat. Lack of awareness, HWC, poor implementation of law against wildlife crime, poverty, recreational activities etc are found key factors for involvement in wildlife crime. Various organizations and Nepal government are working against wildlife crime but cases registered in DFO, Dang regarding to wildlife crime shows that wildlife crime still exists in Dang district. The wildlife crime control institutions and CBOs need to be institutionalized and strengthened according to curb wildlife crime effectively. The local people need to make aware about wildlife crime and HWC to increase their engagement in reducing crime and conflict. Local people should be benefitted and should be priority in conservation programs. Those species which are common in one place of the country may be rare in another place. So, government has to make separate list of animals and their position in Dang district. Trophy hunting can be practiced after the research which can reduce wildlife crime, HWC and improve economic status of local people. Community forests need to be developed into conservation area in order to reduce wildlife crime. Some of the key recommendations for controlling wildlife crime are as follows:

- Increase surveillance of forest area of Dang district and its surrounding areas to control illegal wildlife crime.
- Encourage participation of special target groups in decision making in all institutions by capacitating them through various training for employment.
- Awareness raising program (mainly for the identification of the species and to decrease illegal selling of meat products of different species).
- Train and recruit staffs for smart surveillance (Use of GPS, GIS, data gathering process, data entry process).
- Alternate livelihood support program for livelihood enhancement.

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ANNEXES

Annex 1: Photoplates

A. Questionnaire survey with local people

B. Questionnaire survey with local people

C. Questionnaire survey with focused group

D. Seized skin of common leopard

E. Seized skin of Red panda

F. Seized wildlife parts

G. Seized skin of common leopard

H. Seized wildlife parts

I. Seized antlers sambar deer

J. Key informant interview

K. Key informant interview

L. Interview with forest guard

M. Interaction Program

Annex 2: Questionnaires

1. Village of respondent
2. Sex
3. Age
4. Level of education
    a) Primary level
    b) Secondary level
    c) Higher secondary level
    d) None
5. Occupation
    a) Employed
    b) Agriculture
    c) Unemployed
6. Length of time stay in village
7. Yearly income and source of income?
    a) Rich b)Medium b)Poor d) Very poor
8. How frequently do you enter into forest? For what purpose?
9. List the wild animals found here?
10. Have you ever sighted wild animals? If yes, where and what species?
11. Have you sighted death wild animals? If yes, where and what species?
12. How frequently do you encounter wild animals during forest visit/ Now and then? What might be the reasons behind it?
13. Does any conflict happen in this area by wild animals?
    a) Yes b) No
14. Have you ever heard about wildlife poaching?
    a) Yes b) No
15. Which animals are targeted for crime in this area?
16. Have you ever hunted wild animals? Which species? For what purpose?
17. What are the most commonly used illegal crime methods?
18. In your opinion illegal crime of wild animals increased or decreased?
19. What are the main reasons behind engaging in illegal crime?
20. Any programs launched regarding wildlife crime?
21. What strategies are in place to minimize illegal crime in this area?

22. Do you think wildlife should be protected, why?
23. Is there any other information you would like to share with us regarding to illegal crime in this area.

Annex 3

Table 1: Mammals found in the Dang districts

Common Name	**Scientific Name**	**IUCN Status**
Tiger	*Panthera tigris*	EN
Swamp deer	*Cervus duvaucelii*	VU
Chital	*Axis axis*	LC
Barking deer	*Munticaus vaginalis*	LC
Four horned antelope	*Tetracerus quadricornis*	VU
Eurasian wild boar	*Sus scrofa*	LC
Striped hyena	*Hyaena hyaena*	NT
Grey wolf	*Canis lupus*	LC
Golden jackal	*Canis aureus*	LC
Rhesus macaque	*Macaca mulata*	LC
Jungle cat	*Felis chaus*	LC
Nilgai	*Boselaphus tragocamelus*	LC
Sloth bear	*Melursus ursinus*	VU
Leopard	*Panthera pardus*	VU
Indian crested porcupine	*Hyxtrix indica*	LC
Terai grey langur	*Semnopithecus hector*	NT
Leopard cat	*Felis bengalensis*	LC
Wild mouse	*Rattus* spp.	LC
Yellow throated marten	*Martes flavigula*	LC
Indian grey mongoose	*Herpestes edwardisi*	LC
Northern palm squirrel	*Funambulus* spp.	LC

Table 2: Birds of Dang district

Common Name	Scientific Name	IUCN Status
Great hornbill	*Buceros bicornis*	VU
Black francolin	*Francolinus francolinus*	LC
Swamp francolin	*Francolinus gularis*	VU
Red Jungle Fowl	*Gallus gallus*	LC
Indian grey hornbill	*Ocyeros birostris*	LC
Alexandrine parakeet	*Psittacaula eupatria*	NT
Rose ring parakeet	*Psittacaula krameri*	LC
Slaty headed parakeet	*Psittacaula himalayana*	LC
Red breasted parakeet	*Psittacaula alexandri*	NT
Cinereous vulture	*Aegypius monachus*	NT
White rumped vulture	*Gyps bengalensis*	CR
Long billed vulture	*Gyps tenuirostris*	CR
Spotted jungle owlet	*Glaocidium radiatum*	LC
Cotton pygmy goose	*Nettapus coromandelianus*	LC
Ferruginous pochard	*Aythya nyroca*	NT
Brown fish owl	*Ketupa zeylonensis*	LC
Steppe eagle	*Aquila nipalensis*	EN
Crested goshawk	*Accipiter trivirgatus*	LC
Collared falconet	*Microhierax caerulescens*	LC
Red collared dove	*Streptopelia tranquebarica*	LC
Common kestrel	*Falco tinnunculus*	LC
Asian koel	*Eudynamys scolopaceus*	LC
Red wattled lapwing	*Vanellus indicus*	LC
Black Stork	*Ciconia nigra*	LC
Black drongo	*Dicrurus macrocercus*	LC
Baya weaver	*Ploceus philippinus*	LC
Rufous treepie	*Dendrocitta vagabunda*	LC
Red vented bulbul	*Pycnonotus cafer*	LC

Table 3: Reptiles of Dang districts

Common Name	**Scientific Name**	**IUCN Status**
Indian rock python	*Python molurus molurus*	VU
Spectacled cobra	*Naja naja*	LC
Asian rat snake	*Ptyas mucosa*	LC
Golden tree snake	*Trimeresurus* spp.	LC
Common krait	*Bungarus caeruleus*	LC
Green pit viper	*Trimeresurus* spp.	LC
Monitor lizard	*Varanus* spp.	LC
Golden monitor lizard	*Varanus falvescens*	LC
Mugger crocodile	*Crocodylus palustris*	VU
Indian softshell turtle	*Nilssonia gangetica*	VU

Source: DFO,Dang.

Wildlife species protected under National Park and Wildlife conservation.

Mammals

Scientific Name	Common name	IUCN Status
Macaca assamensis	Assam Macaque	NT
Manis pentadactyla	Chinese Pangolin	CR
Manis crassicaudata	Indian Pangolin	EN
Caprolagus hispidus	Hispid hare	EN
Platanista gangetica	Ganges dolphin	EN
Canis lupus	Grey wolf	LC
Ursus arctos	Brown bear	LC
Ailurus fulgens	Red panda	EN
Prionodon pardicolar	Spotted linsang	LC
Hyaena hyaena	Stripped hyena	NT
Prionailurus bengalensis	Leopard cat	LC
Felis lynx	Lynx	LC
Neofelis nebulosa	Clouded leopard	VU
Panthera tigris	Tiger	EN
Panthera uncial	Snow leopard	VU
Elephas maximus	Asian elephant	EN
Rhinoceros unicornis	One horned rhino	VU
Porcula salvania	Pygmy hog	EN
Moschus chrysogaster	Himalayan musk deer	EN
Rucervus duvauceli	Swamp deer	VU
Bos gaurus	Gaur	VU
Bos mutus	Wild Yak	VU
Bubalus arnee	Water buffalo	EN
Ovis ammon	Argali	NT
Pantholops hodgsoni	Tibetan antelope	NT
Antilope cervicapra	Blackbuck	LC
Tetraceros quadricornis	Four horned antelope	VU

Birds

Scientific Name	Common Name	IUCN Status
Ciconia nigra	Black stork	LC
Ciconia ciconia	White stork	LC
Grus grus	Common crane	LC
Catreus wallichii	Cheer pheasant	VU
Lophophorus impejanus	Himalayan monal	LC
Tragopan satyra	Crimson horned pheasant	NT
Houbaropsis bengalensis	Bengal florican	CR
Buceros bicornis	Great hornbill	VU
Sypheotides indica	Lesser florican	EN

Replites

Scientific Name	Common Name	IUCN Status
Pythos molurus	Python	VU
Gavialis gangeticus	Gharial	CR
Varanus flavescens	Yellow monitor	LC

Source: htpp://lowcommision.gov.np