Conflict, Conservation and Resource Use in Protected Areas: Case Study from Annapurna Conservation Area and Parsa Wildlife Reserve, Nepal

Research Report submitted to The Rufford Foundation, United Kingdom

Principal Investigator/Researcher: KAMAL THAPA, M.Sc.

February 2014

Acknowledgements

I would like to extend my gratitude and thanks to all of those whose support made this research work accomplished. First of all, I am thankful to my project referees who provided the timely reference and was important to secure the research grant from Rufford Small Grant Foundation. Engineer Bhai Raja Manandhar, (Nepal); Mag. Dr. Michael Jungmeier (Austria) and Dr. Tanja Winther (Norway) provided me the reference. Josh Cole and Jane Raymond from Rufford Foundation also deserve big thanks for necessary administrative support. This research could not have been possible without the funding support from Rufford.

I would like to acknowledge Prof. Dr. Joel T. Heinen from Florida International University, USA for providing published material (Journal Paper) on park people issues. Dr. Hum Bahadur Gurung (CEO, HSFF) also supported me in various ways during my studies and research. A lot of credit goes to the respondents in the study site who were very helpful to undertake this study. DNPWC, ACAP and PWR provided research permission to make this mission come true. I would like to thank my colleague Mr. Ajay Kumar Das for accompanying me in the field in PWR. Mr. Rajesh Prasad Gupta (ACAP) helped to secure accommodation in Amlekhgunj at PCP/NTNC office and also supported fully during field study in Sikles sector of ACA. My family members and parents are the source of inspiration and academic achievement. I owe you a great debt! Brother Kalyan Thapa has been supportive in early days of studies in Austria. Pawan KC was always in forefront to work in data collection and compilation work and Prativa KC was behind the scene to make me succeed. Purna Bahadur KC, lovely brother in law and Sister Laxmi KC was always there to criticize me to encourage to take up challenges. Thank you all!

Table of Content

List of Tables

List of Figures

ABBREVIATIONS

ACA- Annapurna Conservation Area

BNP- Bardia National Park

BZ – Buffer Zone

CNP- Chitwan National Park

DNPWC- Department of National Park and Wildlife Conservation

GCA- Gauri Shankar Conservation Area

IUCN- World Conservation Union

ICDP- Integrated Conservation and Development Programme

KTWR- Koshi Tappu Willdlife Reserve

MBCA- Makalu Barun Conservation Area

MCA- Manaslu Conservation Area

NPWC act- National Park and Wildlife Conservation act

NTNC- National Trust for Nature Conservation

PA- Protected Areas

PWR- Parsa Wildlife Reserve

SWR- Shukla Phanta Wildlife Reserve

TAL- Terai Arc Landscape

UC – Users Committee

UG – Users Group

VDC- Village Development Committee

WWF- World Wide Fund for Nature

Chapter I
INTRODUCTION

1.1 Background

Protected Areas (PAs) are the store house of bio-diversity worldwide. They are designed and established to protect the last remaining natural ecosystem, flora and fauna of the planet earth for the benefits of human lives. The World Conservation Union (IUCN) defines PAs as, *''clearly defined geographical space that is recognized, dedicated and managed through the legal and other effective means to achieve the long term conservation of nature with associated ecosystem services and cultural values''* (Dudley, 2008). They do not preserve only the threatening ecosystems and bio-diversity but also the key elements in climate change mitigation strategies and even shelter the threatened human communities and/or sites of cultural and spiritual values (Dudley, 2008; Getzner *et al.,* 2012). PAs provide livelihood and income for the people living in and around the protected areas, provides different form of ecosystem services at the national and global level. Present day PA management therefore, should not be viewed through the narrow concept of ecological perspective alone but should be able to address the social and economic dimension leading to sustainability (Getzner *et al.,* 2012). For the country like Nepal, with rural characteristics, prevalent of poverty and subsistence based agriculture; the role of PAs in alleviating poverty is ever increasing.

Globally, the number and extent of nationally designated PAs has increased dramatically over the past century. There are over 157,897 PAs (figure 1) covering more than 24 million square kilometers of land and sea (figure 2). Among nations there is a great deal of variation in protection: only 45% of the 236 countries and territories assessed have more than 10% of their terrestrial area protected, and only 14% had more than 10% of their marine area protected (WDPA, 2012). In comparison to the global figures, Nepal has done an exemplary work by establishing good number of PAs network that includes 10 National Parks, 3 Wildlife Reserves, 1 hunting reserve, 6 Conservation Areas and 12 Buffer Zones covering the total area of 34365.63 sq km which is about 23.35% of Nepal's area (figure 3) (DNPWC, 2012). International categories of PAs in Nepal include 2 World Heritage Sites (Natural), and 9 Ramsar sites**.**

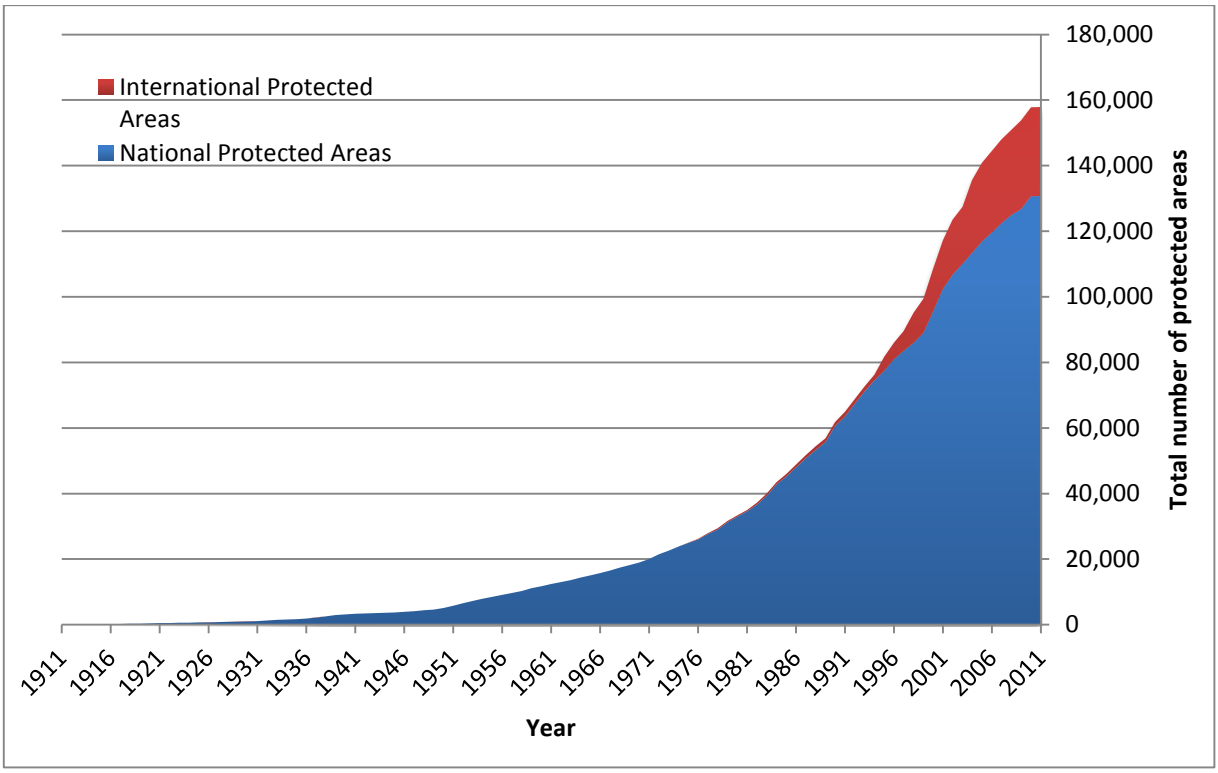

Figure 1 : Growth in number of nationally and internationally designated Protected Areas (1911-2011).

Source: IUCN and UNEP-WCMC (2012)

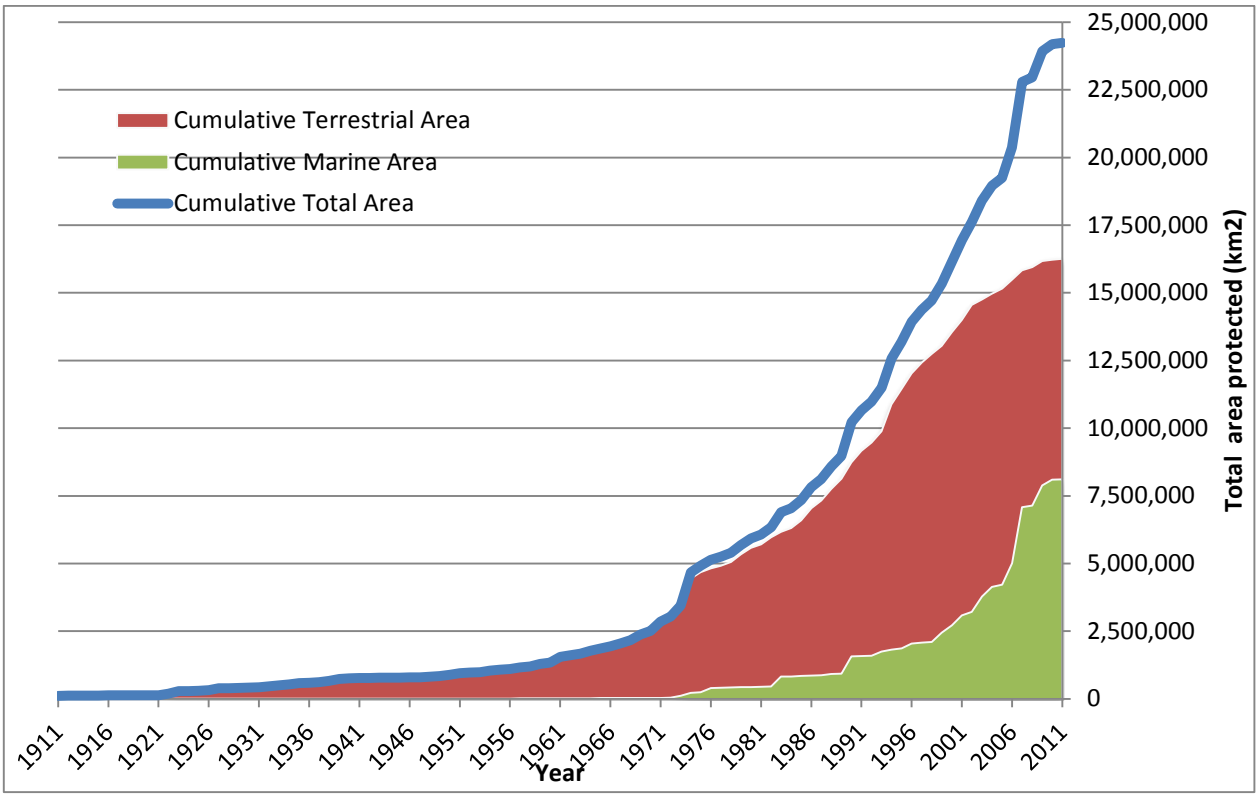

Figure 2: Growth in nationally designated Protected Areas (1911-2011)

Source: IUCN and UNEP-WCMC (2012)

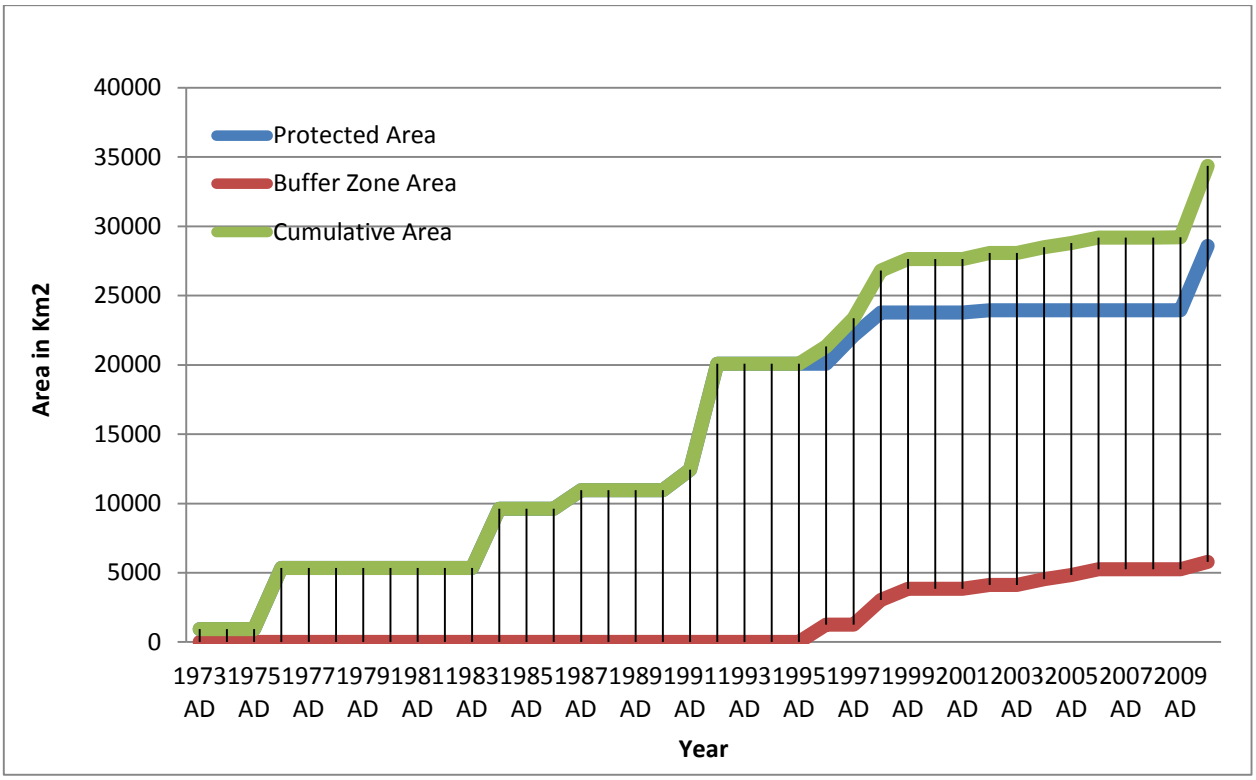

Figure 3: Growth in Protected Area coverage in Nepal by area (includes both PA and BZ)

Source: DNPWC (2010 cited in Thapa 2013)

1.2 Statement of Problem and Justification

The expansion and increment of PAs are the result of lobbying and advocacy by global conservation organizations such as African Wildlife Foundation, Conservation International, IUCN, The Nature Conservancy, World Wide Fund for Nature (WWF), among others (Vedeld *et al.,* 2012). However, these established PAs are not free from conflicts with local people who inhabit the area, either inside the PAs or in the buffer zone. Almost everywhere, these PAs are the breeding ground of conflicts. This happens especially when the traditional resource use rights of the people who are residing in the region since time immemorial, before the creation of park and PAs is revoked or their property is damaged by the wildlife. Africa's PAs were created by colonial administrators without taking any considerations of the local people and in most cases people were displaced with or deprived of the traditional use of resources, causing them to suffer economic hardships (Weladji and Tchamba, 2003) and vulnerable to poverty.

In Nepal too, many PAs have experienced human translocation and/or displacement after the PAs were established. Chitwan National Park and Shukla Phanta Wildlife Reserve are some of them. Currently, 2 settlements of Ramauli and Pratapur in northern part of Parsa Wildlife

Reserve (PWR) are undergoing human translocation activities. Further, economic losses of the local people due to crop and livestock depredation is one of the major issue that triggers park people conflict and causing problem in achieving long term conservation of biodiversity (Tchamba, 1996; Gupta, 2005). Relationships between protected areas and local people are also one of the key features in achieving biodiversity conservation (Heinen, 1993; Allendorf, *et al.,* 2007). Besides conservation, PAs provides opportunities for information and education, recreation, scientific research and have impact on regional and local development (Getzner *et al.,* 2012). Importance of these aims and the significance of regional development depend on the peoples' participation, management objectives and governance type of PAs. Benefit sharing is one of the most important issues when it comes to the costs and benefits of establishing and managing PAs. In most of the protected areas, local people living in and around them are compelled to borne the indirect cost of managing protected areas in the form of restricted land use, restricted entry and use of resources, crop and livestock depredation (Mehta and Heinen, 2001; Weladji and Tchamba, 2003; Allendorf *et al.,* 2007; Karn, 2008). Against the background of these diverse issues between protected area and local people, it is important to explore the relationship between park and people which shapes the future of the protected area.

Protected areas cannot be conserved in isolation and fortress and fine approach alone is not sufficient to secure these areas. There must be support from the wide range of stakeholders if the objective of bio-diversity conservation is to achieve. Often, PAs face significant management challenges due to the park people conflict. The damage done by wildlife of PAs is threatening the local livelihoods making them vulnerable to poverty. Crop and livestock depredation from wildlife, human harassment and injuries leading to death, restrictions to previously used areas are some serious issues in the buffer zone of PAs (Bhatta, 1994). On the other side, PAs also provide resources to the people which supports for their subsistence economy. Several park resources can be used by local people to support their rural livelihood. The participation of local people in park management activities also determines the success or failure of any kind of PAs. Research shows that, community based conservation or participatory conservation leads to more favorable attitudes of local people towards conservation when they receive more tangible benefits from intervention programs over the period of time (Mehta and Heinen, 2001).

In order to achieve the sustainable management of protected areas, one should understand the park people relations which can be applied in designing appropriate management framework. The supply and demand of resources by the local stakeholders, the conflict patterns triggered by the crop and livestock depredation, ban on using park resources and the conservation attitude of local people should be explored. It is also important to know how the park authority views local people in terms of conservation and if local people participate in conservation intervention and decision making activities.

There have been several studies carried out in park people issues and conservation attitudes in several protected areas in Nepal. These studies are carried out only in those PAs which are very much popular in terms of its management intervention and conservation success. Protected areas that are the destination of ecotourism have also been widely researched. But, latest research on those issues in Parsa Wildlife Reserve is lacking though it is one of the most important protected areas in central Nepal. It is the eastern most protected area of Terai Arc Landscape (TAL) which shares the boundary with widely known Chitwan National Park and World Heritage Site in the west and Valmiki Tiger Reserve (India) in the Southern part. Besides TAL, it forms the Chitwan-Parsa-Valmiki complex as Tiger Conservation Unit. Thus, it is very much important and should receive priority on the study related to the dynamic facets of park people issues. Natural resource use, wildlife induced damage, impact of conservation and development activities are the important ways of understanding relationship between local people and protected areas.

1.3 Objectives

General Objective:

The main objective of this study was to assess the Protected Area Management issues in Nepal using Parsa Wildlife Reserve and Annapurna Conservation Area as case study.

Specific Objectives:

• Identify conflicts between the park and people regarding usage of resources and the quantification of property damage done by wildlife.

• Identify the types and intensity of resources used and the villagers' level of dependency on park resources.

• Identify the local people's attitude towards park and park authority attitude towards local people.

• To assess conservation activities adopted by local communities and authority.

Chapter II
LITERATURE REVIEW

2.1 Park People Relationship

Protected areas are the milestone for conservation of biodiversity. These are recognized as the effective means of in-situ conservation. PAs in Nepal has played significant role in the conservation of biodiversity but restrictions of PAs in using park resources created resource conflict and wildlife induced damage in the form of human harassment or killings, crop damage and livestock depredation has brought negative sentiments towards it (Shrestha, 1996; Allendorf *et al.*, 2007). Livelihood of the local people is threatened due to the existence of park when there is low chance of gaining benefits from parks or reserves. Local people are also the core stakeholder in participatory management and conservation of PAs, which is recently realized in Nepal.

There are several approaches of biodiversity conservation as such; fortress and fine conservation, participatory conservation, and landscape conservation (Baral, 2005). Conflicts in Nepalese PAs are inevitable as the park finite resources are used by the local people whereas park authorities impose ban on access, as these resources are also required for the natural maintenance of ecosystems and for wildlife. It is already proved in Nepal that stick and fence or fortress approach to conservation is not viable for protecting PAs that is advocated by strict conservationists. Even the fortress approach did not bring positive achievement on biodiversity conservation management and much lower on addressing local benefits and livelihoods (Vedeld *et al.*, 2012). This has led the conservationist and government to rethink on park policy. Crop damage and livestock depredation due to the wildlife are major economic losses for the people living adjacent to PAs whereas local communities have threatened PAs by poaching and causing habitat loss through encroachment into protected areas (Shrestha, 1996; Weldaji and Tchamba, 2003; Gupta 2005).

Conflicts that often occurred in PAs is due to the evictions, removal and resettlements, exclusion from resources access and use, cost incurred from crop/livestock damage, threats to human lives, health and property damage, insufficient share of park incomes, disparity between costs and benefits accrued to various groups (Vedeld *et al.*, 2012). As high as 86% of the villagers were suffered from crop damage in Benoue Wildlife Conservation Area, Cameroon whereas 31% of crop income lost on average (Weladji and Tchamba, 2003). In

Shivapuri Nagarjun National Park, Nepal, total loss (opportunity cost) for the local people through restricted land use, crop and livestock depredation and restriction on using the park resources was NRs. 26,873/household/year (US$ 304) (Karn, 2008). Similar studies carried out in Koshi Tappu Wildlife Reserve (KTWR) showed that the economic losses to the local farmers due to the crop depredation (potato, wheat and paddy) by park animals is NRs. 2917 per head/ bigha of cultivated land (Limbu and Karki, 2003). Contingent valuation study in KTWR showed that willingness to accept by local people (per household) for forgone access to natural resources was found to be US$ 238 equaling to nearly $ 1.64 million for the neighboring region (Shrestha *et al.*, 2006).

People in the Annapurna Conservation Area (ACA, 74%) and former Makalu Barun Conservation Area (MBCA[1], 96%) reported that they are severely suffered from wildlife depredations and also faced restrictions on using forest and other natural resources. Despite the depredation, conservation attitude in ACA (87%) and MBCA (83%) was very positive (Mehta and Heinen, 2001). The rationale behind the liking and acceptance of ACA is due to the presence of community forestry, community development activities, wildlife conservation, environmental awareness, tourism and trainings. However, the dislike of conservation area (ACA) is mainly due to the restrictions on killing pest animals (wildlife), inequitable distribution of development projects, low attention to agriculture and livestock, strict impose of forest rules (Mehta and Heinen, 2001).

In Chitwan National Park (CNP), wildlife caused several problems including crop damage (78%), livestock depredation (13%), and human harassment (9%). Problem animals were reported as Rhinoceros (*Rhinoceros unicornis*, 71%), Deer (*Axis axis*, 18%), Boar (*Sus scrofa*, 8%) and Parekeets (3%). Most of the economic loss occurred due to damage in Maize (60%), Rice (32%) and Mustard (8%) (Shrestha, 1996). In the buffer zone of Bardia National Park (BNP), 88% of the surveyed people responded that wildlife of the park created problem with crop and livestock losses, human harassment that have negative implications on health, well being and livelihoods (Thapa, 2010). Farming of alternative crops to reduce the damage from wildlife was initiated but it was not much promising and use of different mechanism to protect crops meant investment of resources and time by local people (Thapa, 2010). This indirect cost of park management to locals trigger to negative attitudes towards conservation.

[1] MBCA is no longer existed but transferred into Buffer Zone.

Despite the cost imposed to the local people that led to park-people conflict, PAs offers several benefits. Various eco-system services are delivered by the PAs to the local people. Still, most of the people living in rural areas in Nepal rely on firewood for domestic energy needs and it is true for people living nearby PAs as well. Main resources used by the local inhabitants of PAs, for instance BNP and Shukla Phanta Wildlife Reserve (SWR) are firewood, thatch grass for roofing, timber for construction and furniture, grasses and fodder for livestock (Baral and Heinen, 2007). In BNP, people were using 8 different types of park resources and more dependent on it whereas in SWR, 7 types of resources were used, but not timber. Similarly, the pattern of resource usage was quite different in two PAs (Baral and Heinen, 2007). Locals in BNP had more positive attitudes towards conservation in compare to SWR. This can be attributed to more accessible resources, lower population densities, big size of park, long time conservation and socio-economic intervention, and more functional UGs in BNP then in SWR (Baral and Heinen, 2007). Heinen (1996, cited in Baral and Heinen, 2007) stated that more external economic intervention is required for effective protected area management that has higher population and ethnically diverse.

In KTWR, conservation attitudes of local people was positive (76%), however, the poorest of the community had not benefitted from the reserve, rather their life was turning into hardship every other day (Laim, 2004). People who favor and like the KTWR did so because of actual material benefits gained such as thatch grass and fuel wood collection, potential benefits from tourism and community development activities. Generally, the local people living in and around the PAs showed negative attitudes towards conservation if they do not receive direct benefits. Earlier studies indicate that majority of people (65%) in KTWR had their negative feelings in conservation while 80% in BNP expressed their negative attitudes towards conservation. Wildlife damage and restrictions in the use of park resources led to negative attitudes whereas opportunities for thatch grass collection and forest conservation was the main reason to bring positive attitudes (Heinen, 1993; Leisure and Mehta, 1993 cited in Mehta and Heinen, 2001). However, the recent study by Baral and Heinen (2007) showed that the local people in BNP have increased positive attitudes due to several socio-economic interventions. Buffer Zone programme and its provision of sharing park income might have brought positive attitude towards nature conservation. But, economic losses from the crop damage and livestock depredation together with restrictions in accessing park resources is the main issue that bring park people conflicts.

The National Parks and Wildlife Conservation (NPWC) Act, 1973, and its subsequent amendments, and the Buffer Zone Management Regulations, 1996, represent the most important legislative measures focusing on the needs of local communities as well as minimizing impacts on protected areas to avoid parks and people conflicts. Buffer zones may include forests, settlements, agricultural lands, open spaces in villages, and many other land use forms. In Nepal, people interact with protected areas in numerous ways. There has been a growing conflict over land use rights and practices (Nepal & Weber 1993; Studsrod & Wegge, 1995). The right to collect firewood and graze animals was denied in PAs in the Terai, while for the collection of thatch grass, access was restricted by limiting the collection period to two-three weeks a year during the dry season. As a result, parks and people conflicts are common in all the reserves of Nepal, but the extent of the conflicts varies in different reserves.

2.2 Park and People Conflict

The problem Human-Wildlife Conflict has existed ever since people domesticated livestock and started to do the agricultural crops over 10,000 years ago (Jackson *et al.,* 2001). As we know that all the protected area has more or less problem of Human-Wildlife Conflict and that is not only in our country but also exists in the world. The degree and the magnitude of the problem are different in the different protected areas. Some protected areas need the remedial measures where the study is conducted and the problem has found significant and in high degree. Mitigation measures has not required where the problem was not significant. The significance and the degree of the problem have not known for all the protected areas of our country because the study has not been conducted widely in all the protected areas. The status of the problem is given as follows in term of global, national and local level.

This problem is also found in developed countries but the problem has been minimized in a great extent. The population and the dependency of the people on the natural resources are very less and the local people are award about the conservation and protection of their green resources. Thus the status of the protected areas is in managed way in these countries. The problem is found significant in developing and under developed countries where the people are fully dependent on the natural resources for fulfillment of their daily needs and the conduction of their livelihood. The educational, economical and awareness status of the people is also very low in these countries. Therefore, there is a threat to conserve and protect

the natural resources (and wild flora and fauna) on the one hand and meeting daily necessities of the people on the other hand.

In Hemis National Park (India), 2.3% sheep and goats are killed by snow leopard (Fox *et al.*, 1991, cited by Jackson *et al.*, 2002). Khunjerab National Park (Pakistan) experienced 10% of animals killed by snow leopard and wolfs mostly the sheep and goats (Wegge, 1989, cited by Jackson *et al.*, 2002). Altai or Great Gobi area of Mongolia observed that, 0.3% to 0.4% sheep, goats (up to 10% in hot spot) killed by snow leopard and wolf (Schaller *et al.*, 1994, cited by Jackson *et al.*, 2002)**.**

As we know, the most important objective of the protected areas is to protect and conserve the biodiversity including, wild animals in their natural state and at the same time to contribute the living standard of the local community. Thus the problem is created due to killing of domestic animals, damage to agricultural crops and sometimes killing and injury to the human beings by park animals.

The agricultural crops are damaged equalling to NRs. 1,72,500 by rhino (*Rhinoceros unicornis*) in 1988/89 in Sauraha area of Chitwan Natioal Park. The crops are damaged in different growing season that covers to rice (*Oryza sativa*), maize (*Zea mays*), mustard (*Brassica campestris*), lentil, vegetable and minor crops (Jnawali, 1989). Annapurna Conservation Area has average loss of 2.6% but up to 20% for horses in depredation hotspots by snow leopard (Oli, 1994; Jackson *et al.*, 1994, cited by Jackson *et al.*, 2002) and in eastern Nepal about 10.6% sedentary goats and sheep; 3% to 5% migratory flocks are killed by snow leopard (Braun *et al.*, 1991, cited by Jackson *et al.*, 2002). It was reported that the Royal Bengal tiger (*Panthera tigris*) was found as a major predator in the buffer Zone of the RBNP and it killed 300 (67.87%) of different animals out of which cattle was the highest contributing 41.62% in the year 1993 to 1998 (Tamang, 2000, cited by Thapa, 2000).

A study was done in the upper Mustang about people-wildlife conflict by Magar (2002) and reported that the major wildlife predators are snow leopard, lynx, wolves, jackals, eagles and feral dogs are main animals that prey to the local animals.

It has been reported that altogether seventy animals were lost by snow leopard both in Nar and Phu valley in 1999/2000 (for 1 year). Nar village has lost 31 animals and Phu village has lost 39 animals of this. The depredation rate has found 1.01% and 2.13% respectively. The

result showed that the depredation rate were estimated at 48.39% for young yak, 32.26% sheep and 19.35% goats in Nar and the depredation rate were estimated 17.95% for young yak, 10.26% sheep, 48.79% goats, 15.38% adult female yak (chauri) and 7.69% young horses in the Phu village (Thapa, 2000).

2.3 Resolution of Park People Conflict

In most of the area local people have long history of residing in a particular geographical location before the establishment of any kind of PAs. Especially in the Terai region of Nepal, people from the hill migrate after the eradication of Malaria in 1950s. Prior to the establishment of protected areas, local people were *de facto* free to collect natural resources such as firewood, fodder, timber, grasses and grazing their livestock and hunting in the national forests. Such resources have direct linkage with their livelihoods. Conflicts between the local people and protected area management often arise due to (BPP, 1995, p 8-8):

- Prohibition of the free collection of forest products
- Prohibition of the setting of fires in grasslands and forest areas
- Prohibition of the hunting of birds and animals
- Prohibition of the harassing of wildlife or destroying /disturbing bird nests and eggs
- Restrictions placed on livestock grazing and watering
- Restrictions placed on channeling of water to agricultural land
- The clearing of settlement of agricultural areas from within the protected areas.

The level of these conflicts is intensifying in protected areas. Lack of understanding and sense of partnership between the protected areas staff and local communities pose a direct threat to both the biodiversity and economic value of protected areas. Escalating park people conflicts led the park authority to rethink their policy as this was the threat to achieve conservation goals. Government realized that sustenance of PA is only possible in co-operation and partnership with local people, those residing around the park/reserve border. Accordingly, NPWC act 1973 was amended in 1989 to make provision of conservation area as new form of protected area and fourth amendment in 1993 led to the provision of buffer zone designation. The Buffer Zone Management Regulation is the most important legislative initiative focusing on the needs of local communities who are most likely to be adversely affected by protected areas, and subsequently avoids conflicts between parks and people.

Chapter III
METHODOLOGY

3.1 Study Area

Parsa Wildlife Reserve (PWR) and Annapurna Conservation Area (ACA) was the study region of this research project. Amlekhgunj buffer zone users group in Amlekhgunj VDC (Bara district) and Nirmal Basti VDC (Parsa district) was the field survey site in Parsa Wildlife Reserve. Similarly, Bhachowk V.D.C. and Parche V.D.C. under Sikles Unit Conservation Office was choosen in Annapurna Conservation Area.

3.2 Data Collection Methods

3.2.1 Primary Source of information

Questionnaire Survey:

The main source of primary data was questionnaire survey among the households in study area of buffer zone. The survey instruments contained closed and open ended questions aiming to explore the answers of the questions that were addressed in this research. Information was sought on economic losses, conflict issues, resource uses, conservation attitude and conservation intervention. The questionnaire also consisted of statements based attitudinal survey that was awarded the attitudinal score of 1 (strongly disagree) to 5 (strongly agree) with score 3 being neutral (5 point Likert scale).

The household in the buffer zone community was considered as sampling frame. Respondents were selected for the survey by employing simple random sampling method. Lottery method without replacement was used to select the household under study. Study site was determined and confirmed purposively by researcher's own judgment. Sampling unit for questionnaire survey was household. I did not pretest the questionnaire as the survey instrument was adopted from similar studies (Heinen, 1993; Mehta and Heinen, 2001; Baral, 2005) and modified as per my study requirement.

Key Informant Survey and Focus Group Discussion:

Besides questionnaire survey; key informant survey was also carried out. Chairperson and executive member of buffer zone user group, chairman and secretary of buffer zone user committee, village leaders and field staff of PWR were contacted for the survey. Focus group discussion was conducted with the group of farmers' and community forestry personnel from the district.

Participant Observation:

Each and every kind of information may not be sought from survey and discussions. Therefore, in order to cross check the information obtained from survey and discussions, researcher spent about 2 weeks in the study village to closely monitor the villagers' activities. It was aimed to determine impacts and effects of the activities to the reserve and vice versa.

3.2.2 Secondary Source of Information

Secondary information was also used to support the study. As it was impossible and beyond the capacity of researcher to collect all the required information from field, various sources of published materials were used. Journal articles, earlier research findings, project report, grey report, proceedings etc were reviewed as per requirement. Libraries of various institutions including both the academic and professional institutions were accessed.

3.3 Data Analysis:

Quantitative data was processed and analyzed with the help of MS Excel computer software. Descriptive statistics were used and presented in the form of table, graphs, charts, pie charts etc.

Chapter IV
RESULT AND DISCUSSION

4.1 Result (from Parsa Wildlife Reserve)

4.1.1 Attitude Towards Conservation

41 % of the respondents replied that buffer zone was created for the betterment of their locality whereas 42 % showed indifference towards it and 17 % people disagreed (Figure 9).

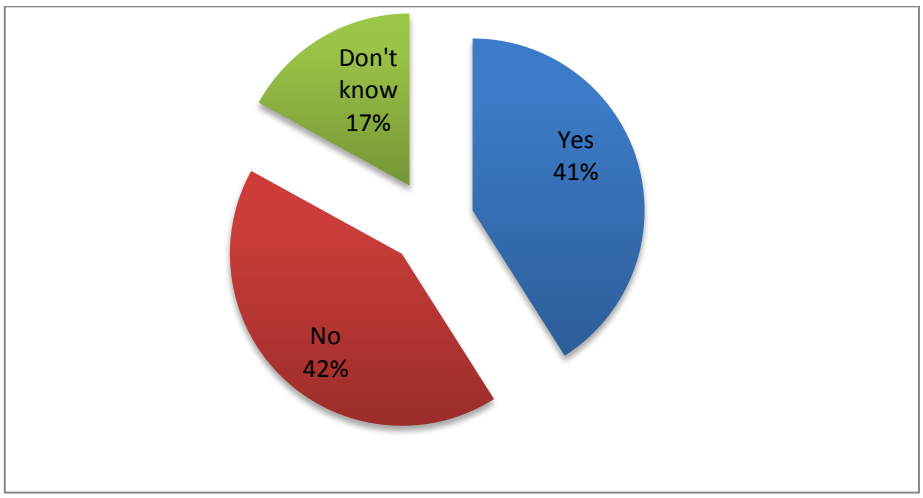

Figure 4: Attitude towards buffer zone. BZ was created for betterment of the locality.

Source: Field survey, 2013

Most of the respondents (37%) agreed that the buffer zone programme has helped them to support their livelihoods and community development activities. 29% respondents were neutral showing no concept on this issue. 34% were disagreed and believed that buffer zone has done nothing on supporting livelihoods and community development action. The attitudinal score was 2.77 which was below neutral attitudinal score showing disagreeness on this. However, 42% respondents were happy to be included in buffer zone area of the reserve. 20% were unhappy to be within buffer zone and 37% had neutral attitude about inclusion within the buffer zone area. Attitudinal scale was found to be 3.43.

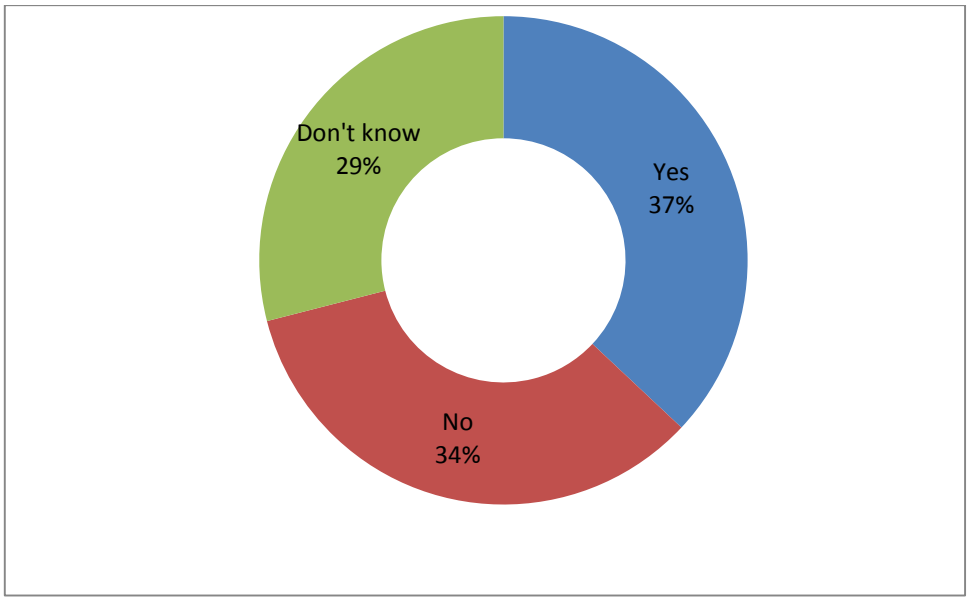

Figure 5: Response of people if Buffer Zone programme has helped to support livelihood

Source: Field survey, 2013

Majority of people did not like the presence of reserve in their vicinity. 40% of the surveyed people replied that they do not like it at all whereas 34% replied that they liked the reserve because of several benefits. 26 % were indifference towards the presence of reserve and were not either for or against it. Overall attitudinal scale of the local people about the presence of reserve nearby their village was found to be 3.22, which shows the sign of neutral attitude.

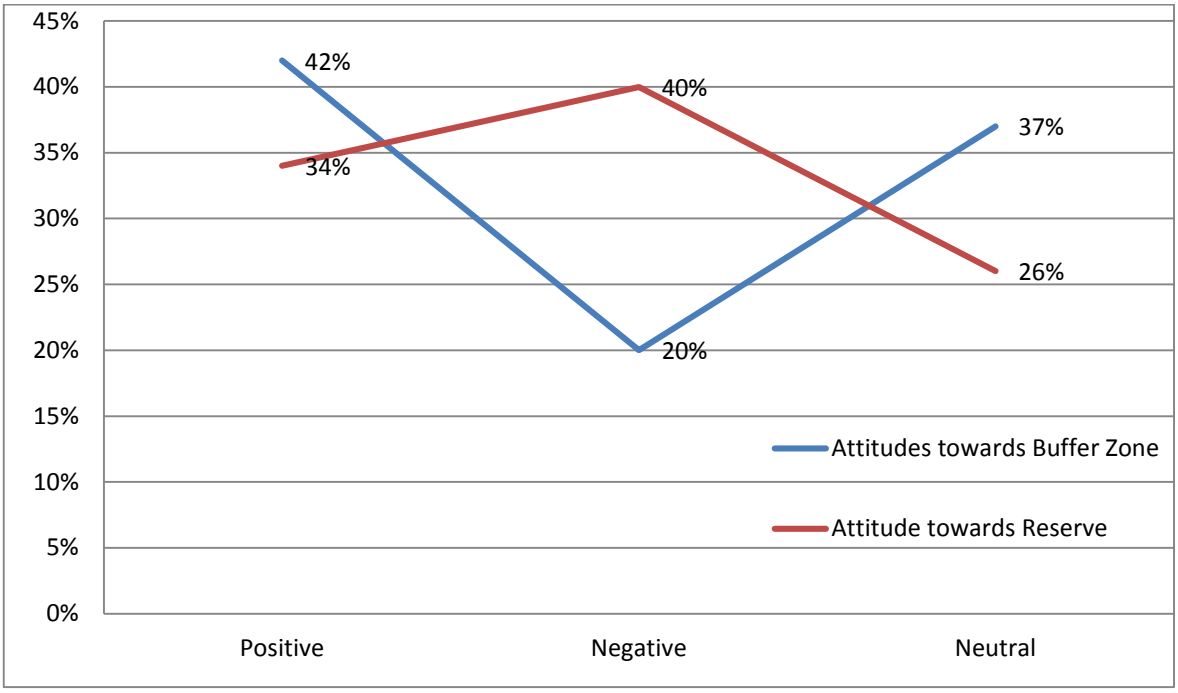

Figure 6: Attitude towards PWR and buffer zone

Source: Field survey, 2013

There was not much difference about the preference of saving crops and livestock against forest and wildlife. They valued more or less equally to biodiversity conservation together with the farming practices. 36 % of the respondents showed no idea on which is to be valued more or preferred more. But overall attitudinal scale was 3.51, that showed the people and their livestock/crops are more important than biodiversity from villager's perspectives.

Though the majority of respondents (47%) replied that the living condition has been improved after the creation of reserve, mean attitudinal score showed that it did not support in the improvement of living condition of the people living nearby the reserve. The score was found to be 2.58. Crop and livestock depredation is prevalent in the reserve. Among this study area, Nirmal Basti experienced more economic losses than Amlekhgunj because this area is a farming community who owns farm and livestock. The compensation mechanism provided by the reserve management for the losses due to crop and livestock depredation is very poor. Most of the respondents replied that they do not have any idea about the compensation mechanism and never claimed for it. 64 % of the local people replied that the compensation received from the reserve is not sufficient, not systematized and never get it. 17 % did not have any idea on compensation mechanism as some of the respondents (mainly in Amlekhgunj) do not have any farm or livestock who never faced crop and livestock depredation. Mean attitudinal score was calculated to be 1.72 showing strongly disagree or disagree over compensation mechanism.

People are aware about conservation of plants and animals by designating certain places. 74% agreed on this and 19 % had neutral attitude. Mean attitudinal score was found to be 3.72 that showed positive attitude. Buffer zone users group and users committees are community organization in the buffer zone region of protected areas that help empower people and promote environmental conservation and development activities in the society. People are satisfied (45%) with the functioning of users group and users committee and 24 % showed dissatisfaction over its working procedure. 31 % had no idea on this if they are working well as per rules and regulations (figure 12).

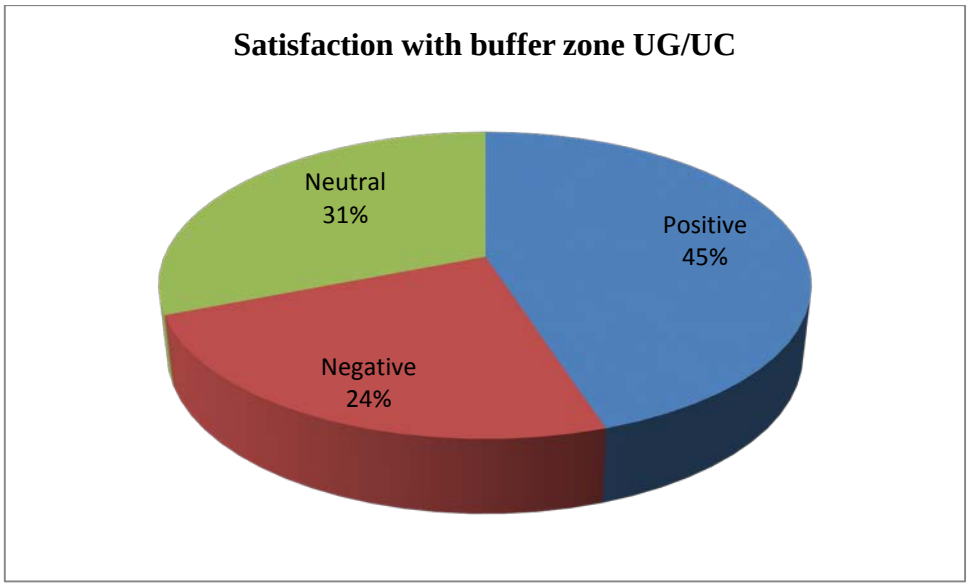

Figure 7: Response towards buffer zone user group/user committee

Source: Field survey, 2013

Distribution of common pool resources and benefits was revealed to be equitably done. 69 % agreed that it was on equitable basis with 20 % having neutral attitude and 10 % disagreed. Overwhelmingly, almost every people are willing from their side to contribute for bio-diversity conservation. 46.55 % strongly agreed, 46.55% agreed and 5.17 % were neutral for biodiversity conservation. Attitudinal score was 4.37 that showed positive attitude.

Table 1: Score summary of conservation statement (N=58)

Conservation statement	Response (%)					Mean[3] ± S.D.	
	SA[2]	A	N	D	SD		
Buffer zone area was created for the betterment of our locality	6.77	33.89	42.37	13.55	3.38	3.43	0.79
Buffer zone programme has helped us to support our livelihoods and community development	1.69	35.59	28.81	28.81	5.08	2.77	0.87
I am happy to be included in the Buffer Zone are	0	42.37	37.28	16.94	3.38	3.43	0.97
I like the presence of Reserve nearby my village	3.44	31.03	25.86	32.75	6.89	3.22	1.06
People and their livestock and crops are more important than saving forests and wildlife	1.72	31.03	36.20	24.13	6.89	3.51	0.70
My living condition improved after the creation of Reserve	3.44	43.10	20.68	25.86	6.89	2.58	0.99
Wildlife damage compensation received from reserve/government is sufficient	8.47	10.16	16.94	22.03	42.37	1.72	0.81
It is important to set aside a place for the animals and plants to live in	3.44	70.68	18.96	6.89	0	3.72	0.69
I am satisfied with the functioning of BZUG/BZUC	3.44	41.37	31.03	22.41	1.72	3.22	0.91
There is an equitable distribution of common pool resources and benefits.	13.55	55.93	20.33	10.16	0	3.72	0.85
You are willing to contribute for bio-diversity conservation.	46.55	46.55	5.17	1.72	0	4.37	0.67

Source: Field survey, 2013

[2] SA= Strongly Agree (5), A= Agree (4), N= Neutral (3), D=Disagree (2), SD= Strongly Disagree (1)

[3] Higher mean score indicates positive attitude and vice versa (Mean ± St. Deviation).

4.1.2 Factors Affecting Attitudes towards Parsa Wildlife Reserve and Buffer Zone

Number of factors affects attitudes towards protected areas. Level of satisfaction with user groups, participation in training and harassment from wildlife were predictors of conservation attitude in western Terai landscape protected areas of BNP and SWR (Baral and Heinen, 2007). Gender (Men), ethnicity, participation in trainings, poor people tend to have positive attitude in ACA and education level, benefit from tourism, ethnicity and no killing of wild pest animals led to positive attitude in MBCA (Mehta and Heinen, 2001).

Local residents' perception and attitude towards the PWR was neutral. The mean attitudinal score of statement about the liking of Reserve's presence nearby the village was 3.22 ± 1.06 (Mean ± SD) on a 5 point scale, showing indifference about it. However, 34.47 % strongly agreed or agreed, 25.86% were neutral and 39.64% strongly disagreed or disagreed on this statement. This showed that people have both the positive and negative attitudes towards PA and the perceptions are diverse, complex and contradictory. Nevertheless, higher percentage of respondents (39.64%) disliked the existence of PWR in the periphery of their village. People are often neither completely in favor of nor opposed to the park (Allendorf *et al.*, 2007). This may happened due to the dynamic relationship between local people and protected areas. Cost and benefits of managing protected areas could be one of them. For instance, local people are dependent on the protected areas resources, either from the core zone or buffer zone, and they harvest such resources either legally or illegally and accrue benefit from other natural resources. On the other hand wildlife pose several threats to the human lives, impose cost to local people through crop and livestock depredation and the entry to the protected areas for the collection of resources is restricted. There are various reasons why the local people have positive and negative attitudes towards the forest and wildlife of protected areas and have been documented elsewhere (Allendorf *et al.*, 2007).

The reason for liking PWR by the local people is due to the role in biodiversity conservation, employment, tourism and business, provision for natural resource use, security and moral attachment to the place (figure 13). The reason for having negative attitude or disliking PWR is due to the restrictions in resource use, crop and livestock depredation, fear of wildlife harassment and forced evictions, human casualties, beating, arrest and prosecution (figure 14).

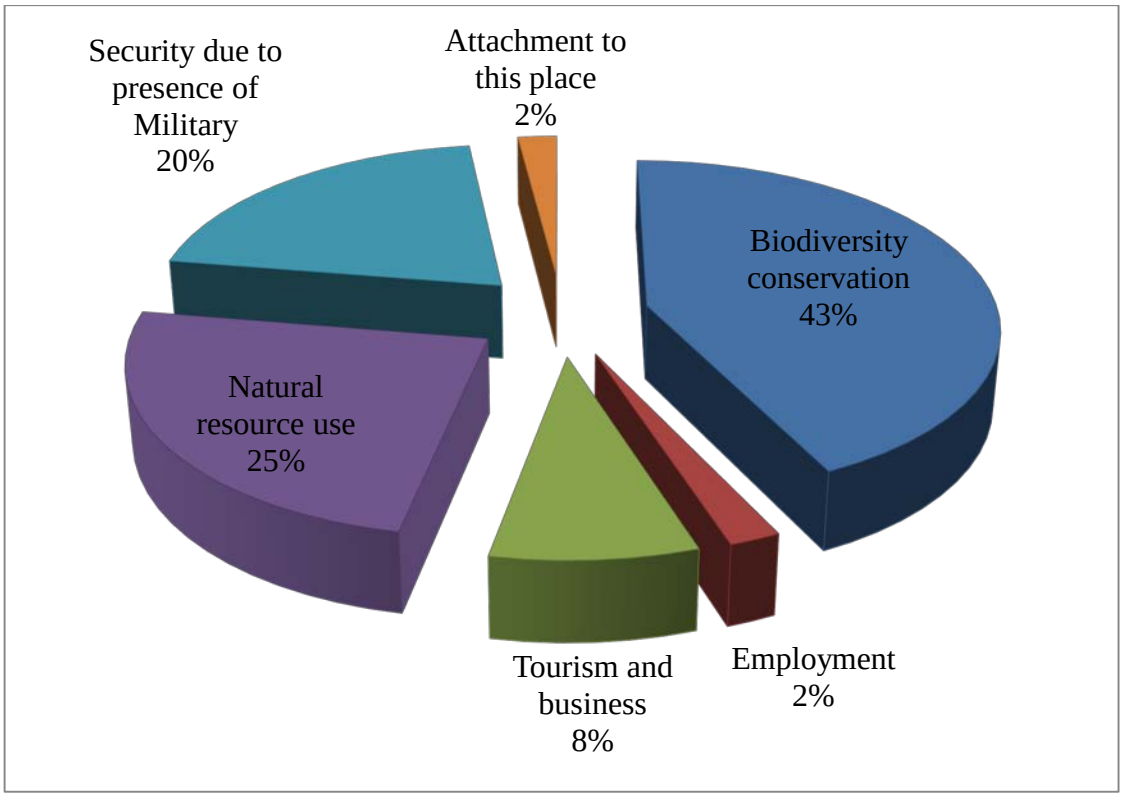

Figure 8: Reason for liking the PWR

Source: Field survey, 2013

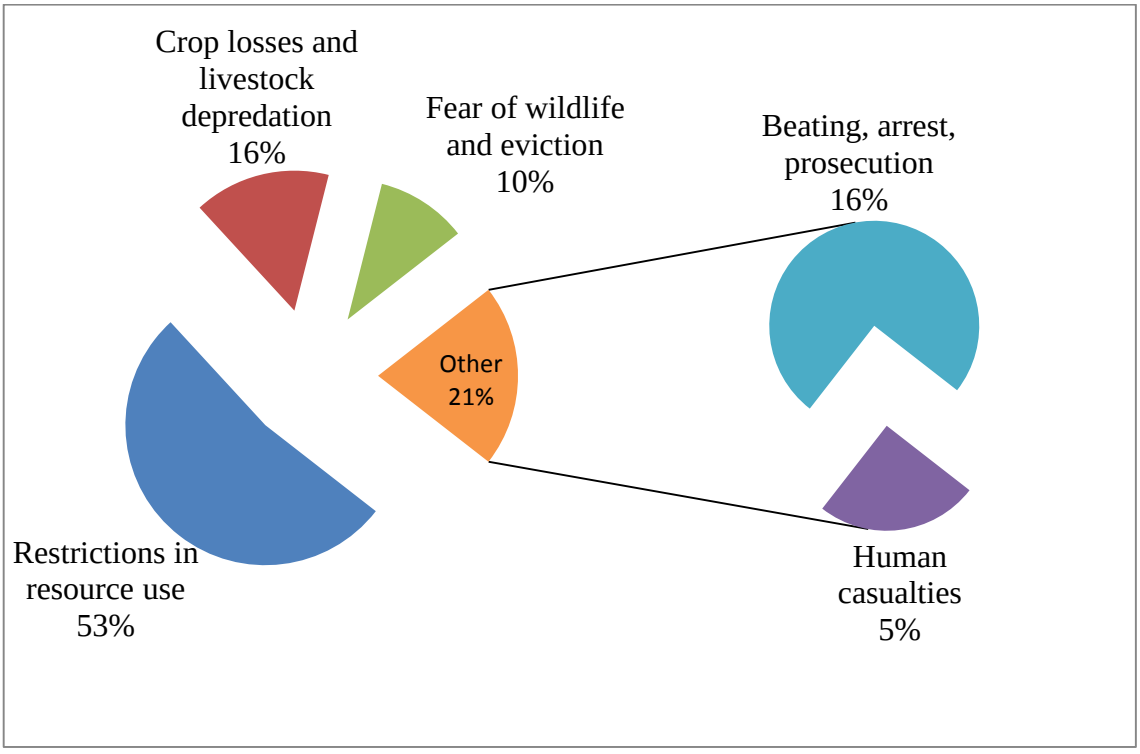

Figure 9: Reason for disliking the PWR

Source: Field survey, 2013

4.1.3 Conservation Activities

Nepalese protected areas that are managed by government which falls under IUCN category II and IV are guarded by Nepalese Army to control illegal activities such as poaching of wildlife, illegal harvest of resources and timber. Only exceptions to army deployment are Makalu Barun National Park and Dhorpatan Hunting Reserve (Paudel, 2011). Protected areas managed by non government organization, National Trust for Nature Conservation (NTNC), are also free from military protection but strong local participation is initiated and encouraged. Anyone found with such illegal activities are subjected to prosecution for legal action. This is often attributed to stick and fence approach or fortress and fine approach or Yellowstone model of conservation (Baral, 2005; Vedeld *et al.,* 2010) and is criticized worldwide as this approach has not been able to contribute well on biodiversity conservation, livelihoods, local benefits and so on (Vedeld *et al.,* 2010).

This study has found that local people are involved in several conservation activities. Such activities were more active when there was donor funded conservation projects such as Park People Programme and Participatory Conservation Programme (both UNDP funded projects). From the key informants' survey, it was revealed that local people in Nirmal Basti V.D.C. devoted their time and efforts to plant several tree and fodder species in the barren land (of course public land) and bank of torrential river of buffer zone area. This was done aiming to grow the plantation forest to meet the local needs of fodder for livestock, fuel wood for domestic energy demand and timber for construction purpose and furniture requirement of the buffer zone residents in the long run. However, there is not the single buffer zone community forest (natural forest) in the study ward (ward 6) of Nirmal Basti V.D.C. to meet the daily requirements for their livelihoods. The absence of buffer zone community forest led the local residents to enter into the Reserve area for natural resources that support their livelihood. Though it is illegal to enter into the protected areas without permit, and to harvest or collect any kind of natural resources, local people do so because of the absence of resources in the buffer zone region. Residents have the long history of residing in this place and resided in this region before the establishment of Reserve. Some were settled under government relocation programme, by clearing the forest. Therefore, I assume there must be the customary rights over the usage of park resources. Despite conflict with the Nepalese army (mandated to patrol the reserve to control illegal activities inside the reserve and if found, should handover such persons to the park authority) such as risk of confiscating harvesting tools and beating, arrests

and prosecution, they struggle to harvest resources such as fuel wood, fodder, leaf litter and take livestock inside the reserve for grazing and feeding water.

On the contrary, local residents in Amlekhgunj buffer zone region have BZCF which provided the opportunities for the collection of fuel wood, grasses, leaf litter and timber as well for private use. This helped the people not to depend on reserve resources for livelihoods. Residents in this region go for patrolling in rotational basis from every household in the forests to check if any illegal activities are going on and if the illegal loggers and wood cutters are chopping down any trees. They also make observations into the reserve boundary to make sure that there are not any illegal activities. Collection of fuel wood in this BZCF is allowed only twice a week, in Tuesday and Saturday. Therefore, local people who need more resources go to the national forest, east of the present BZCF, where there is no control due to inefficiency of forestry staff. One respondent replied that:

> *''We go to patrol our BZCF to check if any illegal harvest of resources is done. Sometimes we have caught people harvesting fire wood illegally and handover to the committee of BZUG for appropriate action. But, if we need more resources then what we are allowed to collect in the BZCF, we go to the government forest as there is no body to control us. Nevertheless, we risk of encountering with forest guard who can confiscate our tools and punish us''.*

Forest fire was prevalent both inside the reserve and in BZCF. I observed forest fire in day and night time inside the reserve, even near the reserve headquarter (less than 500 meter) and in BZCF bordering the reserve. In both study area forest fire was rampant that showed not a single sign of control mechanism by the reserve staff. It was clearly visible that small living organisms and plants dying due to less resistant power to fire. Awareness programme on forest fire conducted by federation of community forestry users group, Bara district was already late to address this problem. It was encouraging finding that majority of the people are positive on biodiversity conservation. This study revealed that local people are willing to contribute for conservation cause. 93.1 % of the respondents are willing to contribute for conservation whereas only 1.72 % did not show any interest for conservation. 5.17 % were indifference for contribution for biodiversity conservation (figure 15). Score for willingness to contribute for conservation was 4.37 ± 0.67 (Mean ± SD) in 5 point Likert scale.

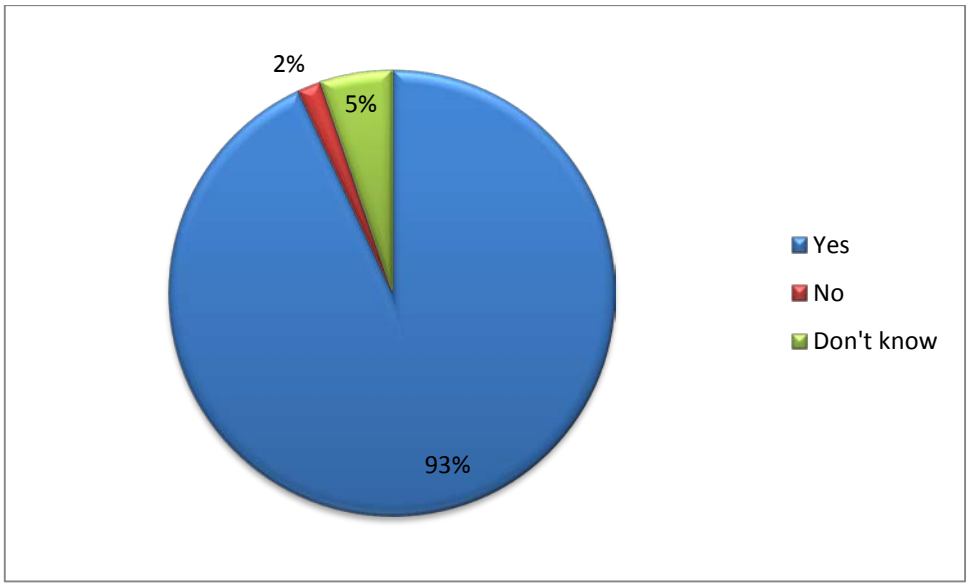

Figure 10: Willingness to contribute for biodiversity conservation

Source: Field survey, 2013

4.1.4 Conflict Issues and Wildlife Induced Damage

Major conflict arised in PWR due to the restrictions in the use of reserve resources for the buffer zone people. Especially, in the study ward of Nirmal Basti VDC there is no presence of community forest or national forest for their daily requirements of fuel wood, fodder and grazing land for livestock. This has compelled villagers to enter inside the reserve for such resources, though it is illegal. When encountered with the Army, they pose risk of being fined, prosecution, confiscation of tools and harassment. Even the beating from Army was experienced by male users, who enter the reserve illegally to harvest natural resources. Besides this, wildlife induced damage also create severe conflicts and led to substantial economic loss for the villagers. Though it was difficult to quantify which animal was most liable to damage the crops it was identified qualitatively. This happened because the damage varied between year to year and crop to crop and it is not the same for all time. However, major wildlife in the region liable to crop damage was found to be Wild Boar, Elephant, Cheetal, Blue Bull and Porcupine. Peacock and Monkey also visited the farm but they are less in compare to other problem animals.

Table 2: Problem animals damaging various crops

Animals liable to damage	**Crop damage**
Elephant *(Elephas maximus)*	Maize, Rice, Wheat
Cheetal *(Axis axis)*	Maize, Rice, Millet, Lentil, Mustard
Boar *(Sus scrofa)*	Maize, Rice, Wheat, Mustard
Porcupine (*Hystrix indica*)	Maize, Rice
Blue Bull *(Boselaphus tragocamelus)*	Lentil, Mustard

Source: Field study, 2013

Most problematic animal, depending on the damage to various crops, was Cheetal as it feeds on almost every crop grown. Other animals mostly feed on Maize, Rice and Wheat but, the crop loss depended on the situation of the field and varied year to year.

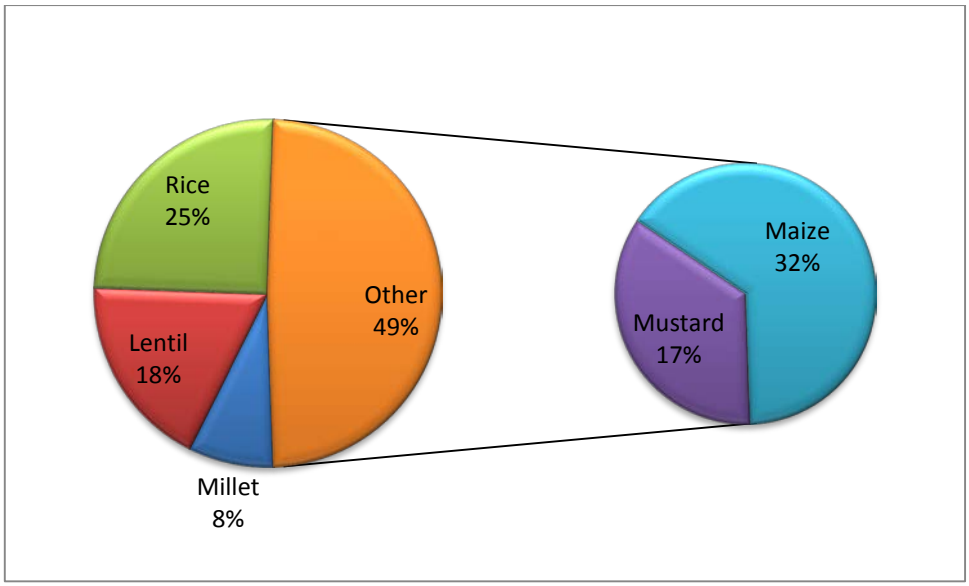

Figure 11: Percentage of loss for each crop due to wildlife

Source: Field study, 2013

In Nirmal Basti region, crop and livestock depredation was much more pronounced then in Amlekhgunj. The study found that the highest percentage of damage was in Maize (32%), followed by Rice (25%), Lentil (18%), Mustard (17%) and Millet (8%). Almost half of the crop losses incurred in Maize and Mustard whereas, damage to Rice accounted to a quarter of total loss.

In monetary term the greater loss was incurred in Maize. This amounted to NRs. 99,800. The second most damaged crop was Rice (NRs.78,500) followed by Lentil (NRs.57,000), Mustard

(NRs.53,800) and Millet (NRs. 25,000). It was found that local people grew cash crop, Tobacco, in winter and spring. This crop are grown and sold to the Surya Tobacco Company in Bara district. Respondents do not have any problem with the wildlife when the field is full of Tobacco as this crop is not eaten/preferred by those problem animals.

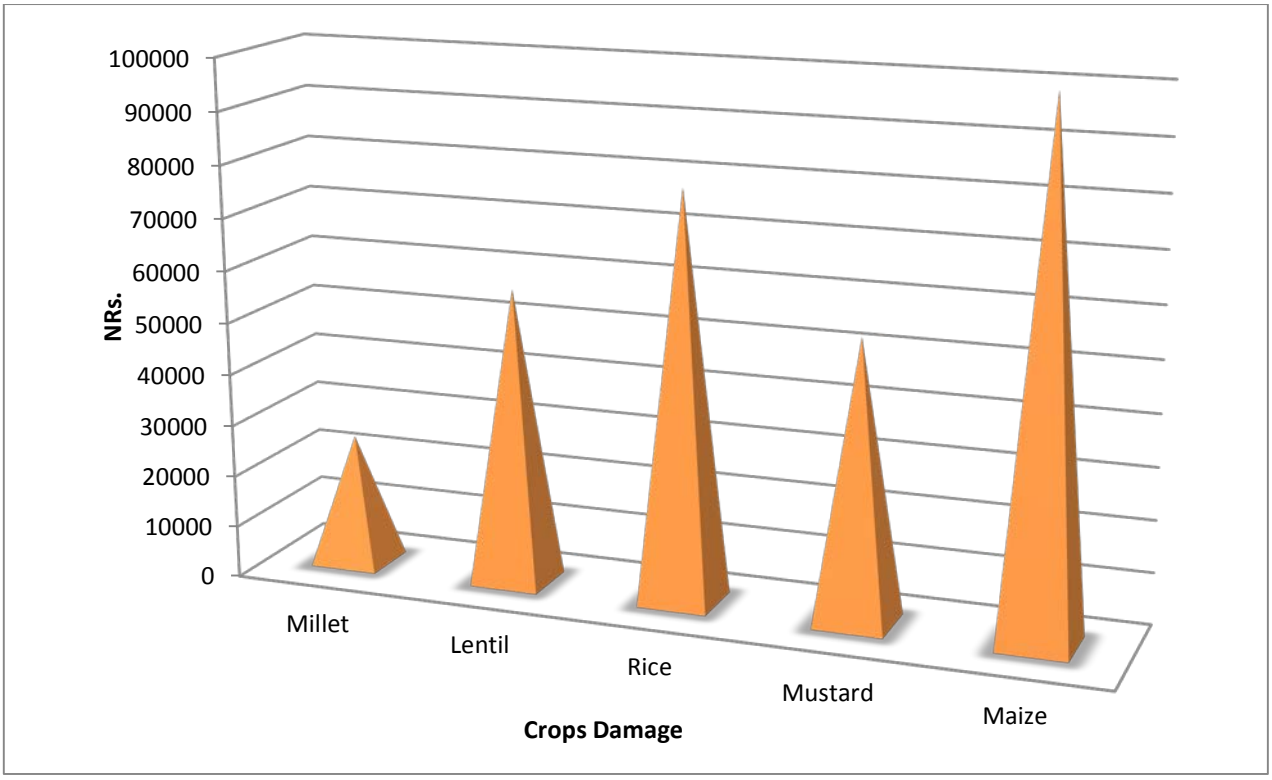

Figure 12: Loss of crop damage in monetary unit (NRs.)

Source: Field study, 2013

It was revealed from the field study that 39 individuals of livestock were predated by tiger and leopard in the last three years. Among them 32 goat (6.4 LSU), 6 cattle (4.8 LSU) and 1 calf (0.4 LSU) were killed. This is equivalent to 11.6 livestock unit. Besides this, it was identified from key informant's survey that elephant also caused damage to private property. One person from the village (Ward 6), bordering the reserve, in Nirmal Basti was killed by elephant recently whereas tiger has attacked an adult boy in the nearby village during my field study. 3 houses were demolished by elephant in the last one year and destroyed and ate the stored Rice and Maize in 2 houses.

Table 3: Property damage due to wildlife

Incident	**Loss**
House destruction by Elephant	NRs.20,000
House destruction and ate stored Rice by Elephant	NRs.26,000
House destruction and ate stored Maize by Elephant	NRs.16,000
Attacked by Elephant	Death
Attacked by Tiger	Seriously injured

Source: Field study, 2013

4.1.4.1 Conflict Mitigation Mechanism

There was varying approaches to mitigate the wildlife induced damage. It was found that local people adopted locally available techniques to mitigate the crop depredation problems whereas, there was not a single practice to mitigate livestock depredation. Major techniques implied was watch tower (*Toong*), sound producing, guarding the farm, tin hitting, and erection of scarecrow. This was similar to the practices adopted elsewhere (Bhatta, 1994; Thapa, 2010). Watch tower and scare crow was very common as it was clearly visible in every field bordering the reserve. Modern means of mitigation measures such as electric fencing, barbed wire fence, scaring devices, trench construction and net wires as practiced in Bardia National Park (Thapa, 2010) was not practiced in the study site. This revealed that local people do not have sufficient financial source to finance such activities on their own and there was very little conservation intervention from government and non-governmental organization in PWR in compare to other protected areas, for instance CNP or BNP. One respondent, in anonymity, replied that:

> *''I take gun with me while I go to the field to guard crops at night. I sleep in watch tower and when I see (wild) animals entering to my field and raiding crops, I dare to open fire (bullet). It depends upon situation if I open fire (bullet) in the space or target at crop raiding animals''.*

4.1.5 Resources Use Pattern

People from the buffer zone of PWR are dependent on reserve resources. Depending upon the socio-economic characteristics of the households in particular and the community characteristics in general, the resources use was determined. As stated earlier, local people in Amlekhgunj study site has less farmland and less livestock holdings in compare to study area of Nirmal Basti.

Local people used 7 types of resources from the buffer zone community forest and reserve. The resources used were Fodder, Fuel Wood, Thatch grass, Leaf litter, Edible plants, Timber and others (resources other than this listed above). Majority of the people used fuel wood (84.48%) as this was the only source of energy for domestic purpose; cooking and heating. Fodder was used by second highest number (36.2%) followed by leaf litter (27.58%), Timber and other resources (3.44% each), edible plants (1.72 %) and thatch grass (1.03%). Edible plants and/or medicinal plants were used by none of the respondents.

Table 4: Resources used by respondents

Natural Resources	Respondents[4]	Percentage[5]
Fodder	21	36.25%
Fuel wood	49	84.48%
Thatch grass	6	1.03%
Leaf litter	16	27.58%
Medicinal herbs	0	0%
Edible plants	1	1.72%
Timber	2	3.44%
Others	2	3.44%

Source: Field study, 2013

In Amlekhgunj buffer zone community forest, timber was sufficient for the members of user group as this was explored by researcher and later proved by president of the user group during key informant survey. Extra timber, which was not consumed by the villagers, was stacked and kept within the office boundary of user group that was in sale, subject to approval

[4] Number exceeds the total respondents as some people used more than one resource.
[5] The total respondent's percentage exceeds 100% as some respondents used more than one resource.

from the reserve office. On the contrary, local people in Nirmal Basti do not have access to timber as they do not have community forest in their locality. Harvesting of timber from the reserve is illegal therefore they do not have any option if they are required to get timber for construction purpose.

Local people are heavily relied on traditional mud stove which uses firewood from the local buffer zone community forest and reserve. 93.10% replied that they have traditional mud stove. Liquefied Petroleum Gas (LPG) was used by 43.10% whereas presence of biogas, improved cook stove and other form of eco-friendly stove was negligible. The percentage of respondents exceeded 100% because households have more than one form of cooking stove.

Reserve authorities permitted to collect thatch grass once a year inside the protected area, whereas in the BZCF permission for collection of firewood is granted frequently, twice a week. People complained that the thatch collection period had been reduced from 2 weeks in earlier days to less than a week at the moment. This has reduced the total thatch grass extraction from the reserve. However, grassland coverage is less than 20 sq km (4% of the reserve area) in PWR in comparison to the Chitwan National Park (185 sq km), Bardia National Park (190 sq km), Shukla Phanta Wildife Reserve (76 sq km) and Koshi Tappu Wildlife Reserve (60 sq km) (Baral, 1999).

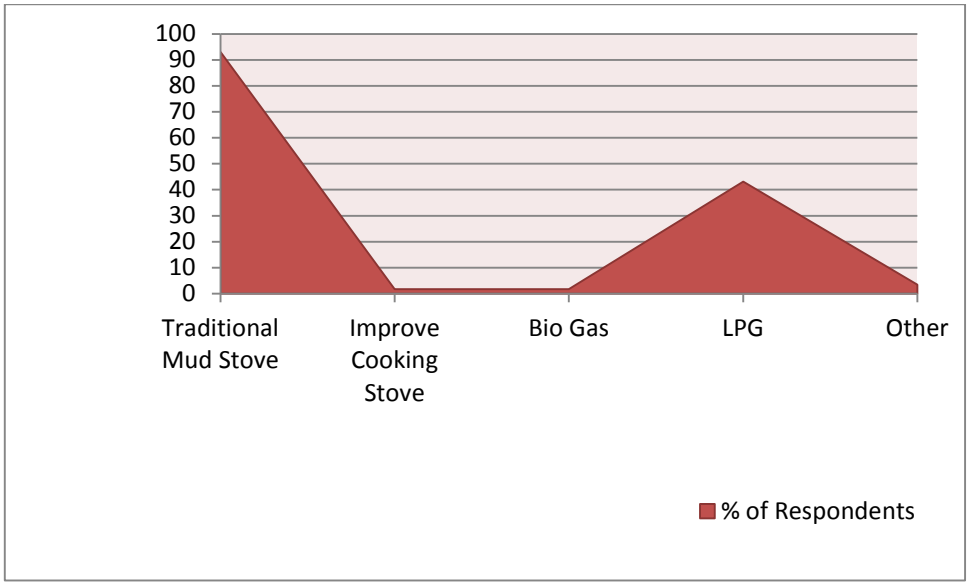

Figure 13: Types of cooking stove used by respondents

Source: Field study, 2013

It was impossible during my field study to measure (quantify) the use of firewood and fodder by local residents in the buffer zone region. Therefore resource use, mainly firewood and fodder, was projected by implying benefit transfer method (IUCN/The Nature Conservancy/The World Bank, 2004). Thapa (2010) reported that fuel wood consumption in Subarnapur buffer zone VDC of PWR was 4622.8 kg/hh/year. This amount equals to 757.83 kg/capita/year. Another study in Handi Khola VDC buffer zone of PWR found that fuel wood consumption was 253.71 kg/hh/year (Upreti, 2011). Average fuel wood consumption in Terai region for cooking, heating and lighting purpose was reported to be 322 kg/capita/year (Regmi, 2000).

Considering previous studies from the buffer zone of PWR and Terai region as a whole, it can be projected that average fuel wood use by the local residents in PWR is 444.51 kg/capita/year or 2969.32 kg/hh/year (2.96 ton/hh/year). In the worst case scenario the fire wood consumption is 5.06 ton/hh/year. In the optimistic scenario the consumption is 1.69 ton/hh/year.

4.2 Result (from Annapurna Conservation Area)

4.2.1 Cropping Pattern

Cropping pattern is most important that has direct and indirect influence on socioeconomic condition. People raise some species of cereal crops that includes Rice, Maize, Millet, Barley, wheat etc. Due to the migration in city area and some adverse climatic condition, there occurs less amount of production of these cereal crops. In cash crops, generally people grow Potato, Peas, Beans, different types of vegetables etc. There are two growing season of these crops, one is the monsoon season and another is the winter season. Monsoon season crop includes Rice, Maize, Millet, Potato, Vegetables etc whereas winter season crop includes Barley, Wheat, and Beans etc. Monsoon season crop includes from Jestha to Asoj months whereas winter season includes the month from Kartik to Chaitra. Both cropping seasons are vulnerable for the damage by wildlife. The main occupation of the people is agriculture who not directly involved in the agriculture is involved in livestock farming, tourism, trade and labor.

4.2.2 Season and Stage of Crop Damage

Through the questionnaire survey and discussion with the key informants, it is found that the season of crop damage varies with the cropping practices. When the crops are raised in the land, it is found damaged by different pest wildlife. Generally Rice, Maize, Millet, Potato are

found damage at all the stage of the crops from Shrawan to Paush. Potato is dug and Maize corn cob are broken by pest wildlife.

4.2.3 Type of Wildlife Damaging the Crops

The agricultural crops grown are damaged by the different wildlife. The major pest wild animals are Bear, Monkey, Barking Deer, Porcupine, Goral, Jackal, Wild Crow etc. The pest animals are kept under based on damage. Crop wise major pest animals are given as follows:

Maize: Bear, Monkey, Porcupine, Jackal, Wild Crow etc.
Rice: Bear, Barking Deer, Goral, Monkey, etc.
Potato: Porcupine and Monkey.
Barley: Barking Deer, Goral, Monkey etc.
Wheat: Barking Deer, Goral, Monkey etc.

4.2.4 Mitigation Measures Adopted by Local People

There are various types of the mitigation measures that are being used by the local people to protect their crops. Generally guarding the crops, making the false human structure, loud sound, belling, firing, fumigation, threatening, blasting of balloons and other things, spraying the rice wine, trapping etc are some protective measures used by the local people. Pest wise protective measures are described as follows:

Bear: Guarding, making loud sound, firing, fumigation, threatening, blasting etc.
Monkey: Making the false human structure, guarding, making loud sound, threatening, blasting etc.
Porcupine: Spraying of rice wine, guarding, firing, fumigation, blasting etc.
Barking Deer, Goral: Guarding, threatening, blasting, making loud sound etc.
Guarding to crops is found more effective for the Bear¸ Monkey and Barking Deer. Blasting is also found effective for the monkey as well as Barking Deer. Spraying of wine, firing and fumigation are found more effective for the Porcupine.

4.2.5 Pattern of Crop Damage

A significant quantity of the crop damage was found in the questionnaire survey. Only 10 respondents out of 102 respondents from two V.D.C. of Parche and Bhachowk replied that they had no damage by wildlife. The quantitative description of the crop damage is illustrated in the following table. According to the table maximum damage was found of the maize that

equals to approximately NRs. 1,81,800 per annum. Similarly rice, millet and potato were other crops depredated by wildlife.

Table 5: Quantitative and economic description of crop damage (one year).

Sn.	Crops	Harvested (Muri)	Damage (Muri)	Damage (NRs.)	% of damage (single crop)
1	Rice	893.25	60.75	121500	6.36
2	Maize	204.60	90.90	181800	30.76
3	Millet	162.35	39.15	78300	19.42
4	Potato	3002 Kg	738 Kg	25830	19.73
	Total			**4,07,430**	

Source: Field Study, 2013

N.B. The rate of rice per Muri is NRs. 2200, maize is NRs 2000 per muri, millet is NRs. 2000 per muri, and potato is rated at NRs 35 per kg. The rate of crops is based on the information provided by local people.

4.2.6 Livestock Depredation

There are different types of the livestock kept by the local people. The economic status of the people of the study area depends upon the types and number of livestock kept by the people. Common livestock that local people own are goat/sheep, cattle, buffalo, chickens etc.

Various species of wildlife are accountable for the livestock depredation. Carnivores and the omnivores are responsible for predating to the livestock. Common Leopard, Jackal, Jungle Cat, Leopard Cat, Tibetan Wolf etc. are some wildlife species involved in predating. Predator wildlife and prey livestock area as follows:

Buffalo: Common Leopard, Tibetan Wolf etc.
Cattle: Common Leopard, Tibetan Wolf etc.
Goat/Sheep: Common Leopard, Tibetan Wolf, Jackal etc.
Chicken: Jackal, Jungle Cat, Tibetan wolf, Otter, Eagle etc.
Cattle, Goat, Sheep, Buffalo and Chicken are pronounced most damaged in the spring and summer season (March to September) because at this time livestock are kept in the high

altitude pastures. Livestock are scattered over large areas in the pastures. Therefore, sufficient care cannot be provided by the herders and more incidences occur in this season. On the other hand, very few incidences take place in the winter season because the herds are kept near the settlement and sufficient guarding can be provided at this period. Loss to chicken is found throughout the year. While the most damage was found in the summer/rainy season According to the questionnaire survey and the discussion with the livestock owners and herders approximately 80% damage was found in the spring and summer season (March to September) that is shown through the following table.

Table 6: Monthly livestock depredation is given in following

S. N.	**Month**	**Bhachowk**	**Parche**	**Total**
1	January	1	5	6
2	February	1	9	10
3	March	8	5	13
4	April	14	9	23
5	May	2	7	9
6	June	4	6	10
7	July	3	12	15
8	August	1	8	9
9	September	4	5	9
10	October	3	6	9
11	November	0	2	2
12	December	4	3	7
	Total	**45**	**77**	**122**

Source: Field Study, 2013

4.2.7 Mitigation Measures Adopted by Local People

Traditional mechanism of mitigating wildlife damage is in practice to date. Making fire around the herd, fumigation, regular and effective guarding, paying more attention at the possible hidden places, trapping and hunting are some protective measures to protect the livestock. Trapping and hunting is not in the practice according to the local informants and also this is against the existing nature conservation law in Nepal.

4.2.8 Quantification of Livestock Depredation

A considerable number of livestock was found depredated by wildlife. Households told that there was no damage found in their own houses. The maximum damage was found in the goat/sheep depredation equaling to NRs 4,65,000 per year. Other damages were found in buffalo and cattle. The total damage was found to be NRs. 7,61,000 that is averaged per household as NRs. 7534.65 per year. The local rate of one goat/sheep is taken as NRs. 5000, buffalo is taken as NRs. 8000.00 and cattle are taken NRs. 8000. We can conclude that significant damage is found for goat/sheep, buffalo and cattle, respectively.

Table 7: Quantitative and economic description of livestock depredation (last 3 years)

Sn.	**Livestock**	**Present (Nr.)**	**Damage (Nr.)**	**Damage (NRs.)**	**% of damage**
1	Goat/Sheep	592	279	13,95,000	32.03
2	Cattle	267	52	4,16,000	16.30
3	Buffalo	340	59	4,72,000	14.78
	Total	**1199**	**390**	**22,83,000**	

Source: Field Study, 2013

4.2.9 Perception of Local People towards Wildlife Conservation

Through the field study I know that local people have positive attitude towards wild life conservation. Their awareness in nature conservation has increased, though problem animals are present in the nearby forest which poses loss to local people. Conservation intervention of ACA can be attributed for the increased perception on wildlife conservation.

4.3 Discussion

4.3.1 Conservation Attitudes

An attitude among the local people towards buffer zone and PWR was not encouraging. Only 39% of the respondents (N= 58), showed favorable attitudes towards various conservation statement that was aimed to assess their attitude towards buffer zone and reserve. 61 % of the respondents had no opinion or held negative attitudes towards the protected area. This was similar finding to the study carried out by Heinen (1993), who reported that 65% of the surveyed people in Koshi Tappu Wildlife Reserve had negative attitudes. However, respondents in PWR showed more favorable attitude than the respondents in Bardia National

Park, where only 20% respondents held favorable attitude. Mountain protected area of Annapurna Conservation Area and Makalu Barun Conservation Area had exceptionally favorable attitude towards conservation (Mehta and Heinen, 2001). Mehta and Heinen (2001) found that 87% of the local people in ACA and 83% in MBCA had positive attitude. This was very high in comparison to the traditional reserves and parks in Nepal. This can be attributed to strong participation of local people in management and benefit sharing of resources. In some cases, people can neither be completely in favor of or in opposition to the protected area (Allendorf *et al.,* 2007), rather it depends on how much benefits they took or costs borne by the local people.

Individual mean attitudinal score on various conservation attitudes towards BZ and PWR ranged from 2.77 to 3.43 on a 5 point Likert scale. The main motive behind the liking of reserve was due to the opportunity to extract natural resources. Though the buffer zone programme was initiated with the aim of bringing peoples' participation in protected area management and conservation (HMG/DNPWC, 1996), it has not been able to deliver so in PWR as shown by this research. 49.70% of the respondents in buffer zone of Makwanpur district, PWR did not have any idea about the buffer zone activities (Bhandari, 2011). This proved the absence of participation and communication in buffer zone management and reserve conservation.

4.3.2 Factors Affecting Attitudes Towards Parsa Wildlife Reserve and Buffer Zone

Number of factors affects attitude towards protected area. Level of satisfaction with user groups, participation in training and harassment from wildlife were predictors of conservation attitude in Western Terai Landscape protected areas of BNP and SWR (Baral and Heinen, 2007). Gender (Men), ethnicity, participation in trainings, poor people tend to have positive attitude in ACA and education level, benefit from tourism, ethnicity and no killing of wild pest animals led to positive attitude in MBCA (Mehta and Heinen, 2001).

From the informal discussion with user group members in Nirmal Basti, it was revealed that they like the reserve because they were able to extract the resources from the reserve, though it was illegal. They try their best to avoid encounter with the Army and Reserve staff because it is problematic when reserve personnel stop and question on resource extraction issues. It was revealed that a kind of informal agreement has been started in Nirmal Basti region with local people that they can enter the reserve assuming they won't destroy the healthy trees and

enter without possession of big harvesting tools. This is done because of the lack of alterative resources in the buffer zone surroundings and also to pay back for the crop and livestock depredation from reserve animals. Big utensils are not allowed to take in-person while entering the reserve fearing that villagers could chop down the healthy woods. However, small tools to cut the leaf and twigs are possible to carry with. This informal and unwritten agreement between local people of Nirmal Basti and Reserve staff to use the resources is well accepted by the villagers. Reserve staff also admitted that this has helped to reduce park people conflict to some extent. Due to the absence of local resources such as fuel wood, fodder, grazing lawn in the buffer zone, people are dependent on reserve.

26% are neutral about liking or disliking the reserve. Role of reserve in biodiversity conservation and possibility for natural resources use was the main motive behind the liking of reserve. Presence of military in several outposts (for conservation purpose) all over the reserve also provides sense of security to the locals bringing positive attitude among them. Restrictions in resource use from the reserve freely and crop and livestock depredation due to reserve wildlife brought negative sentiments among the villagers. According to the NPWC act (1973), not a single resource can be extracted and harvested from the reserve without the prior approval from authority and this is still governed to be fortress and fine approach to conservation.

4.3.3 Conservation Activities

Still most of the traditional protected areas in Nepal practice Yellowstone model of conservation where the entry into the reserves and park boundary without permission is prohibited. Similarly extraction of natural resources from the protected areas is strictly prohibited besides granting permission to collect thatch grass once a year for 2 weeks period at the modest fee. However, after the passing of conservation area management regulation (1991) and buffer zone management regulation (1996), the old system of ‘stick and fence’ approach to biodiversity conservation has been discouraged and Nepal entered into the new era of protected area management.

The provision of channeling fund for the development projects along with environment conservation activities has led people to be more active on conservation. During UNDP funded Park People Programme several conservation activities were carried out but now local people seems to be passive in conservation sector. Forest fire was rampant within the reserve

and BZCF during my field visit and it seemed that there was less focus or awareness to control it.

Despite negative attitude towards the reserve, majority of the people are positive on biodiversity conservation and they were willing from their side for conservation cause. Overwhelmingly, 93.1% of the respondents were willing to contribute for conservation whereas only 1.72 % did not show any interest for conservation and 5.17% were indifference for contribution for biodiversity conservation.

4.3.4 Conflict Issues

Wildlife induced damage, restrictions in using protected area resources and restrictions in land use have been the major issue in park people relationship (Shrestha, 1996; De Boer and Baquete, 1998; Mehta and Kellert, 1998; Regmi, 2000; Gupta, 2005; Allendorf *et al.,* 2007; Karn, 2008; Dorji, 2009). Major conflicts arised in PWR due to restriction in the use of reserve resources for the buffer zone people. Wildlife induced damage also created severe conflicts and led to substantial economic loss for the villagers. Access to natural resources was easy before the creation of PWR but now the law prohibits the resource use. This was experienced same in the protected areas of Bhutan too. Local people in Jigme Dorji National Park (Bhutan) expressed that access to the park resources like timber, fuel wood and fodder was better before the establishment of the park. Implementation of forest act (1995) and rules (2006) has imposed ban on them to use the resources freely (Dorji, 2009), threatening the biodiversity in long run. However, majority of the people (87%) were positive about the establishment of the park.

Major wildlife in the study region liable to crop damage was found to be Wild Boar (*Sus scrofa*), Elephant (*Elephas maximus*), Cheetal (*Axis axis*), Blue Bull (*Boselaphus tragocamelus*) and Porcupine. This was similar to problem animals (cheetal and wild boar) in Bardia National Park (Bhatta, 1994) and Chitwan National Park where, Rhinoceros (*Rhinoceros unicornis*), Bear (*Melursus ursinus*) and Parakeet (*Psittacula kramiri*) were additional problem animals in CNP. While Cheetal (*Axis axis*) was the most destructive animal in PWR; Rhino (*Rhinoceros unicornis*) was the most destructive animal (71% damage) followed by Deer (*Axis axis*) (18% damage) and Boar (*Sus scrofa*) (8 % damage) in CNP (Shrestha, 1996).

Almost half of the crop income lost incurred in Maize and Mustard. Rice accounted to quarter of total loss in PWR. The greater loss was incurred in Maize. Several livestock was also killed by tiger and leopard totaling to 11.6 livestock unit but no compensation was offered. In CNP too, highest economic loss was in Maize (60%), Rice (32%) and Mustard (8%) (Shrestha, 1996). Another study in Thori buffer zone of CNP showed that crop depredation by Elephant was Rice (50%) followed by Wheat (25%). Deer destroyed Wheat (47.1%) followed by Maize (30.9%) and wild Pig damaged vegetables (52.9%), Maize (13.2%) and Wheat (10.3%) (Air, 2010) Paddy/Rice (3.25 ± 3.01 quintal) and Wheat (1.16 ± 1.05 quintal) was the most damaged crops in Shukla Phanta Wildlife Reserve buffer zone which was depredated by Wild Boar (58.3%) and Elephant (12.9%) (Badu, 2012). In Thakurdwara VDC of BNP, paddy was highly affected (29%) followed by lentils (23%) and vegetables (17%). This was quite different than in Shivapur VDC where the loss was highest in vegetables (31%) followed by paddy (20%) and wheat (18%) (Thapa, 2010). This implies that intensity of crop losses varies from place to place and site specific appropriate measures should be adopted to reduce or mitigate the loss.

It has been documented that several approaches to mitigate crop depredation from wildlife has been carried out worldwide such as control shooting (Perez and Pacheco, 2006); electric fencing (Sukumar, 1991); crop (farm) guarding by mass of people (Cai *et al.,* 2008). Use of watch tower to guard the crop with group shouting had been effective to mitigate damage from all depredators in Bardia and Chitwan National Park (Nepal and Weber, 1995; Thapa, 2010), combinations of different means to guard the crops was effective in Bardia and India (Strudsrod and Wegge, 1995; Sekhar, 1998). Implementation of such measures depends on the particular situation only which do not violates the national legislation and socio-economic characteristics of a particular protected area.

There were very few cases of people who complained for the crop and livestock depredation. Government of Nepal has formulated wildlife damage compensation policy (2009) which is targeted to reduce the park people conflicts by providing compensation for the damage occurred due to wildlife. This policy did not seem to work as expected. People who went to claim for compensation often came back home with empty hands. Sometimes, villagers had to spend more money then what they are expected to get from compensation. Thus, they do not trust for the compensation scheme and almost the entire incident goes unreported. The wildlife damage compensation (relief) policy states that maximum of NRs. 5,000 is available

for human injuries, NRs. 50,000 for serious injuries and NRs. 1.50,000 for human death. This policy has recently been revised by the Ministry of Forest and Soil Conservation, Nepal to address the appropriate loss to local people. According to the new provision, injured people will get maximum of NRs 10,000, seriously injured people get maximum of NRs. 50,000 and NRs 3,00,000 for human death (GoN/MoFSC, 2012). Further, the compensation of maximum NRs. 10,000 is provided for livestock death, compensation up to NRs. 10,000 (earlier it was NRs. 4,000) is available for house damage and up to NRs. 10,000 (earlier it was NRs. 5,000) is available for the destruction of stored food items (GoN/MoFSC, 2012). The family member who was died due to attack of elephant got NRs. 1,50,000 and were unhappy with the compensation amount. Another respondent replied that he went to the reserve headquarter three times for claiming compensation for house damage by elephant but the hurdles to get the money did not complete. Therefore, he gave up the compensation procedures as the one time travel to the PWR headquarter requires more than NRs. 500 and the whole day of time.

64 % of the local people replied that the compensation received from the reserve was not sufficient, not systematized and never get it. Study in CNP showed that local people (73.3%) were not satisfied with the present compensation amount and 65.7% replied that compensation amount for the tiger victims must be in between NRs. 3,00,000 to NRs. 10,00,000 (Das, 2012). 29.37% respondents replied that the compensation amount should also be released immediately (Das, 2012).

4.3.5 Resource Use Pattern

7 types of resources were used by local people from the buffer zone community forest and reserve. This was similar to the resources used by residents in BNP and SWR. 84% of the respondent used fuel wood as this was the only source of energy in the study area. Resource use pattern varied quite differently between PWR and other two PAs in Western Terai Landscape region. In PWR, 84% of household used fire wood in compare to 68% in BNP and 58% in SWR. Fodder was used by 36% in PWR and this was 20% in BNP and much lower in SWR (2%). Likewise, leaf litter was collected by 28% in PWR which was lower than BNP (62%) and SWR (34%). None of the respondents used timber in SWR and this was very low in PWR (3%) in compared to BNP, where 41% of local people used from BZCF. Thatch grass was collected by more households in BNP (93%) and SWR (78%) than in PWR (1%). Edibles and herbs were collected by 57% households in BNP and 11% in SWR which is higher than in PWR (5%), which includes edible plants and other resources.

Firewood, fodder for livestock and leaf litter were the most important resources for local people in the study area. Lack of alternative resources in the BZ region in Nirmal Basti region has led more people to depend on reserve resources directly. This has created resource use conflicts between authority and local people; local people are entering the reserve for resources and reserve staff imposing ban on harvesting of such resources. Forestry resources are mainly used for providing a safety net to maintain the current level of income and not to come out of poverty (Vedeld *et. al.,* 2004). Research in Kosovo indicated that there was negative relationship between household income and collection of forest products, showing low income household using higher number of forest products (Jupolli, 2010).

Chapter V
CONCLUSION AND RECOMMENDATION

5.1 Conclusion

This research has highlighted about the relationship between Parsa Wildlife Reserve and local people living in the buffer zone. Overall, the attitude of local people towards the reserve and buffer zone was found to be negative. The lack of natural resources in the buffer zone of Nirmal Basti VDC led local people to depend on reserve resources directly even though the NPWC act (1973) prohibits doing so. The absence of conservation intervention programme and low community development activities in and around the buffer zone of reserve was the main thing that brought negative attitude towards buffer zone. Similarly, wildlife induced damage to the local people in the form of crop and livestock depredation and property damage brought park people conflicts. The damage to the crop could vary by year to year and from animal to animal but no modern means of mitigation measures were adopted. The compensation mechanism that was aimed to reduce park people conflicts in protected areas did not seem to work in the study site. Low amount of compensation in compare to damage and the long bureaucratic hurdles to get refund was the main reason why affected people do not claim for the compensation. Further, majority of the respondents did not know that compensation mechanism exists in protected areas or in Nepal and the process to claim for it. Firewood and fodder was the main natural resources used by local residents either from buffer zone community forest or from reserve. Conservation activities also seemed to be weak as the reserve and buffer zone forest was caught in fire almost every day during my stay in the field. Though the conservation activities were active during the UNDP funded project, it is almost dead at the moment. Parsa Conservation Programme of NTNC is in progress near reserve headquarter but it has no significant impact on conservation. Whatever is the current situation about the conservation in reserve and buffer zone, local people are very much willing to participate in biodiversity conservation. This study showed very optimistic scenario for local peoples' participation in conservation of PWR and buffer zone in the future. Appropriate programme, plan and policies should be developed and design to integrate local residents in reserve management for the long term sustainability of PWR. Participation and communication must be the integral part of any project.

5.2 Recommendation

For the long term survival of PWR and to win peoples' steward for conservation, this study came up with several recommendation at the local level, reserve level and policy level.

- ✓ Buffer zone development fund disbursed from buffer zone management council did not reach to every community, therefore every community must be treated equally and highly affected zone must receive more priority than others.
- ✓ As proved from elsewhere, community based conservation approach and participation of local people in decision making process in reserve and buffer zone management is likely to improve residents' attitudes towards protected area and thus improves park people relationship. Therefore, strong focus must be give on this.
- ✓ While promoting community development projects in the buffer zone, the project should be launch on demand driven basis but not supply driven. This helps to address the most demanded problem or help to address prioritized project by local people.
- ✓ Alternative resources should be promoted in the buffer zone of PWR, so that people will be less dependent on reserve. Promotion of alternative energy and improved cook stove helps to reduce consumption of fuel wood and promotion of fodder trees and grasses, especially agro-forestry practices helps to address resource deficiency for the buffer zone community.
- ✓ Regular interaction between the reserve staff, army personnel and buffer zone people should be initiated. Extension and communication programme must be the regular part of reserve management.
- ✓ Farmers must get the amount what they loose from wildlife. The indirect cost of managing reserve should not be borne by the villagers.
- ✓ Further study should be carried out to design the site specific appropriate strategy to reduce park people conflicts, mitigate crop and livestock depredation, and to improve local livelihoods so that park people relationship will be better.

REFERENCES

Air, A. (2010) Park People relation: A case study of Thori VDC buffer zone of Chitwan National Park. M.Sc. Thesis, Central Department of Environment Science, Tribhuvan University, Kathmandu.

Allendorf, T.D., Smith, J.L.D. and Anderson, D.H. (2007) Residents' perceptions of Royal Bardia National Park, Nepal. Landscape and Urban Planning 82: 33-40.

Badu, M. (2012) Assessment of human wildlife conflict in Shukla Phanta Wildlife Reserve, Kanchanpur, Nepal: A Case study of Daiji VDC and Bhim Dutta Municipality. M.Sc. Thesis, School of Environmental Science and Management, Pokhara University, Kathmandu.

Baral, H.S. (1999) Impact of grassland management on avian fauna. In Richard, C., Basnet, K., Sah, J.P. and Raut, Y. (Eds): Grassland Ecology and Management in Protected Areas of Nepal. Vol. 2. Technical and Status Papers on Grasslands of Terai Protected Areas. International Centre for Integrated Mountain Development (ICIMOD), Kathmandu. ISBN: 92 9115 166 1, Vol. I 92 9115 149 1.

Baral, N. (2005) Resource use and conservation attitudes of local people in the Western Terai Landscape, Nepal. M.Sc. Thesis, Environmental Science, Florida International University, Miami, Florida, USA.

Baral, N and Heinen, J.T. (2007) Resources use, conservation attitudes, management intervention and park-people relations in the Western Terai landscape of Nepal. Environmental Conservation 34: 64-72.

Bhatta, S.R. (1994) Beginning with buffer zone management: A Case study from Royal Bardia National Park. Masters Dissertation (MNRSA), Agriculture University of Norway, As.

Bista, D.B. (1987) People of Nepal. Ratna Pustak Bhandar, Kathmandu.

BPP (1995) Biodiversity profile of high mountains and high himal physiographic zones. Biodiversity Profiles Project Publication No 14. Department of National Parks and Wildlife Conservation, Ministry of Forests and Soil Conservation, Kathmandu. ISBN: 90-73287-15-4.

Bajracharya, S. B. (2004) Community Involvement in conservation: An Assessment of impacts and implication in the Annapurna Conservation Area, Nepal (Ph. D. Dissertation).

Cai, J., Jiang, Z.G., Zeng, Y., Li, C.W. and Bravery B.D. (2008) Factors affecting crop

damage by wild boar and methods of mitigation in a Giant Panda Reserve. European Journal of Wildlife Research 54: 723-728.

CBS (2011) Population census of Nepal. Government of Nepal, National Planning Commission, Central Bureau of Statistics, Kathmandu.

Das, A. (2012) Human tiger conflict in Chitwan National Park: A Case study of Meghauli and Rajhar VDC. M.Sc. Thesis, School of Environmental Science and Management, Pokhara University, Kathmandu.

De Boer, W.F. and Baqquete, D.S. (1998) Natural resource use, crop damage and attitudes of rural people in the vicinity of the Maputo Elephant Reserve, Mozambique. Environmental Conservation 25: 208-218.

DNPWC (2004) Parsa Wildlife Reserve brochure.

DNPWC (2010) Annual Report (2066/2067). Department of National Parks and Wildlife Conservation, Ministry of Forest and Soil Conservation, Government of Nepal, Kathmandu, Nepal.

DNPWC (2012) Protected Areas (online) http://www.dnpwc.gov.np/protectedareas.html (accessed on 21 December, 2012).

Dorji, R. (2009) Interactions between protected areas and local communities- A Case study from Jigme Dorji National Park, Bhutan. M.Sc. Thesis, University of Natural Resources and Applied Life Sciences, Vienna.

Dudley, N. (Editor) (2008). Guidelines for applying protected area management categories. Gland, Switzerland: IUCN. X + 86pp. ISBN: 978-2-8317-1086-0.

Getzner, M., Jungmeier, M. and Lange, S. (2012) People, Parks and Money, Stakeholder Involvement and Regional Development: A Manual for Protected Areas, Verlag Johannes Heyn, Klagenfurt, 2012, ISBN 978-3-7084-0413-4

GoN/MoFSC (2009) Wildlife damage relief guideline. Ministry of Forest and Soil Conservation, Government of Nepal, Kathmandu.

Gupta, R. (2005) Human wildlife conflicts in Khata Corridor under Terai Arc Landscape (TAL), Nepal. B.Sc. Thesis, School of Environmental Science and Management, Pokhara Univeristy, Kathmandu.

Heinen, J.T. (1993) Park people relations in Koshi Tappu Wildlife Reserve, Nepal – a socio-economic analysis. Environment Conservation 20: 25-34.

Heinen, J.T. and Mehta, J.N. (1999) Conceptual and legal issues in the designation and management of conservation areas in Nepal. Environmental Conservation 26 (1): 21-29.

Heinen, J.T. and Shrestha, S.K. (2006) Evolving policies for conservation: An historic profile of the protected area system of Nepal. Journal of Environmental Planning and Management 49 (1): 41-58.

HMG/MoFSC (1996) Buffer zone management regulation. His Majesty's Government of Nepal, Ministry of Forest and Soil Conservation, Kathmandu.

HMGN/MoFSC (2002) Nepal Biodiversity Strategy. His Majesty's Government of Nepal, Ministry of Forest and Soil Conservation, Kathmandu.

HMG/UNDP (1998) Park people programme, towards building partnership for conservation. Department of National Parks and Wildlife Conservation, Park People Programme, Kathmandu.

IUCN/The Nature Conservancy/The World Bank (2004) How Much is an Ecosystem Worth? Assessing the Economic Value of Conservation, the International Bank for Reconstruction and Development/the World Bank, Washington DC.

IUCN/UNEP-WCMC (2012) The World Database on Protected Areas (WDPA). UNEP-WCMC, Cambridge, United Kingdom.

Jnawali, S. R. (1989) Assessment of crop damage and human harassment by Rhinoceros (*Rhinoceros unicornis*) in Sauraha area, Chitwan National Park, Nepal. Masters Dissertation, Agriculture University of Norway, Ås.

Jackson, R., Richard, C., Gurung, P. (2001) Enhancing Participatory Assessment Capacity in Range Land Management and Livestock Wildlife Interaction.

Jupolli, M. (2010) Planning and management issues in Sharr Mountains National Park, Kosovo: Livelihoods of local communities and their perceptions. Masters Thesis, Department of International Environment and Development Studies, Norwegian University of Life Sciences, As.

Karn, P. (2008) Making payment for environmental services (PES) work: A Case study of Shivapuri National Park, Nepal. In: Bajracharya, S.B. and Dahal, N. (Editors), Shifting Paradigms in Protected Area Management, NTNC, Kathmandu.

Laim, L.M. (2004) A study of stated attitudes and behaviour of local people toward conservation in Koshi Tappu Wildlife Reserve, Nepal. Paper presented to the 15th biennial conference of the Asian Studies Association of Australia, Canberra 29th June-2 July 2004.

Limbu, K.P. and Karki, T.B. 2003. Park–people conflict in Koshi Tappu Wildlife Reserve. Our nature 1: 15-18.

Magar, S. B. (2002) Reduction of livestock depredation in Chhoser VDC, Upper Mustang.

Majpuria, T.C. and Majpuria, R.K. (1998) Wildlife, national parks and reserves of Nepal (Resources, Management and Wildlife Safaris). Know Nepal Series Number 11. ISBN: 974-89833-5-8.

Mehta, J.N. and Heinen, J.T. 2001. Does community based conservation shape favorable attitudes among locals? An empirical study from Nepal. Environmental Management 28 (2): 165-177.

Nepal, S.K. and Weber, K.E. (1995) Prospects for co-existence – wildlife and local People. Ambio 24: 238-245.

Pandey, S.B. (1999). Status paper of Parsa Wildlife Reserve. In Richard, C., Basnet, K., Sah, J.P. and Raut, Y. (Eds): Grassland Ecology and Management in Protected Areas of Nepal, Vol. 2. Technical and Status Papers on Grasslands of Terai protected areas. International Centre for Integrated Mountain Development, (ICIMOD), Kathmandu. ISBN: 92 9115 166 1, Vol. I 92 9115 149 1.

Paudel, B.S. (2011) Appraising Protected Area Management Planning in Nepal. The Initiation (4) 69-81, (online) http://nepjol.info/index.php/INIT/article/view/5538/4566 (accessed on 04 May, 2013)

Perez, E. and Pacheco, L.F. (2006) Damage by large mammals to subsistence crops within a protected area in a Montane forest of Bolivia. Crop Protection (25), 933-939.

Phillips, Adrian, (2002). Management guidelines for IUCN category V protected areas: Protected landscapes/seascapes. IUCN Gland, Switzerland and Cambridge, UK. xv +122 pp. ISBN: 2-8317-0685-8.

Regmi, K.R. (2000) Park and people conflict in the Royal Bardia National Park: A Case study of Thakurdwara VDC, Bardia District, Nepal. MA Thesis, Central Department of Geography, Tribhuvan University, Kathmandu

Sekhar, N.U. (1998) Crop and livestock depredation caused by wild animals in protected areas: The Case of Sariksa Tiger Reserve, Rajasthan, India. Environmental Conservation 25: 160-171.

Shrestha, B. (1996) Park people conflict around the Royal Chitwan National Park. Journal of Natural History Museum, Vol. 15, Natural History Museum, Kathmandu.

Shrestha, R.K., Alavalapati, J.R.R., Seidl, A.F.,Weber, K.E. and Suselo, T.B. (2006) Estimating the local cost of protecting Koshi Tappu Wildlife Reserve, Nepal: A contingent valuation approach. Environment, Development and Sustainability 9: 413–426.

Shrestha, T.K. (2000) Birds of Nepal: field ecology, natural history and conservation. Publisher: Mrs. Bimala Shrestha, Kathmandu, Nepal.

Strudsrod, J.E. and Wegge, P. (1995) Park-people relationship - the case of damage caused by park animals around the Royal Bardia National Park, Nepal. Environmental Conservation 22: 133-142.

Sukumar, R. (1991) The management of large mammals in relation to male strategies and conflict with people. Biological Conservation 55: 93-102.

Tchamba, M.N. (1996) Elephants and their interactions with people and vegetation in the Waza-Logone Region, Cameroon. Ph.D. Thesis, University of Utrecht, the Netherlands.

Thapa, K. (2002) A Report on Livestock Depredation in Manang, Unpublished report submitted to KMTNC, ACAP Pokhara.

Thapa, S. (2010) Efffectiveness of crop protection methods against wildlife dmage: A Case study of two villages at Bardia National Park, Nepal. Crop Protection 29: 1297-1304.

Thapa, S. (2010) Forest resource use and vegetation in Subarnapur buffer zone VDC , Parsa Wildlife Reserve, Nepal. M.Sc. Thesis, Central department of Environmental Science, Tribhuvan University, Kathmandu.

Upreti, A.R. (2011) Study of Handikhola buffer zone VDC of Parsa Wildlife Reserve in relation with need and availability of forest resources. M.Sc. Thesis, Central Department of Environmental Science, Tribhuvan University, Kathmandu.

Vedeld, P., Angelsen, A., Sjaastad, E. and Kobugabe, B.G. (2004) Counting on the environment: Forest incomes and the rural poor. Environment Economics Series Paper 98. World Bank, Washington, USA.

Vedeld, P., Jumane, A., Wapalila, G and Songorwa, A. (2012) Protected areas, poverty and conflicts: A livelihood case study of Mikumi National Park, Tanzania. Forest Policy and Economics 21: 20-31.

WDPA (2012). Biodiversity Indicator Partnerships: Coverage of Protected Areas,(online) http://www.wdpa.org/resources/statistics/2010BIP_Factsheet_Coverage_of_Protected_Areas.pdf (accessed on 21 December, 2012).

Weladji, R.B. and Tchamba M.N. (2003) Conflict between people and protected areas within the Benoue Wildlife Conservation Area, North Cameroon. Oryx 37: 72-79.