

The Role of Environmental Education for Biodiversity Conservation:

A Case Study in the Protected Areas of Nepal

by

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## ABSTRACT

Balancing conservation goals and needs of local residents is always challenging. While some believe protected areas are a safe paradise for wildlife, others suggest that it is shortsighted to ignore the social and economic challenges faced by people who live adjacent to protected areas when addressing conservation objectives. This dissertation explores the link between biodiversity conservation and environmental education programs (EEPs) administered to residents of buffer zones adjacent to three protected areas in the Terai Arc Landscape, Nepal. Using surveys and interviews, this study examined 1) the influence of EEPs on attitudes of local people toward biodiversity conservation; 2) the influence of EEPs on conservation behavior; 3) the responses toward biodiversity conservation of local people residing in buffer zones who have received different levels of EEPs; and 4) the effect of EEPs on wildlife populations within adjacent protected areas. Local people who had participated in EEPs and attended school were more likely to express a positive attitude toward conservation goals than participants who had not participated in EEPs or had the opportunity to attend school. Participation in EEPs and level of education favored expressed behavior toward conservation goals, such as making contributions for conservation or supporting anti-poaching patrols. However, EEP participants and non-participants were equally likely to engage in activities that were at odds with positive conservation behavior, such as collecting fuel wood or killing wildlife to protect their farm or feed their families. A direct comparison of EEPs given by schools versus non-government organizations showed that EEPs were largely ineffective in promoting positive conservation attitudes and behaviors. Despite heavy poaching of

charismatic species such as the greater one-horned rhinoceros or tiger over past decades, Nepal recently celebrated ‘zero poaching years’ in 2011 and 2013, largely due to increased anti-poaching enforcement. The relationship between EEPs and the decline in poaching is unclear, although local officials all claimed that EEPs played an important role. These results indicate that current administration of EEPs in Terai buffer zone communities is inadequate, while also providing evidence that properly administrated EEPs may become a valuable investment for these protected areas to achieve long-term success.

## DEDICATION

To my father Mr. Prem Bahadur Pradhan (Shrestha).

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## CHAPTER 1

### INTRODUCTION

Conservation of species and ecosystems has become increasingly important in the 21<sup>st</sup> century. There have been a number of challenges that we as a society face today that include the decline in wildlife numbers and species, and habitat destruction. Loss of habitat, illegal poaching of wildlife, and lack of awareness of conservation have contributed to the loss of biodiversity (Ausden, 2007; Mackay, 2002; Meadows & Meadows, 1999; Woodroffe et al., 2005). A primary strategy to reduce these extreme declines in biodiversity has been the establishment and expansion of protected areas (Liu et al., 2010). While conservation practices and policies have shifted over time and achieved variable success (Adams, 2004), the concerns of social justice and local livelihoods in biodiversity conservation cannot be ignored when almost two-thirds of the world's protected areas are inhabited by subsistence-based human populations, and many others are being threatened by encroachment across their borders (Schaik & Rijksen, 2002; Terborgh & Peres, 2002). Many protected areas are also significantly losing their carrying capacity of wildlife due to issues such as global warming and pollution (Johnson, 1993; Lewis & Jackson, 2005; Simberloff, 1998; Sutherland, 1998, 2000). While some believe that protected areas are a safe paradise for wildlife and should continue to play a critical role in conserving wildlife (Joppa et al., 2008; Karanth et al., 2009, 2011; Terborgh, 1999), others suggest that ignoring social, political and economic challenges that surround protected areas is not realistic or viable (Wells & Brandon, 1993; West et al., 2006). Thus balancing conservation goals and needs of local residents

is always challenging. Establishing and maintaining effective protected areas for nature conservation in developing regions may involve many technical and scientific challenges, along with social and political challenges (Naughton-Terves et al., 2005). In the midst of conservation efforts, establishment of buffer zone communities have become increasingly common along the boundaries of protected areas as a means to incorporate social concerns into environmental management (Brandon, 2002), along with incentive-based programs (IBPs) to encourage local support for conservation. However, research of community-based conservation approaches implemented in many places reveals mixed success, and their ability to conserve biodiversity still remains questionable (Gubbi et al., 2008; Mehta & Kellert, 1998; Wells & Brandon, 1993; Zimmerer et al., 2004; Zimmerer, 2007). Projects like Integrated Conservation and Development Projects (ICDPs) are intended to make a linkage between the conservation of protected areas and development of better living conditions in local human communities with establishment of programs from ecotourism to agroforestry complementing traditional biodiversity protection in the parks (Alpert, 1996; McShane & Wells, 2004; Western et al., 1994). While some conservationists have supported the ICDPs approach, many others have argued its failure to deliver adequate conservation and development benefits (Brandon & Wells, 1992; Ferraro, 2001). Winkler (2011) proposed that ICDP fail when there is a lack of connection between the conservation of wildlife and community development along with the risk of giving too few incentives. Mukanjari et al. (2013) suggested that ICDPs fail because people who hunt illegally will continue to hunt as long as it is more profitable or the revenue significantly supplements income from other sources. However, conflicts

arise because many people reside in or adjacent to protected areas, and many are dependent on the forest for fuel wood (An et al., 2002), medicinal herbs (Dzerefos & Witkowski, 2001), wildlife (Yitbarek et al., 2013), and other products. Thus tension exists between biodiversity conservation and development of local communities (Maikhuri et al., 2001; Oltremari & Jackson, 2006). Local people residing in and around protected areas can benefit from basic services such as fuel wood and grazing land, and economic benefits from tourism-related employment (Adams & Infield, 2003; Archabald & Naughton-Treves, 2001; Campbell, 1999; Gillingham & Lee, 1999; Krüger, 2005; Sandbrook, 2010; Stem et al., 2003; Stone & Wall, 2004; West & Carrier, 2004). Local people also desire religious and cultural values due to the protection of nature in protected areas (Karanth et al., 2006; Spiteri & Nepal, 2006). However, local residents may also be the victim of property damage from protected wildlife such as loss of crops or domestic animals, or occasionally injury or death (Karanth & Nepal, 2012). Thus, people living in and around protected areas can hold a wide range of positive (Badola, 1998; Mehta & Kellert, 1998) and negative attitudes (Mehta & Heinen, 2001; Naidoo & Ricketts, 2006; Spiteri & Nepal, 2008a, b; Walpole & Leader-Williams, 2002) toward biodiversity conservation. The appropriate balance of priorities among protected areas, biodiversity conservation, and poverty alleviation has been a subject of debate for a very long time. Thus novel models of conservation planning and new policy instruments must be explored to integrate biodiversity protection with human well-being (Miller et al., 2011). Understanding attitudes of local people toward wildlife is important to achieve future wildlife management that is sustainable for all (Pratt et al., 2004). Attitude toward



wildlife conservation is formed by people's perception and experience from the parks (Infield & Namara, 2001). Local people in communities that have been displaced because of the establishment of protected areas may be negatively affected economically which in turn may cause them to have negative views on wildlife in the protected areas (Johannesen-Borge & Skonhoft, 2005; Fischer et al., 2011). Environmental attitude can be directly derived from what people claim to do and probably will do environmentally (Kaiser et al., 2007). Several previous studies of rural communities in developing countries have found that access to conservation-related benefits can positively influence local attitudes (Infield, 1988; Lewis et al., 1990; Saharia, 1982). On the other hand, an attitudinal survey conducted in Botswana by Parry and Campbell (1992), found that rural people held negative attitudes toward conservation despite receiving substantial benefits. These negative attitudes were evidently caused by lack of participation in decision making for resource management. Environmental issues have become important socio-environmental subjects in non-Western countries (Shoukry et al., 2012). Increased knowledge about the environment is assumed to change environmental attitudes, and both environmental knowledge and attitudes are assumed to influence environmental behavior (Jacobson et al., 2006).

Environmental education (EE) plays a significant role in promoting conservation. Moreover, people's attitudes and behaviors toward wildlife conservation and protecting their environment can be affected by correctly designed conservation education programs (Adams, 1998; Sterling et al., 2007). It is known that public acceptance and engagement affects the success or failure of environmental protection efforts, thus, there is a need for

conservation education and outreach (Meadows, 2011). Environmental education programs (EEPs) may produce significant behavioral changes in their target audience (Jacobson, 1987; Padua, 1994) and may be more crucial to successful long-term conservation than biologically-focused scientific work (Jacobson & McDuff, 1998). There has been prior research which shows that proper education and outreach programs can contribute to sustainable behavior, promote public support for conservation, reduce poaching and vandalism practices in protected areas, and raise compliance with environmental regulations (Jacobson, 1999; Knudson et al., 1995; Monroe, 2003). These programs have also been shown to increase recreation carrying capacities and have an impact on policies and decisions that influence the environment and natural resources (Fig. 1.1) (Day & Monroe, 2000; Jacobson, 1999; Jacobson et al., 2006; Knudson et al., 1995). Thus, the involvement and the support of the public is vital in achieving important conservation goals.

According to a report by the United Nations Development Program (UNDP, 2007), Nepal has had considerable success in conserving its biodiversity with the establishment of an active protected area system (20 protected areas in the country); however, balancing conservation and human needs remains a major challenge. The Department of National Parks and Wildlife Conservation (DNPWC), National Trust for Nature Conservation (NTNC) and World Wide Fund for Nature (WWF) are some of the major governmental and non-governmental organizations that work toward conservation education in Nepal. The techniques for conservation education used by these

organizations are posters, presentations, publications and school activities through eco-clubs.

### Hypotheses

The main purpose of Environmental Education (EE) is to assess environmental issues, identify feasible solutions and finally create pro-environmental behavior (Magnus et al., 1997). Environmental education gives an individual environmental information and environmental knowledge which can foster a change their environmental behavior (Hungerford & Volk, 1990). The participation in EEPs in this research includes education received from different institutions like schools through eco-clubs, government organizations, non-governmental and international non-governmental organizations. The different types of education include capacity-building programs (training, workshops, study tours, etc.), school based eco-clubs (planting projects, recycling, clean up campaigns, etc.), and environmental awareness programs (World Environmental Day, Wildlife Week, World Wetland Day, etc.). Thus, I assumed that participation in EEPs would bring more positive conservation attitudes (attitude such as “environment should be conserved”) and positive conservation behaviors (behavior such as “making contribution for conservation”) to participants than to those who have not participated in those programs. Also, socio-demographic factors like age and income may affect positive conservation attitudes and positive conservation behaviors. Finally, the level of EEPs in the buffer zones of protected areas should influence positive conservation attitudes and positive conservation behaviors. I also look at the effect of EEPs on wildlife populations

and factors that affect the rate of poaching. Thus, this dissertation is organized into four papers.

In Chapter 2 (Paper I), I hypothesize that 1) participation in EEPs would positively influence attitudes of local people toward biodiversity conservation; 2) socio-demographic factors (age, income, and education) would each individually positively affect attitudes of people toward biodiversity conservation; 3) females have a more positive conservation attitude than males; and 4) there would be a difference in attitudes expressed by people living in the buffer zone communities among Bardia National Park (BNP), Chitwan National Park (CNP) and Parsa Wildlife Reserve (PWR) toward biodiversity conservation that may be attributable to their prior exposure to EEPs.

In Chapter 3 (Paper II), I hypothesize that 1) participation in EEPs would influence positive behavior of local people toward biodiversity conservation; 2) socio-demographic factors (age, income, and education) would positively affect behaviors of people toward biodiversity conservation; 3) females have a more positive conservation behavior than males; and 4) there would be a difference in behaviors expressed by people living in the buffer zone communities among BNP, CNP and PWR toward biodiversity conservation that maybe attributable to their prior exposure to EEPs.

In Chapter 4 (Paper III), I evaluated the effectiveness of EEPs given by schools, non-governmental (NGOs) and international non-governmental organizations (INGOs) in the buffer zone communities adjacent to CNP, BNP and PWR. The main goals were to: 1) measure the attitude of local people who have participated in EEPs given by schools and NGOs/INGOs toward biodiversity conservation in each park; and 2) measure the

behavior of local people who have participated in EEPs given by schools and NGOs/INGOs toward biodiversity conservation in each park.

In Chapter 5 (Paper IV), I examine how EEPs conducted by governmental organizations, NGOs and INGOs correlate with actual levels of poaching in three protected areas of Nepal. I determine the effect of EEPs on wildlife populations with the protected areas of BNP, CNP and PWR. Also, I look at other factors that affect poaching in Nepal.

### Study Area

The study was conducted in the Terai Arc Landscape (TAL) of Nepal and focused mainly on three protected areas: Bardia National Park (BNP), Chitwan National Park (CNP) and Parsa Wildlife Reserve (PWR). The Terai Arc is inhabited by three of the world's most endangered charismatic species, the Bengal tiger (*Panthera tigris tigris*), the greater one-horned rhinoceros (*Rhinoceros unicornis*) and the Asian elephant (*Elephas maximus*). In Nepal, the TAL encompasses 23,129 km<sup>2</sup> comprised of 14 districts including 75 percent of the remaining forests of lowland Nepal including the Churia hills and four protected areas (TAL, 2002). TAL was created to recover and conserve tiger and one-horned rhinoceros and to sustain ecological services (Wikramanayake et al., 2011). Chitwan National Park was the first protected area to be established in Nepal (IUCN Category II), and in 1996 a buffer zone (IUCN Category VI) was created. Bardia National Park is the largest national park in the lowland Terai region (IUCN Category II), with an creation of buffer zone in 1996 (IUCN Category VI). Parsa

Wildlife Reserve (IUCN Category VI) is located in the lowland Terai is the largest wildlife reserve in Nepal; in 2005 a buffer zone was added as an extension to the reserve (IUCN Category VI). The reserve adjoins with CNP in the west. Buffer zone areas of BNP, CNP and PWR include forested areas, cultivated lands and human settlements. Buffer zones are managed by local residents with the help of park management. Different programs oriented toward conservation, community development and sustainable use of natural resources are conducted in the buffer zones of each protected areas and thus form the basis for contrasts highlighted in my research.

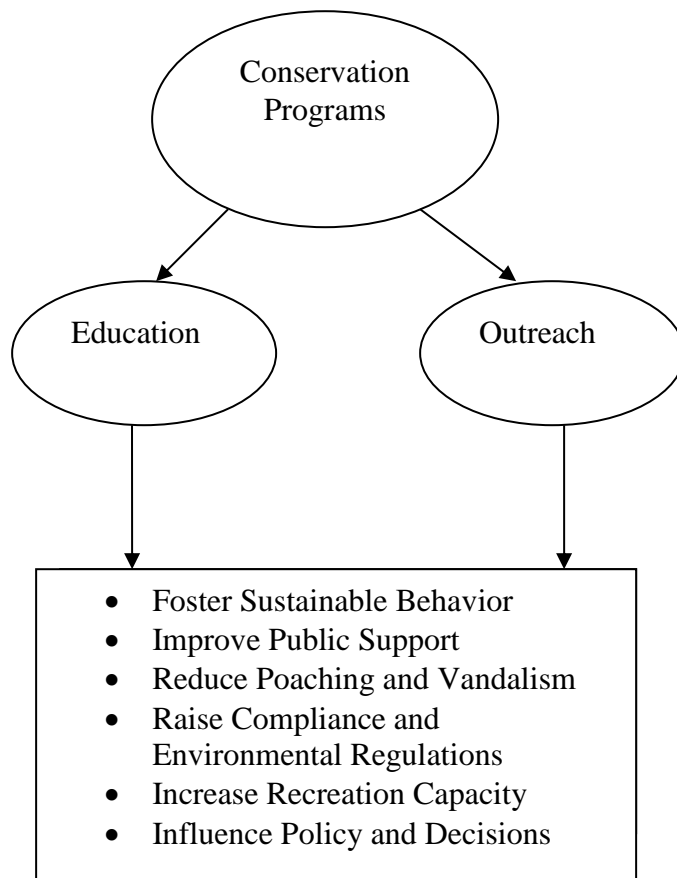


Figure 1. 1. Types of conservation education and outreach programs and their impacts. Figure adapted from Meadows (2011)

## CHAPTER 2

### Environmental Education and Attitudes Toward Biodiversity Conservation: A Case Study in Protected Areas of Nepal.

#### Introduction

As we enter the 21<sup>st</sup> century with an expanding human population, the rate at which societies consume natural resources can no longer be maintained. Presently, the majority of the world's people live below the poverty line, and our environment is in a state of chaos – so much so, that some have called our environment an irreversible human experiment (Caldeira et al., 2003). The only possibility of reversing the most ecologically destructive aspects of human effect and improving our quality of life is to create a new world view and change our way of life to be more compatible with the natural environment of which we are a part. One possible way to accomplish this is through enhanced environmental education (EE). The goal for EE can be achieved if nations, governments, schools and teachers make it a priority to create an environmental ethos within our educational institutions and community. One way to uncover if participation in EE can change the attitudes of people toward conservation is to assess and compare various levels of environmental education and their corresponding effect on biodiversity conservation. Prior research has shown that appropriate education and outreach can foster sustainable behavior, improve public support for conservation, reduce poaching and vandalism in protected areas, improve compliance with environmental regulations, increase recreation carrying-capacities, and influence policies and decisions that affect



the environment and natural resources (Jacobson, 1999; Knudson et al., 1995; Monroe, 2003).

I investigated whether or not local people who participated in environmental education programs (EEPs) developed a positive conservation attitude. Specifically, are there differences in attitude toward conservation in each of three protected areas in the Terai Arc Landscape (TAL) in Nepal (Bardia National Park, Chitwan National and Parsa Wildlife Reserve), and if so, is this difference related to experience with EEPs? Also, I investigated if socio-demographic factors affect attitudes of local people toward conservation. To answer these questions surveys and interviews were conducted in the buffer-zone communities in these three protected areas.

## Literature Review

### *Environmental Attitude*

An attitude has been defined as “a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor” (Eagly & Chaiken, 1993), or as “the enduring positive or negative feeling about some person, object or issue” (Kollmuss & Agyeman, 2002). Many studies have examined the relationship between environmental attitude and knowledge about the environment. Environmental attitude has been described in many different ways. Schultz (2001) classifies environmental attitude using egoistic (items like me, my future, my lifestyle, etc.), biospheric (items like trees, animals, birds, etc.), and altruistic (items like future generations, people in the community, etc.) concern. Each concern identifies a potential

beneficiary of a more environmentally friendly, or a potential victim of a less environmentally friendly lifestyle. In contrast, Schultz et al. (2004) defined environmental attitude as “a collection of beliefs, affects, and behavioral intentions a person holds regarding environmentally-related activities or issues.” The main objective of one’s environmental attitude is either the natural environment itself, some aspects of it, or conservation behavior (Kaiser et al., 2007).

According to Kaiser et al. (2007), environmental attitude can be directly derived from what people claim to do and probably will do environmentally. Several previous studies of rural communities in developing countries have found that access to conservation-related benefits can positively influence local attitudes (Infield, 1988; Lewis et al., 1990; Saharia, 1982). On the other hand, an attitudinal survey conducted in Botswana by Parry and Campbell (1992), found that rural people held negative attitudes toward conservation despite receiving substantial benefits. These negative attitudes were evidently caused by lack of participation in decision making for resource management. Gillingham and Lee (1999) also found that having access to wildlife-related benefits does not, in itself, lead to the establishment of mutually beneficial partnerships for wildlife management between rural communities and the state. “Many current conservation issues are symptoms of larger, more complex problems that are beyond the scope of any one discipline” (Kessler et al., 1998). To more successfully address conservation issues requires a diverse range of skills and activities (e.g., EE, ecological research, management, legislation, and enforcement), coupled with effective partnerships between

organizations with these skills (Jacobson, 1995; Kessler et al., 1998) and regular program evaluation (Ehrenfeld, 2000; Kleiman et al., 2000).

### *Environmental Education and Environmental Attitude*

Environmental education holds a unique place in formal public education (Campbell et al., 2010). Environmental education is aimed to produce a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution (Stapp et al., 1969). Palmer (1998) defines EE as the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the inter-relatedness among man, his culture, and his biophysical surroundings. Jacobson (1991) identified EEPs as a component of multidisciplinary conservation efforts that have the potential to increase ecological awareness, foster favorable attitudes toward the environment, and promote natural resource conservation. At their best, EEPs may produce significant behavioral changes in their target audience (Jacobson, 1987; Padua, 1994) and may be more crucial to successful long-term conservation than biologically-focused scientific work (Jacobson & McDuff, 1998). Thus, education can be one of the most important tools in helping to protect and conserve wildlife, wild habitats and the Earth's natural resources. The strategies used by EEPs are diverse. The early establishment of EEPs provided a foundation on which longer-term conservation plans have been built. Fien et al. (2001) identified various strategies used in EEPs that form a continuum from provision of information to communication, education, and finally to capacity building. Although these strategies may overlap in their

methodologies, each strategy includes the previous one and is capable of contributing successively to effective conservation. Ballantyne et al. (2001) studied the role of program effectiveness in facilitating intergenerational influence in EE. They concluded that students can and do share their learning and environmental attitudes with their parents, and that they can bring about positive change in household practices. Other research in EE also shows that young people can effectively influence their parents' environmental awareness and actions (Kruger, 1992; Sutherland & Ham, 1992; Uzzell, 1999). Trehwella et al. (2005) include conservation and education outcomes as increased awareness and understanding of conservation issues. The issues also include improved knowledge of the status of species, policy making and legislation development, strengthened commitment to conservation and a greater capacity to carry it out, integration of environmental issues into curriculum, establishment of active local environmental NGOs, and support for multidisciplinary conservation programs. Jacobson et al. (2006) concluded that conservation education and outreach programs can inform and involve the public to raise awareness, improve knowledge, acquire attitudes and skills, and encourage participation to help achieve resource management goals.

One recent development in EEPs is their integration with protected area management. Management of protected areas has evolved from a focus on wildlife and endangered species, to more comprehensive tasks including collaboration and communications with the surrounding local communities (Brandon & Wells, 1992a, b; Ledec & Goodland, 1988). A focus on communications is appropriate because a fundamental issue of park management in developing countries concerns the customary

rights of use of park resources by local people and government attempts to curtail this (Barrow & Fabricius, 2002; Borrini-Feyerabend, 1996; Ghimire & Pimbert, 1997; Nepal, 2002; Roe, 2000). Integrated Conservation and Development Projects (ICDPs) are intended to link the conservation of protected areas and development of better living conditions in local human communities with programs from ecotourism to agroforestry along with the traditional biodiversity protection in the parks (Alpert, 1996; McShane & Wells, 2004; Western et al., 1994). While some conservationists have claimed the usefulness of the ICDP approach, many others have argued that it fails to deliver adequate conservation and development benefits at all (Brandon & Wells, 1992a, b; Ferraro, 2001). One primary region of conflict is the area immediately surrounding protected areas, termed as a buffer zone. For this reason, buffer zones have been included in the management process of protected areas (Brandon & Wells, 1992a, b; Ghimire, 1994; Ghimire & Pimbert, 1997; McNeely, 1988; Schelhas & Shaw, 1995). Attention has also focused on the relationship between protected areas and local people following the more technical aspects of alleviating pressure on protected areas by initiating projects in buffer zones (Brandon & Wells, 1992a, b; Brownrigg, 1985; Dasmann, 1984; McNeely, 1988). Different approaches, such as community-based wildlife conservation (Enters & Anderson, 1999; Ghimire & Pimbert, 1997; Kellert, et al. 2000; Roe, 2000) and buffer zone management (Ebregt & Greve, 2000; Martino, 2001; Neumann, 1997), address conflicts between people and protected areas. The establishment and maintenance of buffer zones is regarded as one of the suitable strategies for resolving any existing or

potential conflict (Heinen & Mehta, 2000; Nepal & Weber, 1994; Shyamsundar, 1996; Vandergeest, 1996).

### *Socio-Demographic Variables and Environmental Attitude*

There have been many studies showing people's perception and attitude toward conservation (Baral & Heinen, 2007; Pratt et al., 2004; Infield & Namara, 2001). While Haule et al., (2002) suggested creating a mutual trust between the government wildlife managers and the local people, others believe that management of reserves is hard when local communities are excluded from their natural resources (Infield & Namara, 2001). Studies show socio-demographic variables such as gender, education, age and income as indicators of people's attitude (Baral & Heinen, 2007; Curtis & De Lacy, 1998; Tomicevic et al., 2010; Trehwella et al., 2005; Wells & Lekies, 2006). In a survey conducted in the western Terai of Nepal, females were more likely to participate in conservation programs, as well as those with higher education (Baral & Heinen, 2007). Studies have reported a more positive association between women and environmental attitudes than for males (Baral & Heinen, 2007; Formica & Uysal, 2001). Previous research has also shown education to be a significant predictor leading to positive environmental attitudes (Cottrell, 2003; Tindall et al., 2003) and that there is a positive association between level of education and environmental attitude (Scott & Willits, 1994; Tindall et al., Tomicevic et al. 2010). The level of income also affects conservation attitude. People with higher income were found to have a more favorable conservation attitude in a study conducted by Camboni and Napier (1993). Wells and Lekies (2006) suggested that people who experience nature at an early age are associated with a positive

attitude in adulthood. Lee and Balchin (1995) and Scott and Willitis (1994) have suggested age as a significant indicator for environmental attitude. Cottrell (2003), Formica and Uysal (2001) and Scott and Willitis (1994) have shown a positive association between age and environmental attitude.

### *Environmental Education in Protected Areas of Nepal*

According to a report by the United Nations Development Program (UNDP 2007), Nepal has had considerable success in conserving its biodiversity with the establishment of an active protected area system (20 protected areas in the country); however balancing conservation and human needs remains a major challenge. Nepal is one of the poorest and least developed countries in the world, with about one-quarter of its population living below the poverty line (CIA, 2013). The World Wide Fund for Nature (WWF) Nepal Programme runs many conservation-awareness programs for different target groups. These programs concentrate on conservation of the natural and cultural environment, including protection of biological diversity and restoration of forest corridors, which provide long-term benefits (J. Parajuli, personal communication). WWF Nepal, in collaboration with different community-based organizations, local non-governmental organizations, district development committees, Village Development Committees (VDCs) and local leaders, organizes various capacity-building programs to increase the ability of local people to conserve Nepal's biodiversity in a way that is ecologically viable, economically beneficial and socially equitable. According to Gurung & Shrestha (2004): "Communication and education play a significant role in bettering understanding, among the people living in the National Parks and the surrounding Buffer

Zone, about the importance of conserving the natural and cultural environment.” There have been different approaches for biodiversity conservation and sustainable development in the TAL of southern Nepal, such as capacity-building programs, school-based environmental clubs (“eco-clubs”), environmental awareness and extension programs, and non-formal education. Some of these approaches have been successful, while others have yet to show results (Gurung & Shrestha, 2004).

According to a case study done by WWF Nepal in Bardia National Park, the students, teachers and eco-club members who participated in Wildlife Week 2003 helped to disseminate information about the importance of biodiversity and its conservation. The programs not only helped raise the awareness among those who participated, but also among other people who were not taking part in the event. The knowledge participants gained from their involvement in such events was shared among friends and wider among community members, thus increasing conservation awareness in a larger population (Gurung & Shrestha, 2004). Another example of conservation work done by school-based eco-clubs is the “Students’ Environment Group,” a local school club in Bardia. The club managed eight hectares of government forest that was once illegally encroached upon by landless people. Club members played a crucial role in reforestation of the encroached land and are at present carrying out agro-forestry work on the land. Also, the members of the club are now using mass communication media to spread conservation awareness within the community (Gurung & Shrestha, 2004).



## Research Questions and Hypotheses

The research questions and hypotheses that guided the development of this study were:

1. Does participation in EE influence the attitudes of people in the Terai buffer zone communities toward biodiversity conservation?

H 1: Participation in EE has a positive impact on attitudes toward biodiversity conservation.

P1: People who have received instruction in EE will give higher importance to biodiversity conservation, compared with citizens who have not had EE.

H 2: Socio-demographic factors (age, income level, gender, or education) affect people's attitude toward biodiversity conservation.

P2: A significant correlation will be found between a socio-demographic factor (see P2a-P2d below) and biodiversity conservation attitude. Specifically:

P2a: (Age) Younger people have a more positive conservation attitude than older people.

P2b: (Income) Higher income people will have a more positive conservation attitude than lower income people

P2c: (Gender) Females have a more positive conservation attitude than males.

P2d: (Education) Literate people will have more positive attitude than illiterate people.

2. Is there a difference in attitudes expressed by people living in the buffer zone communities among the three parks toward biodiversity conservation that may be attributable to different prior exposure to EE?

H3: There is a difference in attitudes expressed by local people residing in the buffer zone communities among the parks that may be attributable to different prior exposure to EE.

P3: Buffer zone communities who have received more EEPs will have a more positive conservation attitude than those receiving fewer EEPs.

## Methods

### *Study Area*

The study was conducted in the TAL of Nepal and focused on three protected areas: Chitwan National Park, Bardia National Park and Parsa Wildlife Reserve (Fig. 2.1). The TAL spreads across more than 49,500 km<sup>2</sup> along the outer foothills of the Himalayas from the Bagmati River in eastern Nepal to the Yamuna River of India in the west. The TAL plays an important role in maintaining linkage among 11 protected areas in Nepal and India. The habitat connecting these areas varies along the Terai Arc corridor from dense intact forests to degraded forest patches (TAL, 2002). The Terai Arc is inhabited by three of the world's most endangered charismatic species, the Bengal tiger (*Panthera tigris tigris*), the greater one-horned rhinoceros (*Rhinoceros unicornis*) and the Asian elephant (*Elephas maximus*). In addition, the TAL is home to a wide variety of megafauna including the Ganges dolphin (*Platanista gangetica gangetica*), swamp deer (*Rucervus duvaucelii*), blue bull (*Boselaphus tragocamelus*), and hog deer (*Axis porcinus*). In Nepal, the TAL encompasses 23,129 km<sup>2</sup> comprised of 14 districts including 75 percent of the remaining forests of lowland Nepal including the Churia hills and four protected areas (TAL, 2002).

The rationale to choose these protected areas is because they would represent different levels of prior experience with EEPs. For example, Parsa is remote compared to Chitwan and Bardia and in general has received less attention from government and non-governmental organizations. Also, comparing Chitwan with Bardia, Chitwan has been designated as a World Heritage Site and also, being the first national park in Nepal, has received more attention nationally and internationally than Bardia.

### *Chitwan National Park*

Chitwan National Park (CNP) is renowned for its variety and abundance of precious and rare fauna and flora, as well as its rich cultural heritage (Mishra & Jefferies, 1991). CNP covers 932 km<sup>2</sup> and is situated in the subtropical inner Terai lowlands of south central Nepal. The park was formerly a well-known area for big game and was managed as a hunting reserve for the Rana Prime Ministers and their guests until 1950 (DNPWC, 2006). Established in 1973, this was the first national park in Nepal. The park boundaries are delineated by the Narayani and Rapti rivers in the north and west, and the Reu River and Someshwor Hills in the south and south-west. It shares its eastern border with Parsa Wildlife Reserve. CNP supports the highest density of tigers in Asia, features a high ungulate and carnivore diversity, and provides a habitat for several endangered species (Dinerstein, 2003; Nepal & Weber, 1993). The park was initially formed under a people-free approach, and all communities were consequently resettled outside the boundaries of the park (McLean & Straede, 2003).

In 1996 the buffer zone was established in response to the need for landscape-scale conservation and also to address the conflicts (human-wildlife) between

communities and the park (Straede & Helles, 2000). The buffer zone spreads over 767 km<sup>2</sup> with four districts, with over 260,000 people living in 37 VDCs. VDCs are local administrative units, each comprised of one or more villages. The buffer zone is managed by the local people and the park management. The programs conducted in the buffer zone are oriented toward conservation and community development. Conveying sustainable use of natural resources is also an important part of buffer zone programs. The Department of National Parks and Wildlife Conservation (DNPWC) and its non-governmental partners have since initiated programs to support conservation within and around CNP and improve the economic conditions for local people. Training, park infrastructure improvements, revenue sharing and community forestry are among the capacity building projects undertaken in the buffer zone (DNPWC 2006). The government of Nepal has made a provision to reinvest 30-50% of the park revenue for community development in the buffer zone (DNPWC, 2008). However, research has shown that the exploitation of fuelwood in CNP is unsustainable, challenging the good park-people relations (Straede & Helles, 2000).

### *Bardia National Park*

Bardia National Park is the largest park in the lowland Terai and covers an area of 968 km<sup>2</sup>. The park is situated in Nepal's western Terai and was established to protect representative ecosystems and conserve tigers and their prey species (DNPWC, 2006). Initially, a small area was delineated as the Royal Karnali Wildlife Reserve in 1976. In 1982 it was renamed as Bardia Wildlife Reserve, and in 1984 it was expanded to its current size. The reserve was given the status of a national park in 1988. Greater one-

horned rhinoceros were translocated there from Chitwan National Park in 1986, 1991 and 1999 (DNPWC, 2006). With 86 species of mammals, 550 bird species, 47 herpetofauna, 126 species of fish and over 2100 flowering plant species, species diversity is high in BNP (Baral et al., 2003). Seven major vegetation types have been identified inside the park, including four types of forest and three different grassland habitats. About 70% of the forest consists of sal trees (*Shorea robusta*) with a mixture of grassland and riverine forest (Dinerstein, 1979; Pokharel, 1993). The park is home to endangered animals such as the Bengal tiger, Asian elephant, greater one-horned rhinoceros, swamp deer, and black buck (*Antelope cervicapra*). Other endangered species include gharial (*Gavialis gangeticus*), marsh mugger (*Crocodylus palustris*) and Gangetic dolphin. Endangered birds found in the park include the Bengal florican (*Houbaropsis bengalensis*), the lesser florican (*Sypheotides indica*) and the sarus crane (*Grus antigone*). In addition to the resident species, many migratory birds visit the park (DNPWC, 2006).

In 1996, 327 km<sup>2</sup> of forest and private land near the park was declared as a buffer zone. It includes 17 VDCs in two districts, and about 120,000 people live in 11,504 households (Baral et al., 2007). The park and the local people also jointly initiate community development activities and manage natural resources in the buffer zone. Since the early 1990s, there have been several ongoing community-based conservation programs funded by a number of international donors (Heinen & Mehta, 2000; Heinen & Rayamajhi, 2001).

### Parsa Wildlife Reserve

Established in 1984, Parsa Wildlife Reserve (PWR) is situated in the Terai lowlands with an area of 499 km<sup>2</sup> adjoining Chitwan National Park in the west. The reserve has a sub-tropical monsoon climate. The Churiya hills dominate from east to west ranging from 750 m to 950 m in elevation (DNPWC, 2006). The forests of the reserve consist of tropical and subtropical vegetation, 90% of which are sal trees. Other trees found are sissoo (*Dalbergia sissoo*) and the silk cotton tree (*Bombax cebia*). The reserve supports a good population of the Asian elephant, tiger, leopard (*Panthera pardus*), sloth bear (*Melursus ursinus*), gaur (*Bos gaurus*), and blue bull. Many species of snakes such as king cobra (*Ophiophagus hannah*), krait (*Bungarus caeruleus*) and rat snake (*Elaphe obsoleta obsoleta*) are found in the reserve due to its tropical climate. There are about 300 species of birds found in the reserve. Some of the common birds include giant hornbill (*Buceros bicornis*), peafowl (*Pavo cristatus*), red jungle fowl (*Gallus gallus*), and woodpeckers (*Melanerpes formicivorus*) (DNPWC, 2006). The government of Nepal officially declared the buffer zone of Parsa Wildlife Reserve on 27 June 2005. The buffer zone covers an area of 298 km<sup>2</sup>. It includes 11 VDCs in three districts and around 43,238 people living in 7,228 households (Global Association of Online Foresters, 2005).

### *Overview of EEPs in Each Park*

Public understanding and commitment to conservation is vital to the success of protected areas/biodiversity conservation. EEPs are administered in the buffer zone communities adjoining each park. In CNP EEPs started in the early 1990's. DNPWC conducts programs in schools and communities four to five times yearly. They celebrate

different events including: Tiger Day, National Biodiversity Day and Wildlife Week. DNPWC has been partners with over 100 schools to conduct EEPs (K.J. Kunwar, personal communication, May 2012). The National Trust for Nature Conservation (NTNC) has partnered with 55 schools which conduct eco-club programs every month. Eco-club programs include tree plantation, recycling, waste management program, street drama, etc. Similarly, two-to-three programs are conducted in the communities every year by NTNC. NTNC has a museum in CNP where about 40,000 visitors come per year to study about conservation (B.R. Lamichanne, personal communication, March 2012). WWF has partnered with 188 schools and their eco-clubs in the Chitwan region and conducts programs monthly (A.S. Ansari, personal communication, March 2012) (Fig. 2.2).

EEPs in BNP were started in 1992 by DNPWC. Today over 88 schools have partnered with DNPWC to conduct eco-club programs. The schools have eco-clubs which have programs almost every month. The programs focus on 8<sup>th</sup> and 9<sup>th</sup> grade students. The eco-club programs are conducted by science teachers of the school. DNPWC conducts about one or two community-based education programs annually (T.R. Adhikari, personal communication, March 2012). Community-based education programs include 1-2 day workshops related to wildlife conservation, climate change, etc. and interaction programs among the communities. NTNC also has partnered with 50 schools in BNP where monthly conservation programs are conducted (R. Kadariya, personal communication, March 2012). In 2009, 11 EEPs were conducted in BNP in which there was participation from 40 communities. Similarly, WWF has partnered with

92 schools in BNP to conduct eco-club programs (J. Parajuli, personal communication, April 2012).

EEPs in PWR are fairly new compared to CNP and BNP. DNPWC conducts EEPs in schools depending on the budget they have. One-day programs are conducted for school students using field trips to the park, drawing competitions, street plays, etc. DNPWC receives financial support from WWF and NTNC (M. Ahamad, March 2012, personal communication). There is no definite number of programs done in PWR, but according to N. Shrestha (User Group Committee, PWR), in the year 2011 EEPs were conducted in four schools.

#### *Instrument*

Attitude of an individual toward the environment reflects positive or negative performance for a particular behavior. There will be a stronger intention to perform a positive behavior if there is a favorable attitude toward the behavior (Orams, 1995a). While there is a rise of environmental concern in the public today, many researchers have attempted to develop scales to measure environmental attitude. An Ecological Attitude-Knowledge Scale (four subscales: verbal commitment, actual commitment, affect, and knowledge) with revised 45 items has been developed by Maloney et al. (1975). An Environmental Concern Scale with 16 items was developed by Wiegel and Wiegel (1978). An Ecological Social Paradigm Scale with 8 items has been developed by Dunlap et al. (2000). Similarly, a 12-item Environmental Paradigm Scale was developed by Dunlap and Van Liere (1978), and this was later revised by Dunlap et al. (2000) and renamed as the New Ecological Paradigm (NEP) scale. The NEP Scale contains 15 items



and is measured in three dimensions (balance of nature, limits to growth, and the human dominance of nature). Within the context of conservation, researchers have developed various item scales. Infield and Namara (2001) used a nine item scale to measure community attitudes and behavior toward conservation in Lake Mbuoro National Park, Uganda. Orams (1997) compared the attitude of participant and nonparticipant visitors in an EEP using a three item scale.

Environmental attitude scales are commonly focused on ecological aspects of the environment. Environmental attitude items such as “humans are seriously abusing the environment” and “plants and animals have as much right as humans” (Thapa, 2010) involve aspects of the environment. For my research, three subscales with 14 items were used to measure the attitude of local people residing in the buffer zones of CNP, BNP and PWR. Of these 14 items, four items (Appendix B; Section B Questions 1, 2, 11, and 12) were revised from Kaiser et al. (1999); two items (Appendix B; Section B Questions 7 and 10) were revised from Thapa (2010), and eight items (Appendix B; Section B Questions 3, 4, 5, 6, 8, 9, 13, and 14) were added due to the social aspects involving local communities and wildlife in this study. Specifically, from Kaiser et al. (1999), statements like “all things, whether humans, animals, plants or stones have the right to exist,” “animals should have legal rights,” and “I am ready to pay environmental taxes” were revised to make the questions suitable for this research. Similarly from Thapa (2010), statements like “if things continue on their present course we will soon experience a major catastrophe,” and “plants and animals have as much right as humans to exist,” were also revised for this research. The remaining eight statements were developed through a

series of discussions with local people and officers from different organizations to ensure the scale items were locally relevant. The attitude scale for biodiversity conservation was developed using three subscales (attitudes toward biodiversity conservation, attitudes toward the establishment of buffer zones and attitudes toward wildlife conservation) consisting of three or more items related to each subscale. The scales were made to make them locally relevant with inputs from park staff, local residents, and NGO and INGO officers (personal communication, 2011). 14 items were used during the survey, but based on the feedback from the respondents residing in the buffer zone of the protected areas, only 10 items were used for analysis. There were three items in attitudes toward biodiversity conservation, four items in attitudes toward the establishment of buffer zones and three items in attitudes toward wildlife conservation. Attitude toward wildlife was treated as a separate category since the local people of the buffer zone considered rhino and tiger as wildlife and all the others as biodiversity. Each item was measured on a 5-point Likert scale with responses ranging from *strongly disagree* (1) to *strongly agree* (5) (Babbie, 1990). Similarly, participation in EEPs was measured using a five point scale, with responses ranging from *never* (1) to *always* (5).

#### *Data Collection*

Diverse socioeconomic strata of 16 Village Development Committee's (VDC's) were selected representing three protected areas (Table 2.1). A VDC in Nepal is a lower administrative part of the Ministry of Federal Affairs and Local Development. In Chitwan, four VDC's (Kumrose, Bacchauli, Gardi & Megghauli), in Parsa, four VDC's (Nirmal Basti, Mahadev Patti, Amlekhjung & Suwarnapur), and in Bardia, eight VDC's

(Neulapur, Shivpur, Baniyabar, Magaragadi, Dhadhwar, Thakurdwara, Bakuwa & Bagnaha) were selected. Eight VDC's were chosen to represent Bardia as compared to Chitwan and Parsa, because it is the largest national park in Terai region.

Field research was conducted using surveys, which involved the administration of questionnaires. In CNP, 250 questionnaires, in BNP, 200 questionnaires and in PWR 150 questionnaires, were administered. The number of questionnaires was determined based on the population of residents residing in the buffer zone. However, only 240 questionnaires in CNP, 189 questionnaires in BNP, and in PWR 149 questionnaires were considered for the analysis. Due to some missing values, 22 questionnaires were excluded for the analysis. The VDCs were pre-selected for administration of the household survey based on their location relative to how close or far they are from the park (Table 2.1). There are many VDCs in each park so a representative sample of that particular park was considered for this research. One adult ( $\geq 18$  years old) in each household was interviewed. The population within each VDC was randomly selected based on ethnicity, gender, income, etc. In the absence of the adult household member, a neighboring household was selected to produce the sample size required for that respective VDC. The respondents were all local people occupying the buffer zone communities, and the questionnaire was researcher-administered. Each questionnaire (Appendix B) was divided into several parts: 1) economic activities such as annual average income; 2) ethno-religious background; 3) socio-demographic variables such as gender, age, occupation; 4) education level; and 5) conservation attitude. For conservation attitudes, a series of statements was presented, and respondents were asked to choose among

alternative answers (for example: “strongly agree”/ “agree”/ “neutral”/ “strongly disagree” and “disagree”). The questionnaire was prepared in English, but was translated into Nepali. Taking into account the high illiteracy rate in rural Nepal, questions were clarified by the researcher or research assistant if the respondents had any trouble or doubt understanding the questions.

### *Data Analysis*

Data were analyzed with SPSS version 21. Conservation attitudes were measured by 10 related statements. Data analysis involved descriptive statistics, multiple linear regression and ANOVA. Descriptive analysis (means and standard deviations) were calculated for socio-demographic characteristics. The Cronbach’s alphas ( $\alpha$ ) were calculated to test reliability of the subscales. Multiple linear regression was used to predict the dependent variable (i.e., conservation attitude) by independent variables (such as socio-demographic factors - age, gender, income, education) and also frequency of participation in an environmental education program (EEP). Analysis of Variance (ANOVA) was used to explore differences and post-hoc test was used to explore what these differences were.

Income and education were initially recorded as continuous variables, and age was recorded in five groups: 18-25 yrs, 26-35 yrs, 36-50 yrs, 51-70 yrs, and over 70 yrs. Income (Nepalese Rupees-NRs.) was collapsed under five groups: 1 = below NRs. 24,999/yr; 2 = NRs. 25,000-49,999/yr; 3 = NRs. 50,000-74,999/yr; 4 = NRs. 75,000-99,999; and, 5 = above NRs. 100,000/yr. Education level was initially measured as a continuous variable, but was later categorized into three groups: 1 = 0 (illiterate), 2 = 1-

10 (junior – middle high school), 3 = above 10 (above high school). Gender was a binary variable and dummy coded as female ‘1’ and male ‘0.’ I identified which factors were associated with positive and negative responses at the  $p < 0.05$  significance level.

To determine whether participation in EE changed the attitude of respondents toward conservation, attitudes were grouped under three categories: 1) attitude toward general biodiversity (Appendix B; Section B Questions 1, 2, and 4); 2) attitude toward the buffer zone concept (Appendix B; Section B Questions 3, 5, 8 and 9); and 3) attitude toward wildlife (Appendix B; Section B Questions 10, 11 and 12). Age, gender, income and education were treated as controls. Also, I compared the attitudes of the local buffer zone communities among those at Chitwan, Parsa and Bardia.

## Results

### *Respondent Characteristics*

The final sample consisted of 578 respondents, among which 54.5% were male and 45.5% were female. The median age of all participants was 35 years ( $\bar{X} = 36.7$ ,  $SD = 14.1$ ). Means and standard deviations are presented in Table 2.2. The median income of the respondent was Nepalese Rupees (NRs) 6000/month which is equivalent to US\$69.76/month (as of May 2013). Of all respondents, 37% were illiterate, while 63% had received some level of education with 11% having a high school degree. Different ethnic groups consisting of 31% Tharu, 17% Brahmin, 12% Chettri, 10% Newar and 30% Other (Gurung, Rai, Tamang & Bhote) made up the local communities in the buffer zones. Family size ranged from 1 to 20, and a median of 10. 67% of participants lived in

a joint family. Forty-nine percent of respondents had been living in that area for several generations; less than 5% were new immigrants to the area.

#### *Structure of Attitudes Framework*

Principal component analysis with varimax was conducted to explore the dimensions of the items in the attitudes of local people. The analysis revealed a three-component solution that accounted for 60% of the total variance in the data (Table 2.3). The first component, attitudes of local people toward biodiversity conservation ( $\alpha = 0.72$ ), consists of three items related to the attitude of local people toward the general concept of biodiversity. The second component, attitudes of local toward the establishment of buffer zone communities ( $\alpha = 0.71$ ) consists of four functions related to buffer zones. The third component, attitudes toward wildlife ( $\alpha = 0.73$ ) consists of three functions that are related to the conservation of wildlife. The proportion of the variance accounted by the components: attitude toward biodiversity, attitude toward the establishment of the buffer zones, and attitude toward wildlife conservation were 8.35%, 9.98% and 41.64% respectively.

#### *Attitudes of Local People Toward Biodiversity Conservation*

Multiple linear regression was used to determine the attitudes of local people toward biodiversity conservation. Local people who had participated in EEPs had a positive attitude toward biodiversity conservation; there was a significant difference between participation in EEPs and attitude toward biodiversity conservation ( $t = 4.99, p < 0.001$ ) (Table 2.4). Among the socio-demographic factors, only education showed a significantly positive response toward biodiversity conservation, suggesting that local

people who had attended school were more likely to conserve biodiversity compared to those who had not attended school ( $t = 6.09, p < 0.001$ ). In the case of gender, males were more concerned about conserving the biodiversity compared to females ( $t = -3.34, p < 0.001$ ). Age ( $t = -2.24, p = 0.02$ ) and income ( $t = 0.99, p = 0.32$ ) did not influence local attitudes toward conservation.

#### *Attitudes of Local People Toward the Establishment of Buffer Zones*

Similarly, multiple linear regression was used to test whether local people who had participated in an EEP had a more positive attitude toward the establishment of buffer zones than people who had not participated in such programs. People who had participated in an EEP had a more positive attitude toward the establishment of buffer zones ( $t = 3.35, p < 0.001$ ) (Table 2.5) than those who had not. Among socio-demographic factors, local people who had attended school ( $t = 3.66, p < 0.001$ ) or had a higher income ( $t = 2.35, p < 0.02$ ) were more likely to have a positive attitude toward buffer zone establishment compared to those who had not attended school or who had lower income. Attitude toward the establishment of buffer zones was not influenced by gender ( $t = -1.83, p = 0.06$ ) and age ( $t = -0.59, p = 0.55$ ).

#### *Attitudes of Local People Toward Wildlife Conservation*

A significant positive relationship was found between respondents who had participated in an EEP and their attitude toward wildlife conservation ( $t = 3.87, p < 0.001$ ) (Table 2.6) using multiple linear regression. Education was the only socio-demographic factor which had a positive association with wildlife conservation ( $t = 3.13, p = 0.002$ ). Neither age ( $t = -0.71, p = 0.47$ ), income ( $t = -1.03, p = 0.30$ ) or gender ( $t = -1.74, p =$

0.08) showed any significant association with the development of a positive attitude toward wildlife conservation. The results suggest that only participation in EEPs and education had positive associations with wildlife conservation.

*Attitudes of Local People Toward Biodiversity Conservation Among the Parks*

A one-way ANOVA was conducted to compare the attitudes of local people toward biodiversity conservation among the three parks. A significant difference was found regarding biodiversity conservation among the local people of BNP, CNP and PWR [ $F(2,575) = 68.03, p < 0.001$ ]. Post-hoc comparisons using the Tukey HSD test indicated that respondents from CNP ( $M = 21.7, 95\% \text{ CI } [21.5, 22]$ ) and BNP ( $M = 21.36, 95\% \text{ CI } [20.9, 21.8]$ ) had significantly higher conservation attitude than respondents from PWR ( $M = 18.07, 95\% \text{ CI } [17.4, 18.74]$ ),  $p < 0.001$  (Table 2.7). However, there was no significant difference found between CNP and BNP,  $p = 0.5$ . The results suggest that local people in CNP and BNP are more concerned than local people from PWR about the park and show a more positive attitude for its conservation. The mean difference in attitude toward conservation among the parks showed that respondents from PWR had the most negative attitude compared to those at BNP and CNP (Fig 2.3).

*Attitudes of Local People Toward Establishment of Buffer Zone Among the Parks*

Attitudes toward the establishment of buffer zones adjacent to the protected areas differed significantly [ $F(2,575) = 101.77, p < 0.001$ ]. The mean difference in attitude of residents toward buffer zone establishment among the parks showed that CNP had the most positive attitude followed by BNP and PWR (Fig 2.4). Tukey post-hoc comparisons



of the three parks indicate that residents from CNP ( $M = 16.09$ , 95% CI [15.77, 16.41]) are more concerned than local people from BNP ( $M = 14.23$ , 95% CI [13.82, 14.64]) and PWR ( $M = 11.84$ , 95% CI [11.3, 12.39]),  $p < 0.001$  (Table 2.8).

#### *Attitudes of Local People Toward Wildlife Conservation Among the Parks*

The attitudes of the local people toward wildlife conservation among the parks were found to be significantly different [ $F(2,575) = 35.19$ ,  $p < 0.001$ ] using one-way ANOVA. Among parks the comparison was further conducted using a Tukey post-hoc test which indicated that respondents from the buffer zone of CNP ( $M = 9.46$ , 95% CI [9.28, 9.64]) had a significantly higher conservation attitude than respondents from BNP ( $M = 8.65$ , 95% CI [8.37, 8.92]) and PWR ( $M = 7.99$ , 95% CI [7.68, 8.29]),  $p = 0.001$  (Table 2.9). Residents in the buffer zones of PWR had the least positive attitude compared to those from CNP and BNP (Fig 2.5).

### Discussion

This study supports the contention that local people who have participated in EEPs are more likely to have a positive conservation attitude than who have not participated. Moreover, the difference tends to be more evident between those who attend or who have attended school and had participated in a EEPs compared with those without education and who had not participated in EEPs. One possible explanation for their positive attitude could be that education contributes significantly to the development of a positive attitude toward conservation (Tomicevic et al., 2010). Providing EEPs to local people in the buffer zone areas of the protected areas could mean having a powerful

effect on conservation attitude (Fiallo & Jacobson, 1995; Gillingham & Lee, 1999). Ballantyne et al. (2001) found that half of the students participating in school-based EEPs take an influential message about environmental issues and actions home to their parents. This result highlights the potential power and effectiveness of school students as catalysts and agents of community attitude and behavior change. There have been many studies that attempt to look at the relationship between the attitudes of people with their level of education (Ballantyne et al., 2001; Fiallo & Jacobson, 1995; Gillingham & Lee, 1999; Jacobson, 1991; Tomicevic et al., 2010; Trehwella et al., 2005) and other socio-demographic characteristics (Bulte & Engel, 2006; Camboni & Napier, 1993; Chawla, 2007; Curtis & De Lacy, 1998; Nord, et al., 1998; Theodori, et al, 1998; Wells & Lekies, 2006). My results highlighted that education programs should focus on local people to improve attitudes, increase participation in conservation and also manage environmental activities. Infield and Namara (2001) have stated that “Attitudes are formed in part by communities’ and individuals’ perceptions and experiences of the park.” Thus, I emphasize the need for improving the educational infrastructure in and around the adjoining VDC’s of buffer zones. It is, nevertheless, important to recognize that respondents who had attended school had a more positive attitude compared to those lacking any formal education. This result indicates that education of any form can result in a change of people’s attitude toward conservation.

Further in this study I found that males expressed a more positive attitude compared to females toward wildlife conservation because they are actively connected to the protected areas through employment or other direct relationships. Tomicevic et al.,

(2010) has showed that men tend to hold a positive attitude toward working with national parks and toward conservation. While women have secondary roles and have less power in decision-making, men are considered the head of household. Despite women being more involved in forest resource extraction (Mehta & Kellert, 1998), my results showed that females had the least positive attitude toward conservation compared with males. This was contrary to finding in the literature where studies show a more positive association between women and environmental attitudes than for males (Baral & Heinen, 2007; Formica & Uysal, 2001). Females were found to be more inclined toward household chores giving them less opportunity to participate in EEPs. Unless we can make EEP available to females, potential achievements in conservation can be fragile.

Age on the other hand failed to show any relationship with conservation attitudes. There have been studies which show that if adults are exposed to nature at an early age, they are more likely to engage in positive environmental behavior (Chawla, 2007; Nord, et al., 1998; Theodori, et al, 1998; Wells & Lekies, 2006). A study done by Wells and Lekies (2006) of two thousand Americans showed that participating in activities related to nature (hiking, camping) in early childhood led to a pro-environmental attitude and corresponding behaviors in adulthood. This study suggests that people who experience nature at an early age are associated with an influential development of positive attitude in adulthood. However, in my study I did not find any positive conservation attitude among young people. Among many reasons behind this could be lack of employment opportunity in the park. Employment opportunity created through parks can attract the attention of younger people to change their conservation attitude. The environmental

attitude serves as a mediator between nature and environmental behavior (Cheng & Monroe, 2012), thus, nature experience at any other age can be influential in developing pro-environmental behavior.

Income level affected the attitude of respondents toward the establishment of buffer zones; supporting my hypothesis that people with a higher income had a more positive attitude than lower income people. Studies have shown that the higher the level of off-farm income, the higher the level of conservation behavior (Camboni & Napier, 1993; Curtis & De Lacy, 1998). Mehta & Kellert (1998), working on a conservation policy and program at the Makalu-Barun Conservation Area (Nepal), noted an unfavorable attitude toward wildlife conservation, a result that was not surprising as most people in the conservation area were extremely poor. Similarly, Bulte & Engel (2006) suggest that imposing restrictions on poor communities for the use of forest resources to which they previously had access can create economic hardship resulting in social conflicts.

I documented differences in environmental attitude among respondents living in buffer zone communities adjacent to these park study areas. It is important to examine the relations between the conservation areas and the local communities, particularly the history of the region along with the economic situation. My third research question concerned the potential difference in attitudes among local people living in buffer zone communities adjoining each of the three parks. CNP received the highest number of EEPs from DNPWC, NTNC and WWF. In 2011, CNP received over 250 EEPs followed by BNP with 230 and PWR with less than 5 (Fig. 2.2). Local people who have participated

in EEPs residing in the buffer zone adjoining CNP correspondingly had a more positive conservation attitude compared to those living near PWR, and similarly the conservation attitude of local people from BNP was higher compared to PWR. However, attitudes toward the establishment of a buffer zone were higher for CNP compared to BNP and PWR. Findings in earlier research from CNP have suggested a gap between the local people's needs and the resources that are available to them through the buffer zone community forest (Straede & Treue, 2006). VDCs in PWR have not received EEPs (Fig. 2.2), which resulted in the lowest positive attitude compared to those in CNP and BNP. One of the VDCs in PWR (Nirmal Basti) has not received any EEPs after the TAL program left the VDC (S. Shrestha, personal communication, March 2012).

### Conclusion

This paper has examined the effectiveness of participation in EEPs and concomitant relationship to conservation attitudes. I observed that people who have participated in an EEP showed a positive attitude toward biodiversity conservation. In addition, EEPs can prove to be a win-win situation for biodiversity conservation if they reach the target people within a buffer zone community. There is one VDC (e.g. VDC in PWR) who had never heard about or experienced EEPs, since these programs were not available in their community. Thus, it is important to have EEPs in each VDC if we want to change the attitude of the local people in those areas. I compared the attitudes of buffer zone residents who have received different levels of EEPs in CNP, BNP and PWR and was able to predict that the park with the highest number of EEPs would have a more

positive attitude. Additionally, I selected three protected areas that fall in the same Terai Arc belt of Nepal. This selection will enable different organizations like DNPWC, NTNC and WWF providing EEPs to focus in areas that lack EEPs and show the local people how protected areas could be beneficial to them. The findings indicate that environmental education is a valuable investment for protected areas to achieve long-term success.

TABLE 2. 1. The total number of VDCs in each buffer zones of the BNP, CNP and PWR and VDCs selected in each of the parks based on the criteria from the distance from access point to the park

<i>Parks</i>	<i>Close</i>	<i>Medium</i>	<i>Far</i>	<i>Total</i>	<i>Total BZ VDCs</i>	<i>Total VDCs</i>
Bardia	4	3	1	8	22	34
Chitwan	2	0	2	4	26	39
Parsa	3	0	1*	4	5	90

Source: WWF, Nepal (J. Parajuli, personal communication, October 2013)

Note: \* At Parsa one VDC far from the park entrance is accessed by a major road and thus acted as a surrogate for a “close” reference zone VDC.

TABLE 2. 2. Socio-demographic characteristics of respondents from CNP, BNP and PWR (N=578, January – May 2012). Gender is recorded as a dummy variable with female ‘0’ and male ‘1.’ Age, education, income and family size were recorded as continuous variables.

<i>Characteristics</i>	<i>Mean</i>	<i>(SD)</i>	<i>Minimum</i>	<i>Maximum</i>
Gender		(.498)	0	1
Age	36.7	(14.1)	18	88
Income (NRs. *)	9364.8	(12551.05)	500	150000
Education	5.65	(5.056)	0	17
Family Size	5.58	(2.330)	1	20

Note: \* NRs = Nepalese Rupees



TABLE 2. 3. Factor Loadings for Exploratory Factor Analysis of Attitude Scale Items

Attitude Scale Items	Components		
	Biodiversity	Buffer Zones	Wildlife
Biodiversity is important to us	<b>.806</b>		
We need to conserve wildlife and biodiversity	<b>.701</b>		
Education on biodiversity is needed	<b>.671</b>		
Establishment of buffer zone was fruitful		<b>.665</b>	
Conservation education in the buffer zone has been beneficial		<b>.614</b>	
My living conditions improved since the protected area creation		<b>.704</b>	
After the establishment of buffer zone you don't have problem of access to resources		<b>.748</b>	
It is important to set aside a place for the animals to live			<b>.791</b>
It is important to protect the animals			<b>.720</b>
You are willing to contribute for conservation			<b>.675</b>
Number of items	3	4	3
Variance explained	8.35%	9.98%	41.64%
Cronbach's alpha ( $\alpha$ )	0.72	0.71	0.73

TABLE 2. 4. Summary of attitudes of local people toward biodiversity conservation in the study area. The variables are participation in an environmental education program (EEP) along with the socio-demographic characteristics of the residents in CNP, BNP and PWR.

<i>Variables</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>	<i>Sig.</i>
(Constant)	0.657		27.838	0.001***
EEP	0.097	0.208	4.99	0.001***
Age	0.104	-.070	-2.24	0.210
Gender	0.274	-.149	-3.34	0.001***
Income	0.089	0.014	0.99	0.32
Education	0.215	0.258	6.09	0.001***

Note: SE = standard error, EEP = participation in an environmental education program, \*\*\*p<.001

Significance of the model  $F(5, 572) = 23.68, p < 0.001. R^2(0.171), \text{adjusted } R^2(0.164).$

TABLE 2. 5. Results of analysis for the attitudes of local people toward the establishment of the buffer zones in CNP, BNP and PWR. Attitude is a measure of 578 respondents with variables EEP and socio-demographic characteristics.

<i>Variables</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>	<i>Sig.</i>
(Constant)	0.652		18.389	0.001***
EEP	0.096	0.138	3.35	0.001***
Age	0.104	0.026	0.598	0.55
Gender	0.271	-.075	-1.839	0.07
Income	0.088	-0.10	2.351	0.019*
Education	0.214	0.214	3.660	0.001***

Note: SE = standard error, EEP = participation in an environmental education program, \*p<.05, \*\*\*p<.001

Significance of the model F (5,572) =11.99, p <0.001, R<sup>2</sup> (0.095), adjusted R<sup>2</sup> (0.087).

TABLE 2. 6. Multiple linear regression estimates for predicting the relationships for the attitudes of local people toward wildlife and socio-demographic factors in CNP, BNP and PWR (N=578).

<i>Variables</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>	<i>Sig.</i>
(Constant)	0.362		22.378	0.001***
EEP	0.053	0.162	3.874	0.001***
Age	0.058	0.032	-.717	0.474
Gender	0.151	-.072	-1.747	0.081
Income	0.049	-.045	-1.038	0.30
Education	0.119	0.145	3.874	0.002***

Note: SE = standard error, EEP = participation in an environmental education program, \*\*\*p<.001

Significance of the model F (5,572) =7.507, p <0.001, R<sup>2</sup> (0.062), adjusted R<sup>2</sup> (0.053).

TABLE 2. 7. Comparison of attitudes of local people toward biodiversity among CNP, BNP and PWR using post-hoc Tukey method at 95% confidence interval.

<i>Parks</i>	N	M (SD)	95% CI	
			LL	UL
Chitwan	240	21.7 (2.3)	21.4	22.0
Bardia	189	21.4 (3.0)	20.9	21.8
Parsa	149	18.0 (4.1)	17.4	18.7

Note. N = 578, M = Mean, SD = standard deviation, CI = confidence interval, LL = lower bound, UL = upper bound.

Significance of the model  $F(2,575) = 68.035$ ,  $p < 0.001$ .

TABLE 2. 8. Post-hoc Tukey comparison of attitudes toward the establishment of buffer zones among the local people between CNP, BNP and PWR.

<i>Parks</i>	N	M (SD)	95% CI	
			LL	UL
Chitwan	240	16.1 (2.5)	15.8	16.4
Bardia	189	14.2 (2.8)	13.8	14.6
Parsa	149	11.8 (3.3)	11.3	12.4

Note: N = 578, M = Mean, SD = standard deviation, CI = confidence interval, LL = lower bound, UL = upper bound.

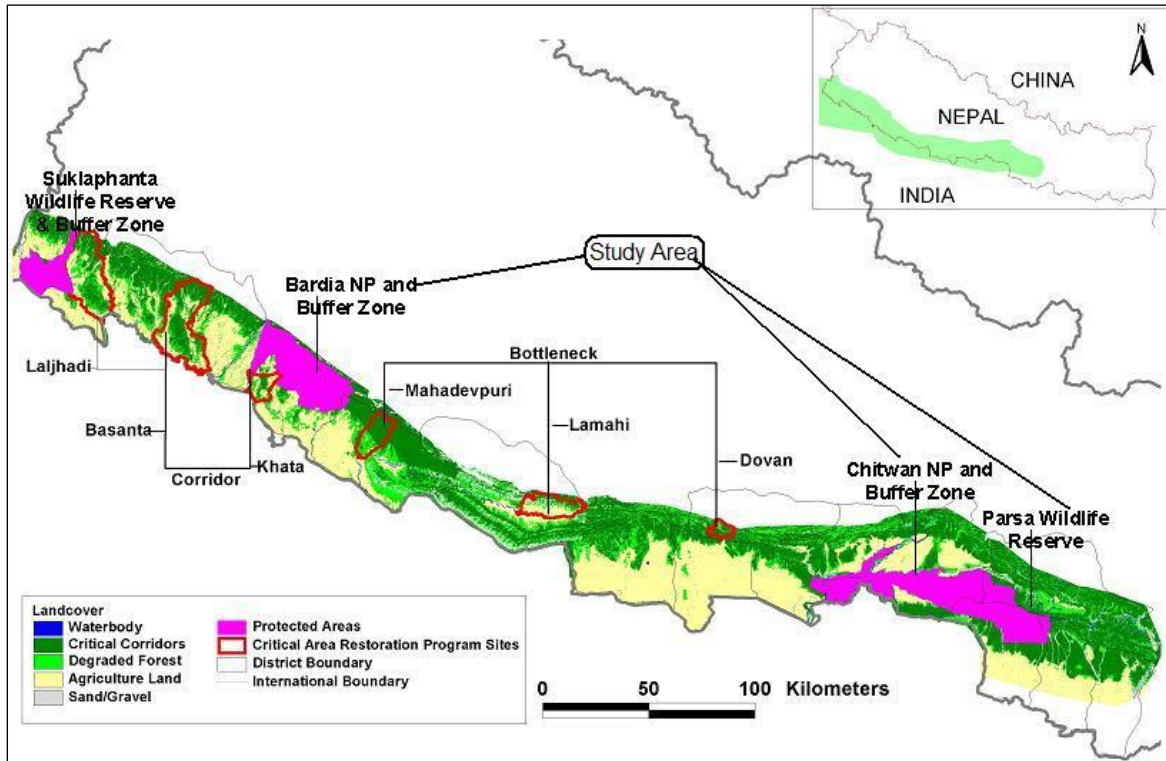
Significance of the model  $F(2,575) = 101.77, p < 0.001$ .

TABLE 2. 9. Results of analysis for comparison between CNP, BNP and PWR and attitude toward wildlife among the local people residing in the adjoining buffer zone communities.

<i>Parks</i>	N	M (SD)	95% CI	
			LL	UL
Chitwan	240	9.5 (1.4)	9.3	9.6
Bardia	189	8.6 (1.9)	8.3	8.9
Parsa	149	7.9 (1.9)	7.7	8.3

Note: N = 578, M = Mean, SD = standard deviation, CI = confidence interval, LL = lower bound, UL = upper bound.

Significance of the model  $F(2,575) = 35.19, p < 0.001$ .



Source: World Wide Fund for Nature (WWF)

Figure 2.1. The Terai Arc Landscape in Nepal and India showing the three study areas: Bardia National Park, Chitwan National Park and Parsa Wildlife Reserve.



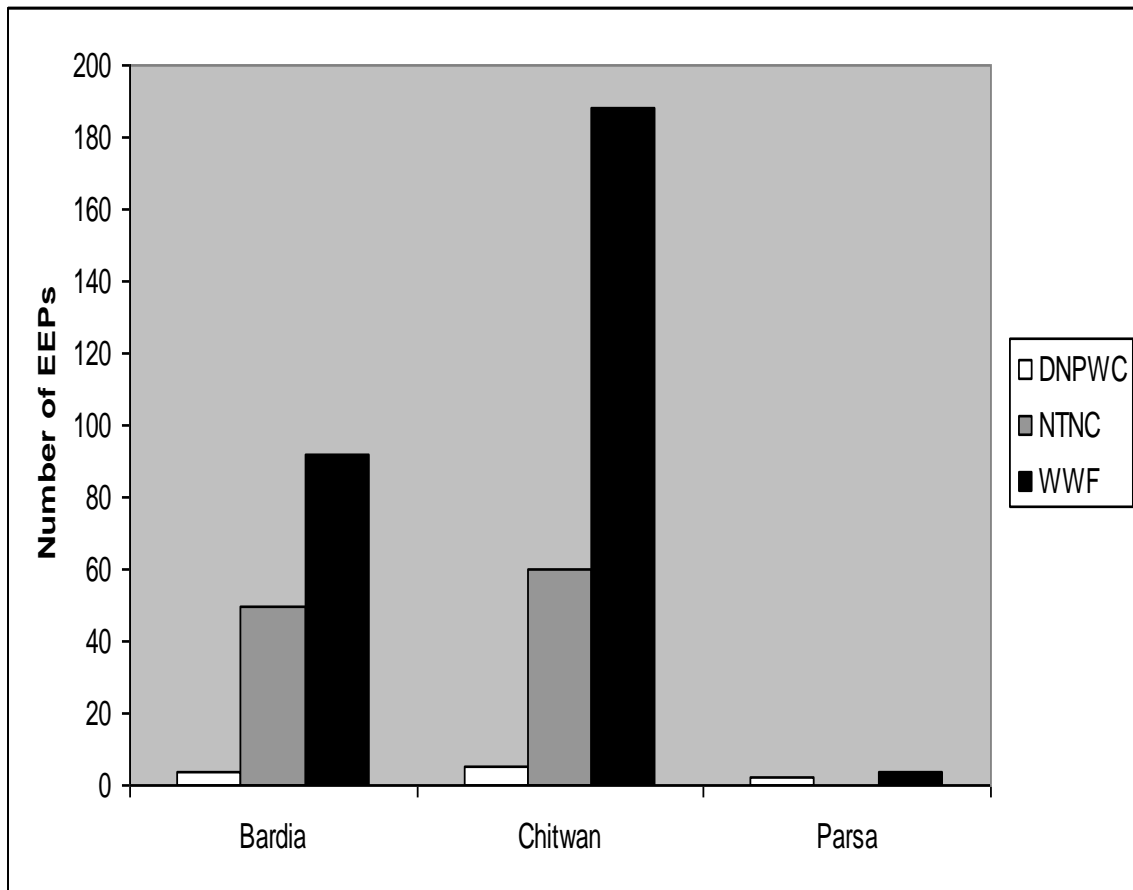


Figure 2.2. Summary of number of EEPs in CNP, BNP and PWR as given by DNPWC, NTNC and WWF. The numbers indicate the EEPs in schools and communities. School programs are conducted monthly in eco-clubs and target students and local people in the community.

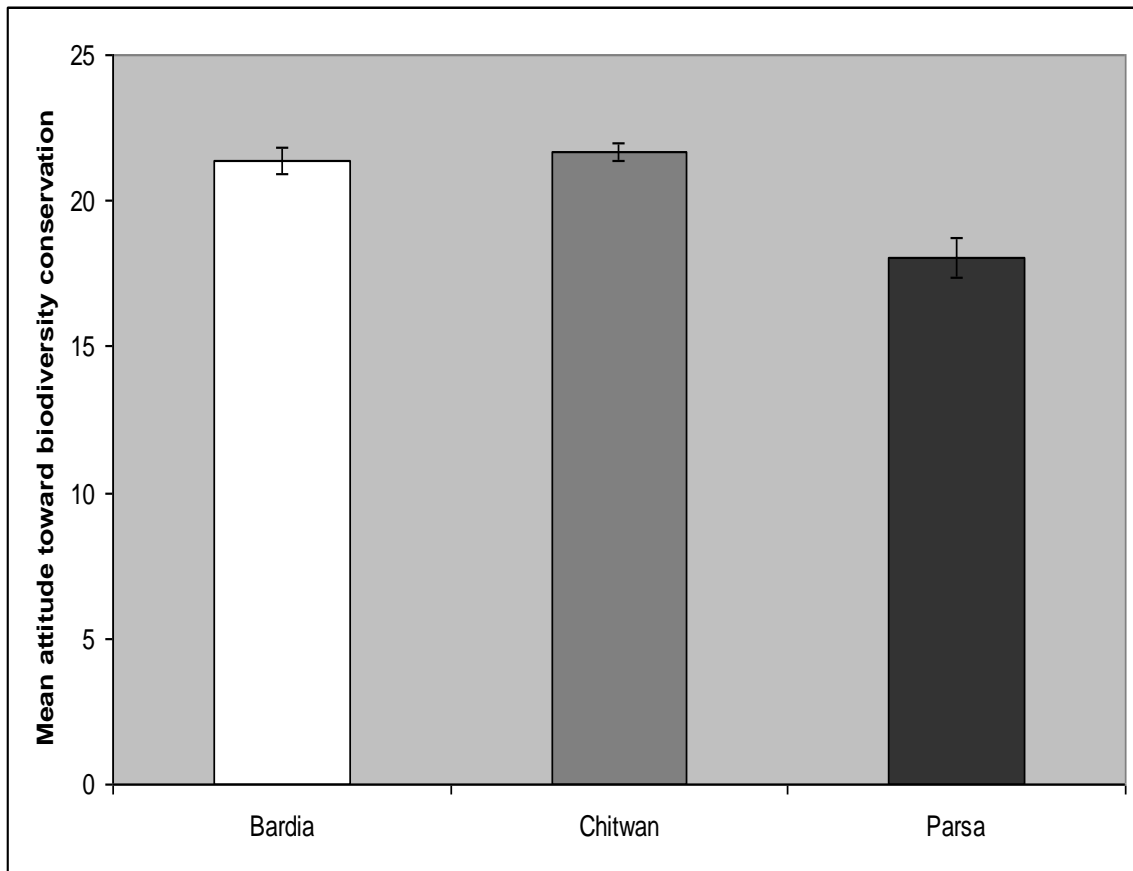


Figure 2.3. Mean comparison of attitudes toward conservation among the CNP, BNP and PWR based on responses to six statement scores [ranging from *strongly disagree* (1) to *strongly agree* (5)] and summed to 30. Error bars = 95% CI.

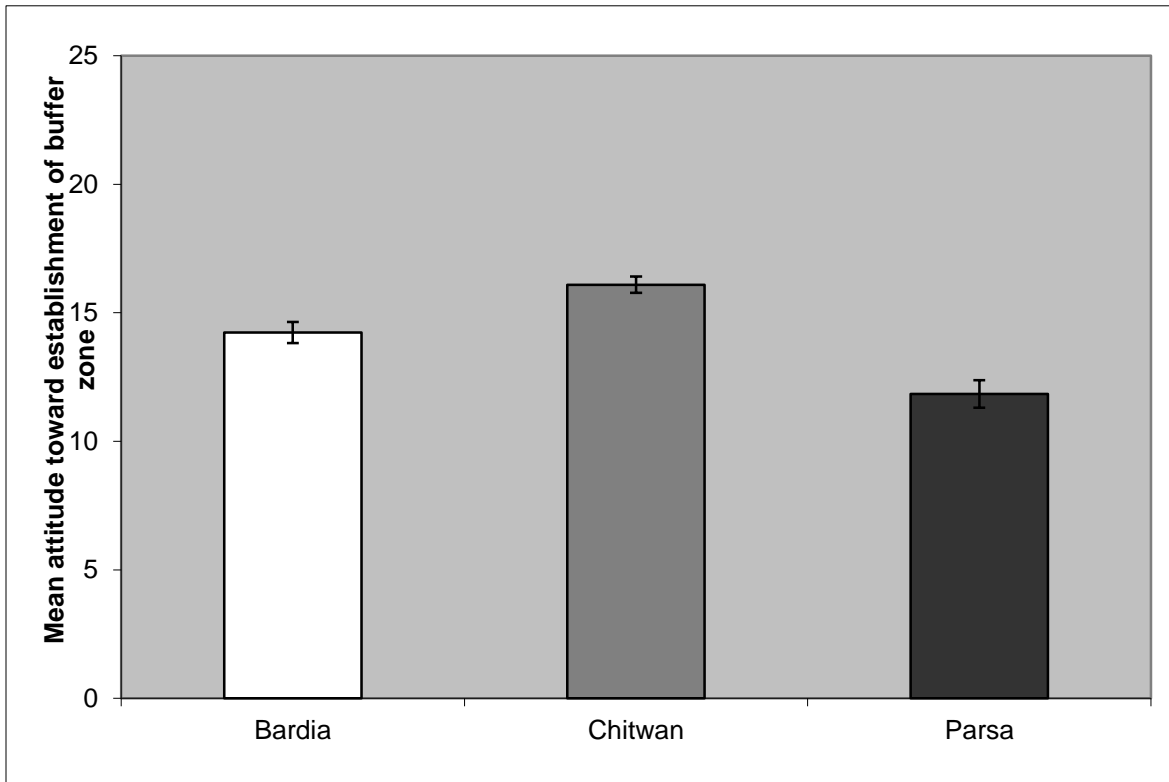


Figure 2. 4. Mean comparison of attitudes toward establishment of buffer zones among CNP, BNP and PWR based on responses to five statement scores [ranging from *strongly disagree* (1) to *strongly agree* (5)] and summed to 25. Error bars = 95% CI.

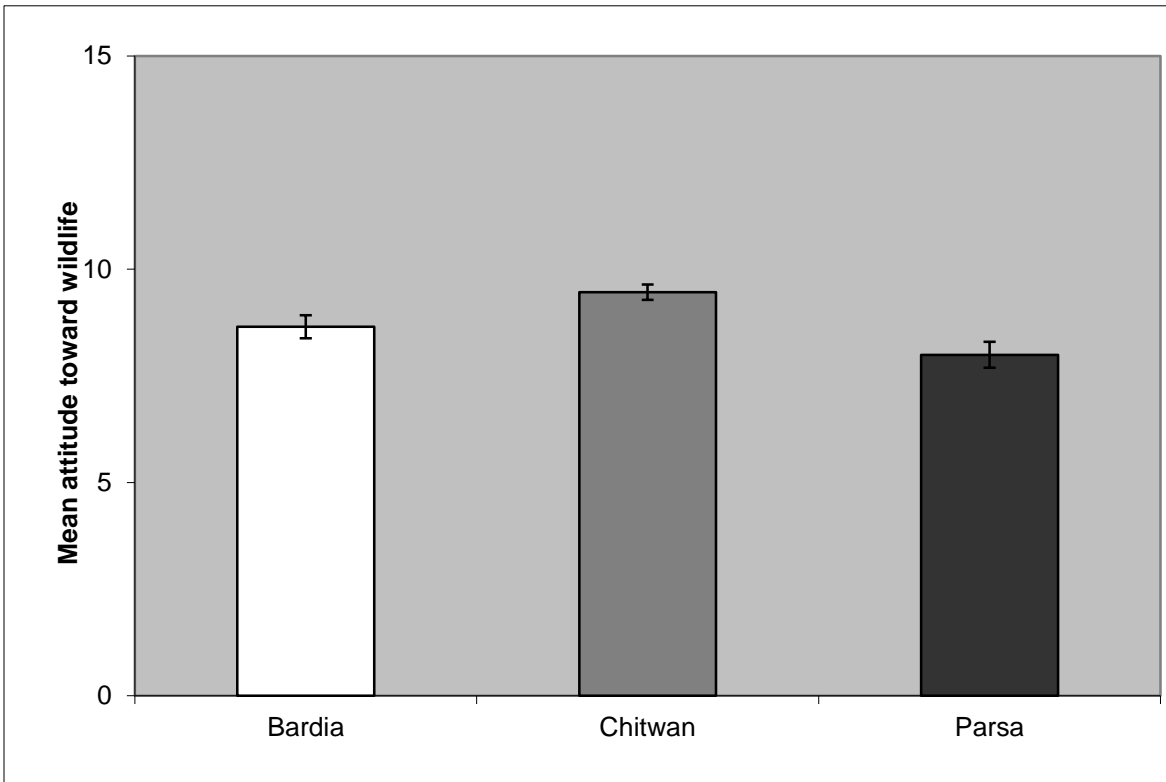


Figure 2.5. Mean comparison of attitudes toward wildlife among the local residents in the buffer zones adjacent to CNP, BNP and PWR based on responses to five statement scores [ranging from *strongly disagree* (1) to *strongly agree* (5)] and summed to 25. Error bars = 95% CI.

## CHAPTER 3

### Does Environmental Education Change Environmental Behavior? A Case Study in Chitwan, Bardia and Parsa, Nepal

#### Introduction

A relationship between a person and the natural environment is very important, since human behavior can affect the well-being of the environment and vice versa. Humans depend on the environment for desirable outcomes, but on the other hand human behavior may cause environmental problems. Different human activities have affected the environment causing water pollution, air pollution, and the extinction of species. Though earlier studies have shown little association between environmental concerns and collective action (Finger, 1994; Lober, 1995), Bisung et al. (2014) suggest that environment concerns could be major reasons for people's engagement in environmental collective action. Axelrod and Lehman (1993) defined environmental behavior as "action which contributes towards environmental preservation and/or conservation." Evolutionary ecologists define it as an act involving short-term costs that allow greater value to accrue in the future (Alvard, 1998; Ruttan & Mulder, 1999; Smith & Wishnie, 2000). Kaiser and Wilson (2004) argued that a person's engagement in certain behaviors is determined by that person's commitment, coupled with the difficulty of a specific behavior. The difficulty of behavior is further determined by the socio-cultural environment in which an activity takes place. The context provides both opportunities and obstacles; and the environment shapes performance regardless of a person's

motivation even without subjective acknowledgement of prevailing conditions (Scheuthle et al., 2005). Similarly, Kaiser (1998) outlined two reasons for measurement problems of ecological behavior: 1) some ecological behaviors are more difficult to carry out than others; and 2) ecological behavior is susceptible to many influences. Behavior has been assumed to be a cause from intentions (Rodriguez-Barreiro, et al., 2012). They state that attitudes are important to the behavior, but do not determine behavior directly; rather, attitudes influence behavioral intentions, which in turn shape a person's actions.

Armitage and Conner (2001), Bamberg and Schmidt (2003), Bamberg and Moser (2007), Ravis, et al. (2009) and Webb and Sheeran (2006) all have presented that intentions have shown to exert a causal effect on behavior. Research has shown that reading environmental literature can be one way to change an individual's behavior (Gardner and Stern, 1996). Research has also shown a positive relationship between exposure to environmental literature and participation in environmental behavior (Corral-Verdugo & Armendariz, 2000; Sivek & Hungerford, 1990). Other different attributes such as gender, age, and education may play important roles in shaping environmental behavior. The implication is that ecological behaviors are of varying degrees of difficulty to carry out (Kaiser & Wilson, 2004), and people may behave ecologically in one domain and the opposite in another (Kaiser, 1998; Kaiser et al., 1999).

The main purpose of my research is to examine environmental behavior of local people residing in the buffer zones of three different protected areas in the Terai region of southern Nepal toward biodiversity conservation. Specifically, I investigated if there are

conservation behavior differences in each of the protected areas. The effects of socio-demographic factors on conservation behavior were also investigated.

### Literature Review

*“If you want one year of prosperity grow grains. If you want 10 years of prosperity grow trees. If you want 100 years of prosperity grow people – educate them”.*

Chinese proverb

### *Environmental Behavior*

In recent years policy makers and researchers have become increasingly aware that individual behaviors can ameliorate environmental behaviors. Assumptions are often made that individuals who are concerned about the environment and are knowledgeable will participate in environmentally responsible behavior (ERB) (Mobley et al., 2009). Cottrell (2003) expressed that ERB occurs when an individual or group aims “to do right to help protect the environment in general practice.” The actions of ERB are also referred to as pro-environmental behavior, conservation behavior and environmentally friendly behavior. Hungerford and Volk (1990) have categorized two variables that incline people to take interest in the environment: 1) ownership variables - such as one’s own investment in environmental issues, - to make themselves knowledgeable about the issues; and 2) empowerment variables - one’s skills in using environmental action strategies and the belief of being successful. These categories are parallel to value-belief-norm theory (Stern, 2000). According to value-belief-norm theory, people need to value the protection of their environment for their own sake and also have knowledge about

environmental issues that matter to them. They need to believe that they can have an effect on environmental issues, and norms prescribe that they should act (Chawla & Cushing, 2007). Today most instances of deteriorating environmental conditions are blamed on human behavior. Environmental phenomenon such as pollution and climate change are mostly due to human lifestyle rather than malicious intent (Schultz, 2011). Schultz and Kaiser (2012) stress that efforts to promote conservation must change behavior. Recently there have been many studies showing the link between conservation and behavior. Schultz (2011) proposed that “conservation is a goal that can only be achieved by changing behavior.” Mascia et al. (2003) discuss biodiversity conservation as a human endeavor which is initiated and designed by humans and intended to modify human behavior. Balmford and Cowling (2006) contend that conservation is primarily more about people and the choices they make and not biology. Researchers have found individuals more likely to engage in conservation behavior if they are connected to nature (Gosling & Williams, 2010; Mayer & Frantz, 2004; Schultz, 2001). However, there are individuals who tend to think they are not a part of the nature, but separate from it (Schultz, 2002). To promote connectedness between nature and humans, different activities such as environmental education and first-hand activities could be potentially important to increase conservation behavior. Education focused on conservation should make an effort to educate the public and raise awareness. Media has proved to be powerful in changing behavior toward conservation (McKenzie-Mohr et al., 2012). However, behavioral scientists believe that the public should be approached with a focus on single and achievable action to succeed (Schultz, 2011). People’s attachment to a



place also determines their behavior (Dredge, 2010). Research has been done to investigate the attachment of place on pro-environmental behavior (Devine-Wright & Howes, 2010; Gosling & Williams, 2010). The concept of place attachment is important in explaining pro-environmental behavior (Burley et al., 2007; Walker & Ryan, 2008). It is likely that an individual would show commitment and responsibility to the place they are attached to (Walker & Chapman, 2003).

### *Environmental Education and Environmental Behavior*

Environmental education (EE) is an integral part of conservation. It has always been seen as a key to improving the quality of life collectively for humankind and not just of individuals (Tilbury, 2012). Environmental education holds a unique place in formal public education (Campbell et al., 2010). Pooley and O'Connor (2000) identified the main goals of EE as: 1) assessment of environmental issues; 2) finding feasible solutions to any problems that are identified; and 3) creating pro-environmental behavior. There is also a clear assumption in EE that we need to give environmental information to an individual, as the more environmental knowledge a person has, the more likely they are to change their environmental behavior (Hungerford & Volk, 1990). Traditionally, EE has focused more on conveying specific information through formal education in order to motivate people to change their behavior (Stables & Bishop, 2001). Gardner and Stern (1996) state that reading environmental literature can be one way to change an individual's behavior. Research has shown a positive relationship between exposure to environmental literature and participation in environmental behavior (Corral-Verdugo & Armendariz, 2000; Sivek & Hungerford, 1990). Mobley et al. (2009) state that the

knowledge gained through reading environmental literature should be combined with a concrete application to address local environment issues. Monroe (2003) describes how reading environmental literature could be integrated into formal environmental education programs (EEPs) focusing on specific concerns and solutions. Behavior elicited by EEPs requires a level of awareness which is dependent on the environmental attitudes of individuals (Kandir et al., 2012). Environmental education's main objective has always been to improve environmental awareness of problems to encourage solutions, to raise awareness for using resources economically, to increase respect for the rights of all living things, and to help individuals develop positive environmental values and attitudes (Kandir et al., 2012). Jacobson et al. (2006) found that EE and outreach programs can inform and involve the public to raise awareness, improve knowledge, acquire attitudes and skills, and encourage participation to help achieve resource management goals. An increase in people's tolerance is also seen through education programs (Ogada et al., 2003). Weaver (2002) claimed that individuals with more environmental knowledge maybe more sympathetic toward the environment and engage in ERB compared to those with a low level of environmental knowledge.

#### *Socio-Demographic Variables and Environmental Behavior*

Socio-demographic characteristics and behavior have been linked directly in many studies (Dunlap & Van Liere, 1984; Scott & Willits, 1994) encouraging ERB. Findings indicate that increased education and level of environmental knowledge usually encourage conservation behavior (Pannell et al., 2006). Ballantyne et al. (2001) found that half of the students participating in school-based EEPs take an influential message

about environmental issues and actions home to their parents. This result highlights the potential power and effectiveness of school students as catalysts and agents of community attitude and behavior change. Individuals with higher levels of education express more environmental concern and are more likely to engage in ERB (Hines et al., 1987; Scott & Willits, 1994; Xiao & McCright, 2007). Studies show positive association between higher education and pro-environmental behavior (Olli et al., 2001; Poortinga et al., 2004; Scott & Willits, 1994). Like education, gender has a role in conservation behavior. Stern et al. (1993) discuss gender differences in environmentalism and imply that links exist between socialization and values. As values predict attitudes and behavior (Olson & Zanna, 1993), females compared to males are socialized to value the needs of others. Women exhibit more positive behavior compared to males (Agrawal, 2009 and Gilligan, 1982); but see chapter 2. Tindall et al. (2003) noted that women engage in significantly higher rates of conservation behavior, whereas Byron et al. (2004) found no significant differences by gender. While some argue that females are less concerned about the environment due to level of education, income and their time toward domestic responsibilities (Tindall et. al., 2003), others claim that women are more likely to engage in ERB due to gender socialization resulting in greater sensitivity toward environmental issues (Zelezny et al., 2000; Mobley et al., 2009). Various studies have reported a positive association between women and ERB (Barr & Gilg, 2007; Hunter et al., 2004; Olli et al., 2001; Scott & Willits, 1994; Tindall et al., 2003). Some studies have shown that the higher the level of off-farm income, the higher the level of conservation behavior (Camboni & Napier, 1993; Cary, et al., 2001 and Curtis & De Lacy, 1998). Social class

theory (Van Liere & Dunlap, 1980) explains the correlation between environmental behavior and income. ERB can only be performed when individuals have fulfilled their basic material needs. Olli et al. (2001) explain that individuals give priority to the environment and show ERB only after their needs have been fulfilled for a significant period of time. The association between higher income and positive environmental behavior has been shown in many studies (Poortinga et al., 2004; Scott & Willits, 1994). Age can also be associated with environmental behavior (Berenguer et al., 2005; Cottrell, 2003; Scott & Willits, 1994). Younger people have been shown to be more actively involved in environmental activity and adopt ERB (Olli et al., 2001). Studies have shown a positive correlation between younger ages and pro-environmental behavior (Scott & Willits, 1994; Hallin, 1995).

The main objective of this study was to see if there are any positive conservation behaviors among the local residents who have participated in EEPs compared with those who have not experienced EEPs. Also, based on the literature review, I investigated the effect of socio-demographic factors on conservation behavior. Specifically, I examined conservation behavior differences among three different protected areas who have received different levels of EEPs. Thus, the research questions and hypotheses that guided the development of this study were:

1. Does environmental education positively influence the environmental behavior of people toward biodiversity conservation?

H1: Participation in environmental education programs will positively influence the environmental behavior of people toward biodiversity conservation.

P1: People who have participated in environmental education programs will behave positively toward biodiversity conservation.

H2: Socio-demographic (age, gender, education and income) factors will influence pro-conservation behavior.

P2: Socio-demographic factors (see P2a-P2d) will have a strong positive correlation with observed conservation behavior.

P2a: Younger people will exhibit a more positive conservation behavior than older people.

P2b: Females will exhibit a more positive conservation behavior than males.

P2c: Literate people will exhibit a more positive conservation behavior than illiterate people.

P2d: Higher income people will exhibit a more positive conservation behavior than lower income people.

2. Does environmental behavior expressed by people living in the buffer zone communities among the three parks toward biodiversity conservation differ with their prior exposure to EE?

H3: Conservation behavior differs among the buffer zone communities associated with differences in the amount of prior exposure to EE in the three protected areas.

P3: Buffer zone communities that have received a large number of EEPs will have a more positive conservation behavior than the communities with fewer EEPs.

## Methods

### *Study Area*

Situated in the Terai Arc Landscape (TAL) of Nepal, the study was conducted in the buffer zones adjacent to three protected areas: Chitwan National Park, Bardia National Park and Parsa Wildlife Reserve (Chapter 2, Fig. 2.1). The TAL is a system of protected areas and corridors that extends for about 1000 km along the Himalayan foothills of Nepal and north-western India (Dinerstein et al., 2013). The landscape was created to recover and conserve tigers (*Panthera tigris*) and greater one-horned rhinoceros (*Rhinoceros unicornis*) and to sustain ecological services in the region (Wikramanayake et al., 2011). Chitwan National Park (CNP) is one of the world's most unique protected areas, renowned for its variety and abundance of precious and rare fauna, flora, and rich cultural heritage (Mishra & Jefferies, 1991). CNP covers 932 km<sup>2</sup> and is situated in the subtropical inner Terai lowlands of south central Nepal. CNP supports the highest density of tigers in Asia, features a high ungulate and carnivore diversity, and provides a habitat for several endangered species (Dinerstein, 2003; Nepal & Weber, 1993). The park was initially formed under a people-free approach, and all communities were consequently resettled outside the boundaries of the park (McLean & Straede, 2003). The buffer zone spreads over 767 km<sup>2</sup> with four districts, 37 Village Development Committees (VDCs) and over 223,000 people living in the area surrounding the park (DNPWC, 2006). Bardia National Park is the largest park in the lowland Terai and covers an area of 968 km<sup>2</sup>. The park is situated in Nepal's western Terai and was established to protect representative ecosystems and conserve the tiger and

its prey species (DNPWC, 2006). In 1996, 327 km<sup>2</sup> of forest and private land near the park was declared as a buffer zone. It includes 17 VDCs in two districts, and about 120,000 people live in 11,504 households (Baral et al., 2007). Established in 1984, Parsa Wildlife Reserve (PWR) is situated in the Terai lowlands with an area of 499 km<sup>2</sup> adjoining Chitwan National Park in the west. The reserve has a sub-tropical monsoon climate. The Churiya hills dominate from east to west ranging from 750 m to 950 m in elevation (DNPWC, 2006). The government of Nepal officially declared the buffer zone of Parsa Wildlife Reserve on 27 June 2005. The buffer zone covers an area of 298 km<sup>2</sup>. It includes 11 VDCs in three districts, and around 43,238 people live in 7,228 households (Global Association of Online Foresters, 2005).

#### *Instrument*

Many studies have examined the antecedents of environmental behavior from several theoretical perspectives. Value-belief-norm theory states that the performance or pro-environmental behavior is based on personal values, beliefs about environmental condition and individual agency (Stern et al., 1995; Stern, 2000). The theory of planned behavior uses intention as a composite of attitudes, norms and perceived behavior control to predict pro-environmental behavior (Ajzen, 1985). Various studies have used several ways to measure ecological behaviors. A General Ecological Behavior (GEB) scale was formed with 40-items by Kaiser (1998) incorporating several categories: 1) pro-social behavior; 2) water and power conservation; 3) ecological garbage removal; 4) ecologically aware consumer behavior; 4) garbage inhibition; 5) volunteering in nature protection activities; and 6) ecological automobile use. Researchers have adapted the

original scale using different item numbers from 65 (Kaiser & Gutscher, 2003), 50 (Kaiser & Wilson, 2004), to 47 (Scheuthle et al., 2005). It is evident from Kaiser and Wilson (2004) that GEB is a reliable and valid scale. In their study, the items that could not be measured dichotomously (yes/no) were measured in a 5-point scale with *never* (1) to *always* (5). Some self-developed scales have also been used to assess environmental behavior (Beaumont, 2001; Orams, 1997; Tarrant & Green, 1999). A five-item scale to measure people's behavior after being exposed to EEPs was developed by Orams (1997). The items in the scale included "became more involved in environmental issues to make donation to an environmental organization." However, in terms of a behavior scale I could not use a scale in its original form, because environmental conservation also includes socio-cultural and economic aspects. For the purpose of this study, behavioral items such as "I am a member of an environmental organization," and "I contribute financially to environmental organizations" were adapted from Kaiser and Wilson (2004) and Kaiser, et al. (2007). The adapted items were revised in three statements in my research (Appendix B; Section C; Questions 5, 7, and 8). Other behavioral items (Appendix B; Section C; Questions 1, 2, 3, 4, 6, 9, 10, 11, 12, and 13) were developed based on conversation with local people and officers from different local organizations. Thirteen behavioral items were measured using a 5-point Likert scale ranging from *never* (1) to *always* (5). However, only 10 items were used for analysis due to the similarity in the statement of two items and unwillingness of the participants to answer some statements. Similarly, participation in EEPs was also measured using 5-point Likert scale with responses ranging from *never* (1) to *always* (5). Prior research involving the



frequency of participation of local people in EEPs provided by schools, governmental organizations, non-governmental organizations and international non-governmental organizations could not be found. Thus, the participation scale for EEPs was developed based on conversation with local people from the buffer zone communities about how frequently they participated in EEPs. EEPs included different activities conducted by different institutions such as schools, governmental organizations, non-governmental organizations and international non-governmental organizations. Activities included tree plantation, recycling, street dramas, rallies, bird-watching and different forms of competition from art, poem, etc. The dependent variables in this study are behavior of local people toward: 1) biodiversity conservation; 2) making a contribution for conservation; 3) collecting fuel wood from the forest; 4) killing wildlife to support family; and, 5) killing wildlife to protect their farm. The independent variables measured for this study were participation in EEPs and demographic characteristics (age, gender, income and education).

#### *Data Collection*

The study was aimed to explore conservation behavior of local people residing in the buffer zones of three protected areas who have received EEPs and those who had not received EEPs. The study was granted exempt category after a review by the Institutional Review Board pursuant to Federal Regulations (Appendix A). Data were collected from January 2012 to May 2012. Six hundred respondents (CNP = 250, BNP = 200 and PWR = 150) were selected from diverse socioeconomic strata of 16 Village Development Committee's (VDC's) from the buffer zone communities adjoining the three protected

areas. In Chitwan, four VDC's (Kumrose, Bacchauli, Gardi & Meghauri); in Parsa, four VDC's (Nirmal Basti, Mahadev Patti, Amlekhjung & Suwarnapur); and in Bardia, eight VDC's (Neulapur, Shivpur, Baniyabar, Magaragadhi, Dhadhawar, Thakurdwara, Beluwa & Baganaha) were selected. Eight VDC's were chosen to represent Bardia as compared to Chitwan and Parsa, because it is the largest national park in Terai region. Field research was conducted by administering questionnaire surveys. Among the N = 600, only 578 surveys were included in the analysis; 22 were excluded because of some missing values. One adult aged 18 or over in each household was interviewed. The population within each VDC was randomly selected based on the ethnicity, gender, income, etc. The questionnaire was researcher-administered. Each questionnaire (Appendix B) was divided into several parts: 1) economic activities such as annual average income; 2) ethno-religious background; 3) socio-demographic variables such as gender, age, occupation; 4) education level; and 5) conservation behavior (behavior toward conservation). For conservation behavior (Appendix B; Section C), a series of statements was presented, and respondents were asked to choose among alternative answers (for example: never/ seldom/ occasionally/ often/ always). The questionnaire was prepared in English, but was translated into Nepali. Taking into account the high illiteracy rate in rural Nepal, questions were clarified by the researcher or research assistant if the respondents had any trouble or doubt understanding the questions.

#### *Data Analysis*

Statistical Package for the Social Sciences (SPSS) version 21 was used for the statistical analysis. The data analysis included descriptive statistics (means and standard

deviations), Cronbach's alphas, multiple linear regression and one-way repeated measure analysis of variance (ANOVA). Behavior toward biodiversity conservation was measured by 13 related questions (Appendix B; Section C). Responses to these items were recorded using a Likert-scaling format, ranging from *never* (1) to *always* (5) (Babbie 1990). The first hypothesis (H1) was tested using multiple linear regressions between the dependent variable (i.e., conservation behavior) and independent variable participation in an environmental education program. Similarly, the second hypothesis (H2) was tested using multiple linear regression between the dependent variable of conservation behavior and independent variable of socio-demographic factors: age, gender, income, education, and ethnicity. For the third hypothesis (H3), a post-hoc test in the Analysis of Variance (ANOVA) was used to explore additional differences among means of conservation behavior in the parks to provide specific information on which means were significantly different from each other. Descriptive analyses (means and standard deviation) were calculated for socio-demographic characteristics.

Gender was a binary variable and dummy coded as female '1' and male '0.' Age was recorded into five groups: 18-25 yrs, 26-35 yrs, 36-50 yrs, 51-70 yrs, 70 yrs or over. Income (Nepalese Rupees-NRs.) was recorded as a continuous variables which was later collapsed under five groups: 1 = below NRs. 24,999/yr; 2 = NRs. 25,000-49,999/yr; 3 = NRs. 50,000-74,999/yr; 4 = NRs. 75,000-99,999; and, 5 = above NRs. 100,000/yr. Similarly, education was also recorded as a continuous variable which was later collapsed under three groups: 1 = 0 (illiterate), 2 = 1-10 (junior – high school), 3 = above 10 (above high school) respectively.

To determine whether participation in EE changed the behavior of the respondents toward conservation, behavior was grouped under six categories: i) behavior toward general biodiversity (Appendix B; Section C; Questions 9, 11 and 13,  $\alpha = 0.76$ ); ii) behavior toward making a contribution for conservation (Appendix B; Section C; Questions 7 and 8); iii) behavior toward anti-poaching activity (Appendix B; Section C; Questions 4 and 5); iv) behavior toward collecting fuel wood (Appendix B; Section C; Question 2); v) behavior toward killing wildlife to support family (Appendix B; Section C; Question 12); and vi) behavior toward killing wildlife to protect their property/farm (Appendix B; Section C; Question 3). Also, a comparison was done among recorded behaviors of participants from the local communities among the three parks and their prior participation in EEPs.

## Results

### *Demographic Characteristics of Participants*

The majority of respondents were male (54.5%). Ages ranged from 18 to 88, with a median age of 35 years ( $\bar{X} = 36.71$ ,  $SD = 14.1$ ) (Chapter 2). Monthly income of respondents ranged from Nepalese Rupees (NRs.) 500 to 150,000 with median income of NRs. 6000/month which is equivalent to US\$69.76/month (as of May 2013). The variation in the income was due to the fact that many of the respondents were farmers and worked in their field on daily basis while others owned hotels in the buffer zone and made a high income during the tourist season. 37% of the respondents were illiterate, and 63% had received some level of education; 11% had received a high school degree.

Different ethnic groups made up the local communities in the buffer zone and consisted of 31% Tharu, 17% Brahmin, 12% Chettri, 10% Newar and 30% Other (Gurung, Rai, Tamang & Bhote). Family size ranged from 1 to 20 with a mean of 5.58. The majority of the participants lived in extended family groups (67%), and 49% had been living in that area since their ancestral period. Less than 5% of families were new to that area. CNP receives the highest number of EEPs in a year; CNP received over 250 EEPs in a year (K.J. Kunwar, B.R. Lamichanne and A.S. Ansari, personal communication, March – May 2012) followed by BNP with 230 (T.R. Adhikari, R. Kadariya and J. Parajuli, personal communication, March - April 2012) and PWR with less than five programs (M. Ahamad and N. Shrestha, personal communication, March – May 2012) in 2011.

#### *Behavior of Local People Toward General Conservation*

Multiple linear regression showed that local people who had participated in EEPs displayed a positive behavior toward biodiversity conservation, and there was a significant difference between participation in EEPs and behavior of participants toward biodiversity conservation ( $t = 3.51, p = 0.001$ ; Table 3.1). Education also showed a significant association with the behavior of participants toward conservation. Literate residents showed a positive behavior toward conservation ( $t = 5.59, p = 0.001$ ). Considering gender, males ( $t = -2.18, p = 0.03$ ) had a more positive attitude in their behavior toward conservation compared to behavior expressed by females. Behavior toward wildlife conservation was not influenced by income or age (Table 3.1).

### *Behavior of Local People Toward Making a Contribution for Conservation*

A significant difference was found using multiple linear regression between local people who had participated in an EEP and the contribution they would make toward biodiversity ( $t = 7.82, p = 0.001$ ; Table 3.2). Potential contributions would be a small donation of money or time to conserve biodiversity. Education ( $t = 3.83, p = 0.001$ ) was the only other independent variable that had a significant positive association with the likelihood of contribution toward conservation. This result signifies that local people who have attended school are more likely to support conservation and contribute toward it than those who have not attended school. However, males appeared more likely to support conservation through small contributions than females ( $t = -1.98, p = 0.04$ ; Table 3.2). All other socio-demographic variables such as age and income failed to indicate a differential response toward the likelihood of contributing to biodiversity conservation.

### *Behavior of Local People Toward Anti-poaching Groups*

Multiple linear regression showed that local residents who had participated in EEPs were more likely to become involved in anti-poaching groups or to inform authorities about poaching in their neighborhood than participants who had not participated in EEPs ( $t = 7.22, p = 0.001$ ; Table 3.3). Participants with higher incomes ( $t = 2.35, p = 0.02$ ) and who had attended school ( $t = 1.96, p = 0.05$ ) were also more likely to be involved in anti-poaching groups or to inform authorities about poaching than lower income people and those who had not attended school. Other independent variables like age and gender did not show any relationship with behavior toward anti-poaching groups (Table 3.3).

### *Behavior of Local People Toward Killing Wildlife to Support Family*

When asked behavior statements like “I kill wildlife to support my family” there was no significance difference found with participation in EEPs (Appendix B; Section C: Statement 12). People who had participated in EEPs were equally likely to kill wildlife to support their family than those without EEPs ( $t=0.68$ ,  $p = 0.293$ ; Table 3.4). However, low income residents were more likely to kill wildlife to support their family than respondents with higher income ( $t = -2.19$ ,  $p = 0.03$ ; Table 3.4).

### *Behavior of Local People Toward Killing Wildlife to Protect Their Farm*

People who had participated in EEPs appeared equally likely to kill wildlife to protect their farm than those who had not participated in EEPs based on their response to the statement “I kill wild animals if it comes to my farm/area” ( $t = 1.81$ ,  $p = 0.07$ ; Table 3.5). Income was the only socio-demographic factor that showed a positive significance difference in response to this question ( $t = 2.66$ ,  $p = 0.008$ ). The positive result suggests that people with a higher income are more likely to kill a wild animal if it invades their property. Education, on the other hand, had a negative relationship ( $t = -2.99$ ,  $p = 0.003$ ), which signifies that less-educated people were more likely than educated respondents to kill a wild animal if they found it in their farm/area. Age and gender did not show any significant difference with this behavior (Table 3.5).

### *Behavior of Local People Toward Collecting Fuel Wood from the Forest*

All of the independent variables (EEP, age, gender, education and income) had no association with the behavior of collecting fuel wood from the forest, based on the

response to the question “ I collect fuel wood from the forest” (Table 3.6). All respondents were equally likely to collect fuel wood from the forest.

#### *Behavior of Local People Among the Parks Toward Conservation*

There was a significant difference among the parks and local people toward biodiversity conservation [ $F(2,575) = 29.146, p < 0.001$ ]. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for CNP ( $M = 13.4, 95\% \text{ CI } [13.1, 13.7]$ ) was significantly different than PWR ( $M = 9.3, 95\% \text{ CI } [8.8, 9.9]$ ),  $P < 0.001$  and BNP ( $M = 11.9, 95\% \text{ CI } [11.6, 12.3]$ ),  $P < 0.001$  (Fig. 3.1). The results indicate that the local people residing in the buffer zones of CNP demonstrated a more positive behavior toward conservation compared to those from PWR and BNP.

#### *Behavior of Local People Among the Parks Toward Contribution for Conservation*

Similarly, there was a significant difference found among the parks by local people toward making a potential contribution to enhance conservation [ $F(2, 575) = 130.83, p < 0.001$ ]. Post-hoc comparisons using the Tukey HSD test indicated that the mean score for CNP ( $M = 8.4, 95\% \text{ CI } [8.1, 8.6]$ ) was significantly different than PWR ( $M = 4.8, 95\% \text{ CI } [4.5, 5.2]$ ),  $P < 0.001$  and BNP ( $M = 6.7, 95\% \text{ CI } [6.4, 7.0]$ ),  $P < 0.001$  (Fig. 3.2). Specifically, the result suggests that local people in CNP are more likely to make contributions toward conservation and the people in PWR are least likely to contribute toward conservation.

#### *Behavior of Local People Among the Parks Toward Anti-poaching Group/Activities*

Involvement in anti-poaching groups differed between the local people of the buffer zones among the three parks [ $F(2, 575) = 29.146, p < 0.001$ ]. A post-hoc



comparisons using the Tukey HSD test indicated that the behavior of the local people of CNP ( $M = 6.6$ , 95% CI [6.3, 6.5]) was significantly different than PWR ( $M = 4.8$ , 95% CI [4.4, 5.2]),  $P < 0.001$  and BNP ( $M = 5.7$ , 95% CI [5.4, 6.0]),  $P < 0.001$  (Fig. 3.3). The result implies that people in CNP are more involved in anti-poaching groups or are more likely to inform authorities about poaching compared to those residing in the buffer zones of BNP and PRW.

#### *Behavior of Local People Among the Parks Toward Collecting Fuel Wood*

The behavior of the local people toward collecting fuel wood was found to be significantly different [ $F(2, 575) = 14.39$ ,  $p < 0.001$ ] among the three parks. A multiple comparison indicated that the behavior of the local people in BNP ( $M = 3.35$ , 95% CI [3.2, 3.5]) were more likely to collect more fuel wood followed by PWR ( $M = 2.9$ , 95% CI [2.7, 3.2]),  $P = 0.007$  and CNP ( $M = 2.7$ , 95% CI [2.6, 2.9]),  $P < 0.001$  (Fig. 3.4). However, there was no significant difference found between CNP and PWR for the behavior of collecting fuel wood ( $P = 0.16$ ) (Fig. 3.4).

#### *Behavior of the Local People Among Parks Toward Killing Wildlife To Protect Their Farm*

In another behavior statement about killing wildlife if it came onto their property, no significant difference [ $F(2, 575) = 14.39$ ,  $p = 0.08$ ] was found among CNP, BNP, PWR. The results indicate that the local people in all the parks are equally likely to kill wild animals if they invade their farm (Fig. 3.5).

*Behavior of the Local People Among Parks Toward Killing Wildlife To Support Their family*

There was a significant difference [ $F(2, 575) = 8.18, p < 0.001$ ] found between parks and the behavior of local people toward killing wildlife to support their family. Tukey post-hoc comparisons of the three parks indicate that the residents in PWR ( $M = 1.53, 95\% \text{ CI } [1.4, 1.7]$ ) were more likely to kill wildlife to support their family in comparison to respondents from CNP ( $M = 1.18, 95\% \text{ CI } [1.1, 1.2]$ ),  $P < 0.001$  and BNP ( $M = 1.3, 95\% \text{ CI } [1.2, 1.4]$ ),  $P = 0.02$  (Fig. 3.6). On the other hand, there was no significance difference found between CNP and PRW ( $P = 0.37$ ).

### Discussion

The statistical analysis for EE revealed that participation in EEPs and level of education serves to change people's behavior toward some aspects of biodiversity conservation. The purpose of every EEP is to increase environmental knowledge, environmental attitude, and create intention to change behavior and actual behavioral change (Barney et al., 2005; Orams, 1995, 1997). Thus my result indicates that local people from buffer zones who have participated in any form of EEP were more likely to take care of the biodiversity in their area and also to conserve wildlife for future generations. Rodrigues-Barreiro et al. (2012) state that providing adequate resources and habits in everyday life becomes a very significant aspect for fostering pro-environmental behavior. Similarly, my results showed that there was a significant association between EEPs and behavior of local residents toward making a contribution for conservation

( $p=0.001$ ) and participation in anti-poaching groups ( $p=0.001$ ). Thus, supporting my hypothesis that local people who participated in EEPs will exhibit a positive behavior toward making a contribution for conservation and will participate in anti-poaching activities.

Gender is known to represent a very important factor in conservation; it has been found that women are more active in making-decision for conservation (Agrawal, 2009). My results found that men had a more positive behavior toward biodiversity conservation, and also were more likely to make small contributions for conservation than females (MacDonald & Hara, 1994). The results are similar to a study conducted in the Annapurna Conservation Area (ACA), Nepal, where men held a more favorable conservation behavior attitude than did females (Mehta & Heinen, 2001). One possible explanation for females to be less concerned about the environment could be that they are more inclined to household chores (Tindall et al., 2003), making it difficult for them to participate in EEPs. However, some argue that females should have a more positive conservation behavior than males (Agrawal, 2009; Gilligan, 1982; Tindall et al., 2003). The lack of participation in EEPs could be one of the reasons that women are less supportive of the environment resulting in less favorable conservation behavior.

An increase in environmental knowledge about environmental problems may raise peoples' concern and awareness. However, this knowledge does not necessarily result in behavioral changes (Bamberg & Moser, 2007; Kollmuss & Agyeman, 2002). My results indicate that the income level of the local people residing in a buffer zone was not correlated with participation in EEPs or behavior toward conservation. However,

there was a positive significant difference between income level and their participation in anti-poaching activities and predispositions to kill wildlife to protect their farm.

Individuals give priority to the environment and show ERB only after their needs have been fulfilled for a longer period of time than those individuals with lower income (Olli et al., 2001). Some studies have shown that the higher the level of off-farm income, the higher the level of conservation behavior (Camboni & Napier, 1993; Cary, et al., 2001 and Curtis & De Lacy, 1998). However, that was not the case in my study. Higher income people did not show any association with conserving biodiversity or toward making contributions toward conservation. Yet I found that people with a lower income were more likely to kill wild animals to support their family than those from high income families. Low income people may kill wildlife for meat while people with higher income may kill wildlife to protect their resources. Wildlife may affect the humans by destroying their livestock, by transmitting disease or by attacking them (Chardonnet et al. 2010, Ogada et al. 2003, Woodroffe et al., 2005). These activities of the wildlife, in turn, often encourage people to kill wildlife (Kissui 2008, Woodroffe et al. 2005) and also to ignore the rules designed to protect wildlife (Nyhus et al. 2005). Thus, people living in close proximity with wildlife can have a negative effect to human livelihoods.

Despite having EEPs, the local people collected fuel wood from the forest. This behavior was not affected by the level of education, age, income or gender. Daily activity of local people in CNP includes collection of resources surrounding the park (Matthews et al., 2000; Nagendra et al., 2005; Straede & Helles, 2000). In CNP, the local people are allowed to collect grass and fuel wood three times per year (Straede & Helles, 2000).

However, local people residing in the buffer zone area are heavily dependent on the forest resources within the parks for their livelihood and hence, are inclined to break the rules, especially when no other alternative source exists. Collecting resources during the three day period along with illegal extraction from the park and from resources in buffer zone forests has been noted in CNP (Spiteri & Nepal, 2008a, b). Thus people will continue to trespass the park boundary as alternative sources are inadequate to fulfil their needs.

Behavior of local people toward killing wildlife to support their family and to protect their farm was not affected by their participation in EEPs, gender, education and age. Many households suffer from wildlife damage such as livestock and crop damage, which is strongly associated with a negative attitude toward conservation (Akama et al., 1995; De Boer & Baquete, 1998; Heinen, 1993; Newmark et al., 1993). Benefits provided from the government and other conservation organizations are often unsuccessful in offsetting local costs (Gillingham & Lee, 1999; Adhikari, 2005). Negative conservation behaviors of local people are likely to occur when livelihoods are threatened by crop and livestock damaged by wildlife (Baral & Heinen, 2007). Similarly, in poor areas where people are struggling to meet their basic needs, illegal hunting is often seen as an additional income. Lindsey et al. (2011) explain how important it is to motivate people for conservation, but that it is difficult to offer such benefits that would make it worthwhile for them to stop illegal poaching. Studies show increasing law enforcement (Watson et al., 2013), giving people more power or ownership to obtain a feel of responsibility (Baral & Heinen, 2007), and making them a part of solution (Infield

& Namara, 2001) are some of the solutions to accomplish conservation goals. I believe good communication between the community and the conservation management group will help facilitate conservation goals.

Behavioral differences among the responses of participants from the buffer zone communities adjacent to the three protected area were also documented during this study. Local people residing in the buffer zone adjacent to CNP had a more positive behavior for conservation, were more likely to make a contribution for conservation, and were more involved in anti-poaching activities in comparison to the other two parks. These differences could primarily be because of the larger number of EEPs CNP receives every year compared with the other parks.

Also, there have been objections about the management policies which restrict or limit the livelihood activities of the local people within the protected areas (Bauer, 2003 and Infield, 2003), despite the people showing support for conservation of protected areas (De Boer & Baquete, 1998, Mehta & Heinen, 2001, Mukherjee & Borad, 2004, Picard, 2003 and Weladji et al., 2003). Similarly, I found that despite the fact that the local people showed a positive behavior toward conservation, they were still likely to collect fuel wood from the forest or kill wildlife to support their family. Thus, EEPs are not totally effective and have a long way to go.

## Conclusion

This study tested the connection between participation in EEPs and conservation, i.e., biodiversity conservation, tendency toward making contributions toward conservation, or getting involved in anti-poaching groups. The findings show that local people of the buffer zones who have participated in EEPs showed a more positive behavior toward some different conservation behaviors compared with those who had not participated in EEPs. While Waylen et al. (2010) suggest that interventions must address other drivers and constraints of behavior before making a linkage between local participation and education to measure conservation success, other research suggests that information is necessary for people to become concerned about nature (Jacobson et al., 2006). Thus it can be suggested that identifying the determinants of EEPs can better inform environmental behavior. As the main goal of EE is to change environmental behavior, it is important to understand the basis of environmental attitudes which aid in shaping environmental behavior. It is important to make a clear conceptual framework for environmental attitude in EE studies. This framework can be included in EEPs not only targeting school children but the community as whole. Without understanding the behavior of an individual toward the environment, it is difficult address environmental problems and measure conservation success. As my results showed the link between EEPs and some behaviors toward conservation, it is very important to establish EEPs in every VDC in the parks. Local people in PWR exhibited the least positive behavior toward conservation or toward making any contribution toward conservation activities. The local people were not shy to say that they would kill wild animals to support their

family. There have to be EEPs focusing on these groups to bring a change in their behavior. The number of EEPs in each park is indicative of the behaviors exhibited by participants toward conservation.

The research has shortcomings that could have biased the results. First, most of the survey questions were in English which was later transcribed in Nepali. Some of the Nepali survey was later transcribed in Tharu language by research assistants to clarify some questions to the local respondents. This implies that there could be some mis-interpretation of questions while transcribing the survey. Despite this and other possible shortcomings, I believe that this research helps to understand the link between EEPs and behavior of local people toward conservation.



TABLE 3. 1. Multiple linear regression analysis result for the behavior of local people toward biodiversity conservation in CNP, BNP and PWR. The behavior is measure of 578 respondents with variables EEP and the socio-demographic characteristics.

Variables	SE	Beta	t	Sig.
(Constant)	0.616		15.002	0.001***
EEP	0.91	0.144	3.513	0.001***
Age	0.098	0.017	0.381	0.703
Gender	0.257	-.088	-2.176	0.03*
Income	0.083	0.008	0.185	0.853
Education	0.202	0.252	5.589	0.001***

Note. SE = standard error, EEP = participation in an environmental education program, \* $p < .05$ , \*\*\* $p < .001$

Significance of the model  $F(5,572) = 13.62$ ,  $p = 0.001$ ,  $R^2(0.106)$ , adjusted  $R^2(0.099)$ .

TABLE 3. 2. Multiple linear regression analysis result for the behavior of local people toward making contribution for conservation in CNP, BNP and PWR. The behavior is measure of 578 respondents with variables PEE and the socio-demographic characteristics.

Variables	SE	Beta	t	Sig.
(Constant)	0.481		9.157	0.001***
EEP	0.071	0.309	7.821	0.001***
Age	0.076	0.025	0.596	0.551
Gender	0.2	-.078	-1.98	0.04*
Income	0.065	0.053	1.286	0.199
Education	0.158	0.167	3.831	0.001***

Note. SE = standard error, EEP = participation in an environmental education program, \*p<.05, \*\*\*p<.001

Significance of the model  $F(5,572) = 22.366$ ,  $p = 0.001$ ,  $R^2(0.164)$ , adjusted  $R^2(0.156)$ .

TABLE 3. 3. Multiple linear regression analysis result for the behavior of local people toward anti-poaching group/ activities in CNP, BNP and PWR. The behavior is measure of 578 respondents with variables PEE and the socio-demographic characteristics.

Variables	SE	Beta	t	Sig.
(Constant)	0.445		8.258	0.001***
EEP	0.066	0.291	7.222	0.001***
Age	0.071	-.060	1.388	0.166
Gender	0.185	-.054	-1.362	0.174
Income	0.060	0.099	2.358	0.02*
Education	0.146	0.087	1.963	0.05*

Note. SE = standard error, EEP = participation in an environmental education program,

\*p<.05, \*\*\*p<.001

Significance of the model  $F(5,572) = 17.187$ ,  $p = 0.001$ ,  $R^2(0.131)$ , adjusted  $R^2(0.123)$ .

TABLE 3. 4. Multiple linear regression analysis result for behavior of local people toward killing wildlife to support the family in CNP, BNP and PWR. The behavior is measure of 578 respondents with variables PEE and the socio-demographic characteristics.

Variables	SE	Beta	t	Sig.
(Constant)	0.175		10.030	0.001***
EEP	0.026	0.029	0.687	0.293
Age	0.028	-.067	-1.462	0.144
Gender	0.073	-.053	-1.261	0.208
Income	0.024	0.097	-2.188	0.03*
Education	0.057	-.075	-1.581	0.115

Note. SE = standard error, EEP = participation in an environmental education program, \*p<.05, \*\*\*p<.001

Significance of the model  $F(5,572) = 2.12$ ,  $p = 0.06$ ,  $R^2(0.018)$ , adjusted  $R^2(0.010)$ .

TABLE 3. 5. Multiple linear regression analysis result for behavior local people toward killing of wildlife to protect their farm (i.e. the local residents have killed or would kill any wild animals if it destroyed their farm) in CNP, BNP and PWR. The behavior is measure of 578 respondents with variables PEE and the socio-demographic characteristics.

Variables	SE	Beta	t	Sig.
(Constant)	0.232		7.785	0.001***
EEP	0.034	0.077	1.811	0.071
Age	0.037	-.028	-.61	0.542
Gender	0.097	-.036	-.866	0.387
Income	0.031	0.118	2.665	0.01**
Education	0.076	-.141	-2.996	0.003**

Note. SE = standard error, EEP = participation in an environmental education program, \*\*p<.01, \*\*\*p<.001

Significance of the model  $F(5,572) = 3.573$ ,  $p = 0.003$ ,  $R^2(0.030)$ , adjusted  $R^2(0.022)$ .

TABLE 3. 6 . Multiple linear regression analysis result for behavior of local people toward collecting fuel wood from the forest in three different protected areas. The behavior is measure of 578 respondents with variables PEE and the socio-demographic characteristics.

Variables	SE	Beta	t	Sig.
(Constant)	0.259		11.162	0.001***
EEP	0.038	0.055	1.277	0.202
Age	0.041	-.062	-1.348	0.178
Gender	0.108	0.02	0.466	0.641
Income	0.035	-.029	-.661	0.509
Education	0.085	.012	0.262	0.793

Note. SE = standard error, EEP = participation in an environmental education program, \*\*\*p<.001

Significance of the model  $F(5,572) = 1.32$ ,  $p = 0.254$ ,  $R^2(0.011)$ , adjusted  $R^2(0.003)$ .

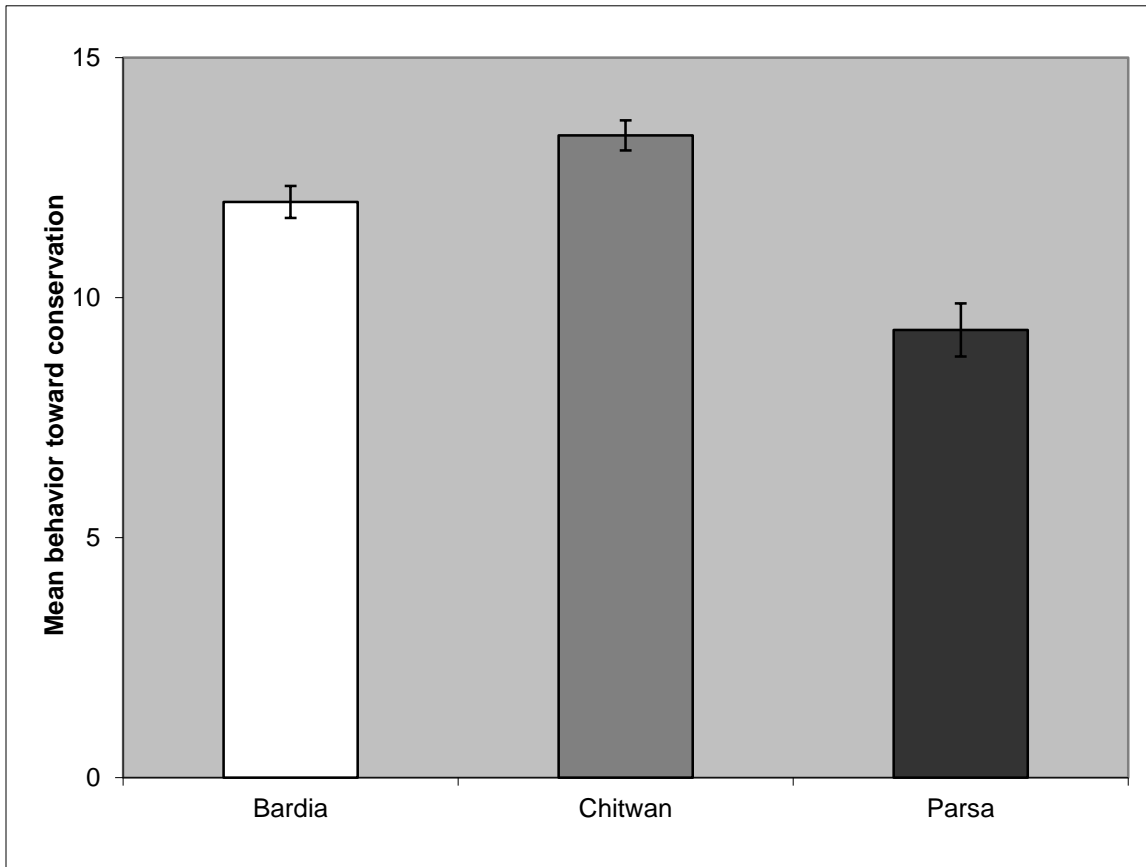


Figure 3.1. Mean comparison of behavior toward conservation among the three protected areas by local residents (N=578). Three statements ranged from *Never* (1) to *Always* (5) and summed to 15. Error bars 95% CI.

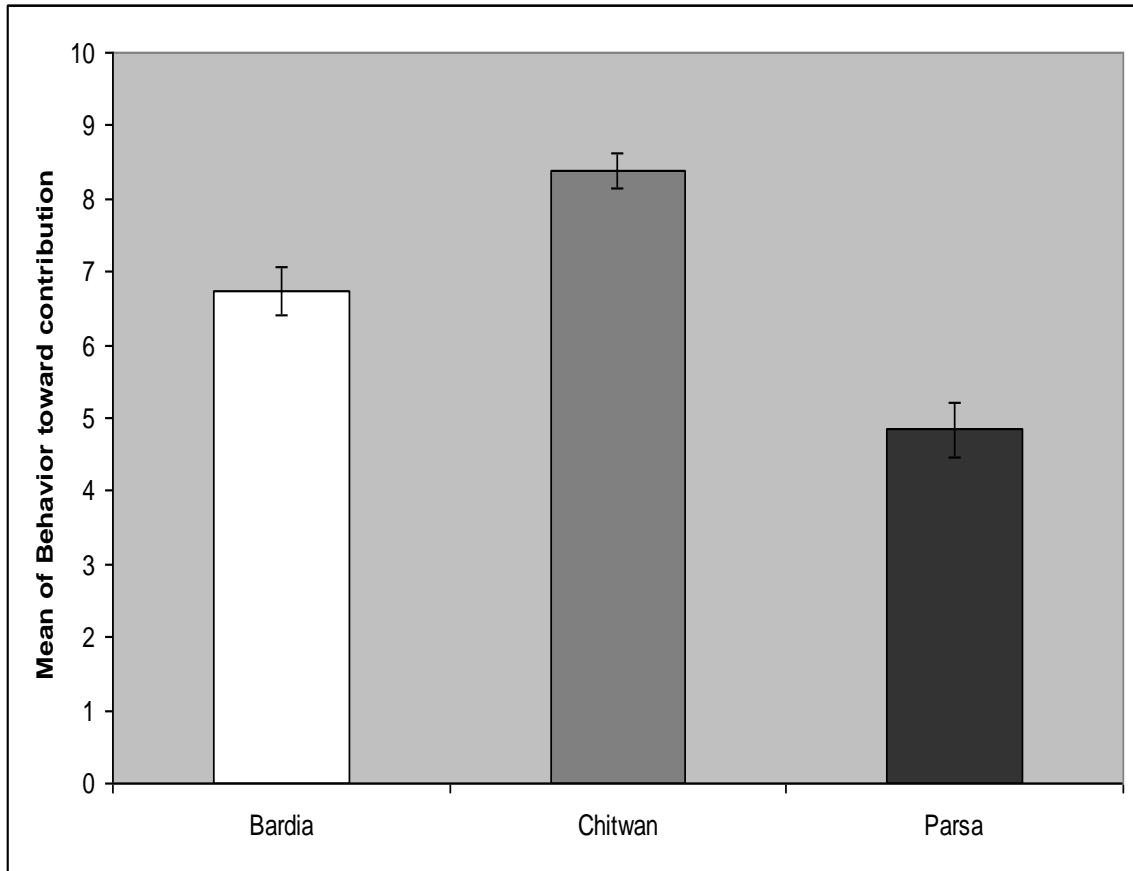


Figure 3.2. Mean comparison of behavior toward making a contribution for conservation among participants from buffer zone communities in three protected areas. Two statements ranged from *Never* (1) to *Always* (5) and summed to 10. Error bars 95% CI.



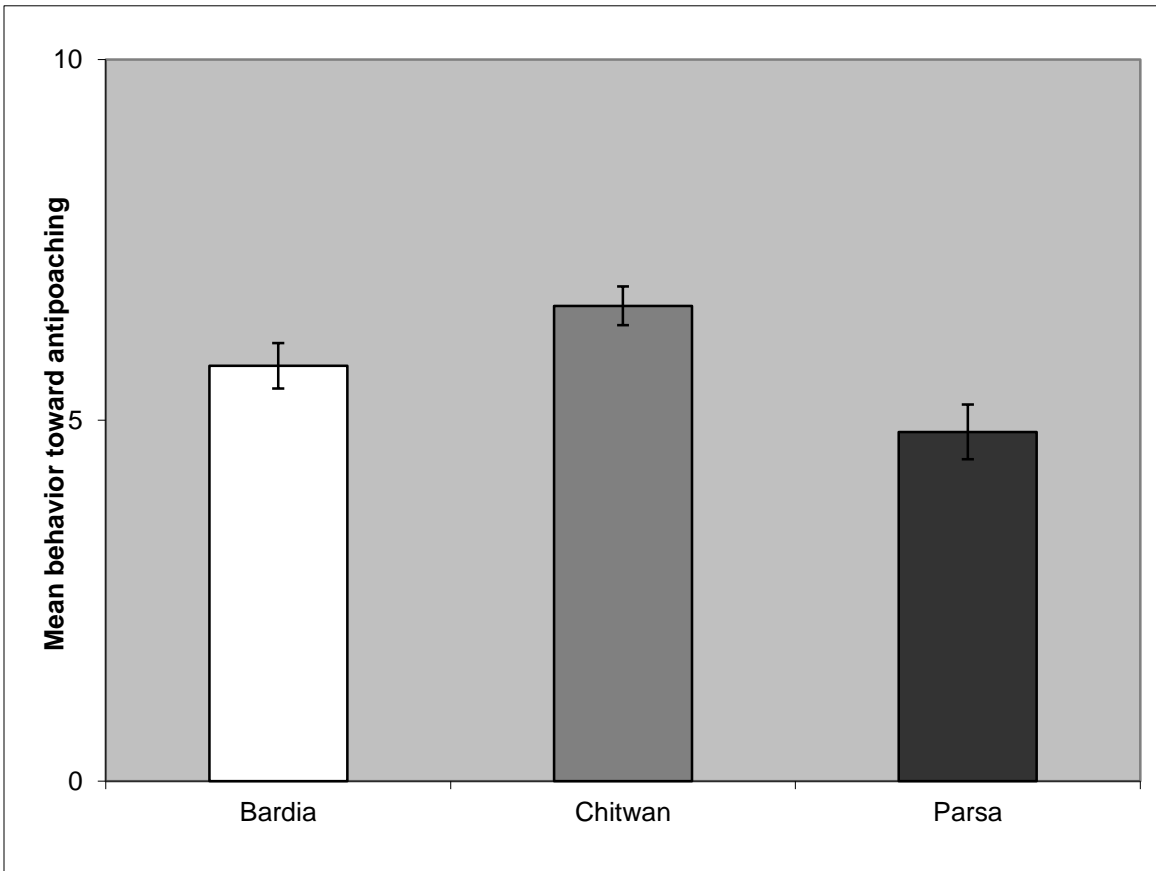
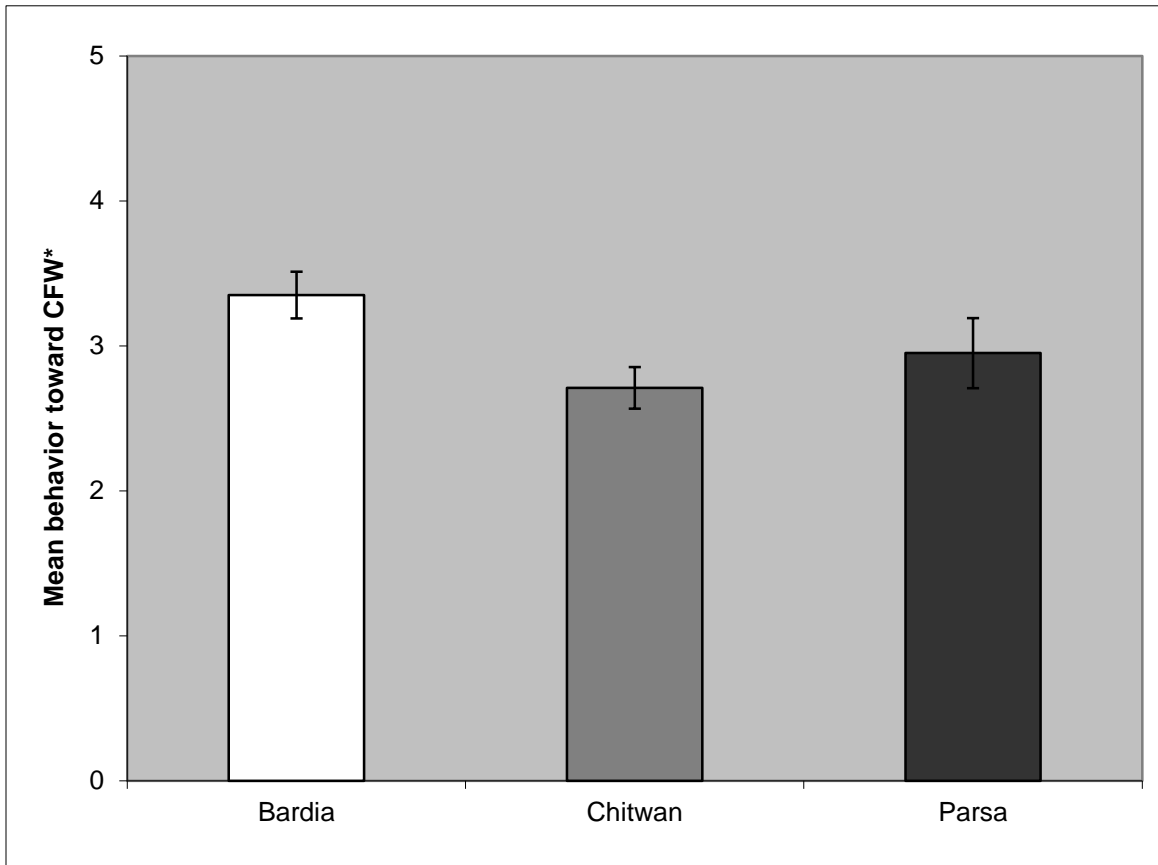
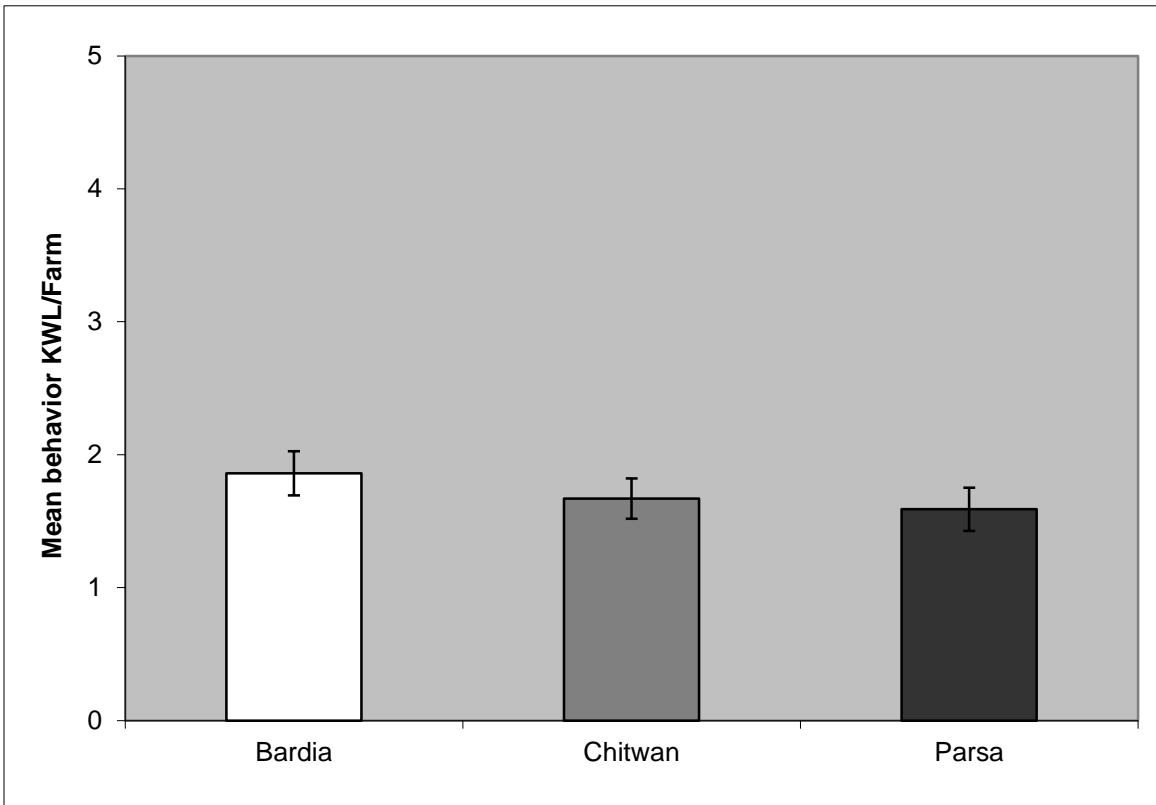


Figure 3.3. Mean comparison of behavior toward anti-poaching group/activities among the local residents in the buffer zone of three protected areas. Two statements ranged from *Never* (1) to *Always* (5) and summed to 10. Error bars 95% CI.



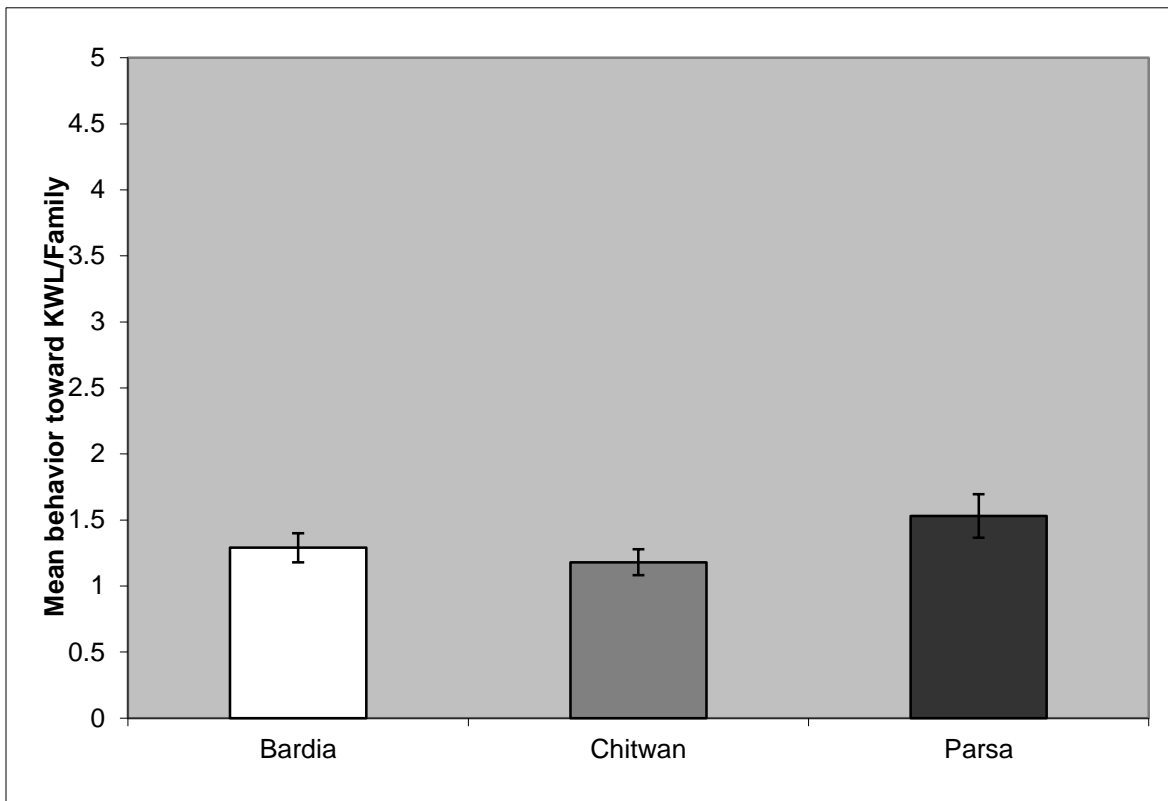
Note. CFW = Collect Fuel Wood

Figure 3.4. Mean comparison of behavior of local residents residing in the buffer zone communities of three protected areas toward collecting fuel wood from the forest. One statement ranged from *Never* (1) to *Always* (5). Error bars 95% CI.



Note. KWL/Farm = Kill wildlife if it comes to their farm.

Figure 3.5. Mean comparison of behavior of local residents toward killing of wildlife if they invade their farm in the buffer zone areas of three protected areas. One statement ranged from *Never* (1) to *Always* (5). Error bars 95% CI.



Note. KWL/Family = Kill wildlife to support family.

Figure 3.6. Mean comparison of behavior of local residents residing in the buffer zone among three protected areas toward killing of wildlife to support their family. One statement ranged from *Never* (1) to *Always* (5). Error bars 95% CI.

## CHAPTER 4

### Educational and Outreach Activities: Their Types and Effect on Biodiversity

#### Conservation

##### Introduction

The term “Biodiversity” was first introduced during the National Forum on Biodiversity, held in Washington DC, in September 1986 (Reaka-Kudla et al., 1996). That symposium in 1986, and the follow-up book *Biodiversity* (Wilson, 1988), edited by biologist E. O. Wilson, introduced this concept defining biodiversity as all hereditarily-based variation at all levels of organization, from the genes within a single local population or species, to the species composing all or part of a local community, and finally to the communities themselves that compose the living parts of the multifarious ecosystems of the world (Reaka-Kudla et al., 1996). Hooper et al. (2005) describes biodiversity as a secure long-term flow of benefits from nature providing resilience from disturbance and environmental changes. Over 193 parties from around the world have committed themselves to the United Nations Convention on Biological Diversity (CBD). Today there are millions of people worldwide who actively support biodiversity conservation and millions who do not (Rands et al., 2010). The World Wide Fund for Nature (WWF) alone has more than 5 million supporters worldwide, and additionally the membership in conservation organizations in developing countries is also growing (Rands et al., 2010). Conservation practices and policies have also shifted over time and achieved variable success (Adams, 2004). A primary strategy to neutralize the extreme

declines in biodiversity has been the establishment and expansion of protected areas (Liu et al., 2010). However, conflicts arise because many people reside in or adjacent to protected areas, and many are dependent on the forest for fuel wood (An et al., 2002), medicinal herbs (Dzerefos & Witkowski, 2001), wildlife (Yitbarek et al., 2013) and other products. Thus tension exists between biodiversity conservation and development of local communities (Maikhuri et al., 2001; Oltremari & Jackson, 2006). Take the example, of greater one-horned rhinoceros (*Rhinoceros unicornis*), conservation in Nepal. Despite a large-scale global effort to conserve the greater one-horned rhinoceros its population continues to decline. Biodiversity conservation is challenging when local people depend on forest resources for subsistence, yet the establishment of reserves restricts access thus leading to conflict (Lewis, 1996; Nepal, 2002). Reports of crop damage and livestock loss caused by wild animals (Mishra, 1997; Newmark et al., 1994; Weladji & Tschuma, 2003) and lack of suitable compensation often result in dissatisfaction with wildlife conservation (Bajracharya et al., 2006; Maikhuri et al., 2001).

Many organizations are providing environmental education programs (EEPs) to engage citizens to think and act in a new way to contribute as environmentally literate residents. Carleton-Hug and Hug (2010) stated that “environmental education (EE) is often delivered through educational programs and seeks to change learner’s cognitive, affective and participatory knowledge, skills and behavior.” Considerable research has been done on the use of attitudes and perceptions of local people to facilitate proper conservation management in protected areas (Allendorf et al., 2007; Cihar & Stankova, 2006; Sekhar, 2003). Also, studies that evaluate the relationship between attitudes and

behavior have found that attitudes are important determinants of environmentally-oriented behaviors (Glasman & Albarracin, 2006). Moreover, there are other social contexts like age, education and gender that may influence an individual's attitudes and beliefs regarding human-environment interactions, thus shaping their behavioral intentions (Dunlap et al., 2000; Stern et al., 1995). Some prior research has shown that appropriate education and outreach can foster sustainable behavior, reduce poaching and vandalism in protected areas, improve public support for conservation, improve compliance with environmental regulations, increase recreation carrying-capacities, and influence policies and decisions that affect the environment and natural resources (Jacobson, 1999; Knudson et al., 1995; Monroe, 2003).

In this study, I evaluated the effectiveness of EEPs given by schools, non-governmental (NGOs) and international non-governmental organizations (INGOs) in the buffer zone communities adjacent to Chitwan National Park (CNP), Bardia National Park (BNP) and Parsa Wildlife Reserve (PWR) of Nepal. The main goals were to: 1) measure the attitude of local people who have participated in EEPs given by schools and NGOs/INGOs toward biodiversity conservation in each park; 2) measure the behavior of local people who have participated in EEPs given by schools and NGOs/INGOs toward biodiversity conservation in each park; 3) propose potentially useful recommendations for institution of effective EEPs.

## *Overview of EEPs by Different Organizations*

### *World Wide Fund for Nature (WWF) Nepal:*

Conservation education is an integral part of all the projects and programs at WWF Nepal. WWF Nepal along with various partners has initiated and endorsed awareness and capacity-building programs at the local level. These programs have helped people to conserve Nepal's biodiversity in a way that is ecologically viable, economically beneficial and socially equitable (WWF 2010). The conservation education programs by WWF Nepal are designed for school children, teachers, community members, and other target groups to enhance their decision-making capacities for conservation and sustainable development. Eco-club formation, a conservation awareness program, promotion of conservation education in school curriculums, non-formal education and production of a conservation education resources book are some of the conservation activities engaged in by WWF Nepal (P. B. Kunwar, June 2009, personal communication). According to Jagadish Parajuli (Education Officer WWF Nepal, personal communication), the organization gives schools funds to form eco-clubs, and in turn the eco-clubs conduct EEPs and activities. The programs are evaluated by the project staff that visit and monitor various activities performed by the eco-clubs. In CNP, WWF has partners with 188 school eco-clubs, and conducts programs monthly (A.S. Ansari, personal communication, March 2012). In BNP, WWF interacts with 92 schools (J. Parajuli, personal communication, April 2012), while only a few programs have been conducted in PWR (N. Shrestha, personal communication, April 2012).



*National Trust for Nature Conservation (NTNC):*

The National Trust for Nature Conservation (NTNC) was established in 1982 by a Legislative Act as an autonomous and not-for-profit organization, mandated to work in the field of nature conservation in Nepal. The Trust's activities in the lowlands are based in and around CNP, BNP and the Shuklaphanta Wildlife Reserve located in the central, western and far-western development regions of Nepal, and are being administered through the Biodiversity Conservation Center (BCC) in Chitwan, the Bardia Conservation Program (BCP) in Bardia and the Suklaphanta Conservation Program (SCP) in Kanchanpur (NTNC 2009). BCP has various programs that target school students, user groups and other community members. Eco-clubs formed with project support organize a range of conservation activities including rallies, a sign campaign, street dramas, a poem competition, folk songs, art competition and a wall magazine publication to disseminate conservation messages. NTNC has partnered with 55 schools as of 2010 in CNP which conduct eco-club programs every month. Similarly, two-to-three programs are conducted in the communities every year by NTNC. NTNC has a museum in CNP where about 40,000 visitors come per year to study about conservation (B.R. Lamichanne, personal communication, March 2012). NTNC also has partnered with 50 schools in BNP where monthly conservation programs are done (R. Kadariya, personal communication, March 2012). In 2009, 11 EEPs were conducted in BNP in which there was participation from 40 communities.

*Department of National Parks and Wildlife Conservation (DNPWC):*

One of the most important mandates of the Department of National Parks and Wildlife Conservation (DNPWC) is to raise conservation awareness among the local public to save forests, wildlife and the environment. The Department and the protected areas under it celebrate special days and weeks (World Wetland Day, International Mountain Day, Wildlife Week, International Day for Biological Diversity, World Environment Day) with various activities that are aimed to raise awareness of the importance of biological diversity and the need for conservation. National parks and wildlife reserves organize public meetings and broadcast conservation messages through local and national mass media such as radio, television and local FM stations. Various programs of conservation education such as a school program, video shows, wildlife games, competitive events like elocution, essay, quiz, art, etc., that target youth and school children are being conducted in buffer zones. DNPWC has partnered with over 100 schools to conduct EEPs (K.J. Kunwar, personal communication, May 2012). Today over 88 schools have partnered with DNPWC to conduct EE programs. DNPWC conducts about one or two education programs yearly in the communities (T.R. Adhikari, personal communication, March 2012). There is no definite number of programs done in PWR, but according to N. Shrestha (User Group Committee, PWR, personal communication), in 2011 EEPs were conducted in four schools.

## Methods

### *Study Area*

The study was conducted in three different protected areas of Nepal: BNP, CNP and PWR (Figs. 4.1, 4.2, 4.3). All three protected areas fall in the Terai Arc Landscape (TAL) of Nepal. Spreading over more than 49,500 km<sup>2</sup> along the outer foothills of the Himalayas from the Bagmati River in eastern Nepal to the Yamuna River of India in the west, the TAL plays an important role in maintaining linkage among 11 protected areas in Nepal and India. In Nepal, the TAL encompasses 23,129 km<sup>2</sup> comprised of 14 districts that include 75 percent of the remaining forests of lowland Nepal including the Churia hills and four protected areas (TAL, 2002). The Terai Arc is inhabited by three of the world's most endangered charismatic species, the Bengal tiger (*Panthera tigris tigris*), the greater one-horned rhinoceros (*Rhinoceros unicornis*) and the Asian elephant (*Elephas maximus*).

Bardia, Chitwan and Parsa were chosen because I assumed each park would represent different levels of prior experience with EEPs. For example, Parsa is remote compared to Chitwan and Bardia, and in general has received less attention from government and non-governmental organizations. Also, in a comparison of Chitwan to Bardia, Chitwan is listed as a World Heritage Site and also was the first national park recognized in Nepal, thus it has received more attention nationally and internationally than Bardia.

### Bardia National Park

Bardia National Park is the largest park in the lowland Terai and covers an area of 968 km<sup>2</sup> (Fig. 4.1). The park is situated in Nepal's western Terai and was established to protect representative ecosystems and conserve tigers and their prey species (DNPWC, 2006). Initially, a small area was delineated as the Royal Karnali Wildlife Reserve in 1976. In 1982 it was renamed as Bardia Wildlife Reserve, and in 1984 it was expanded to its current size. The reserve was given the status of a national park in 1988. In 1996, 327 km<sup>2</sup> of forest and private land near the park was declared as a buffer zone. It includes 17 VDCs in two districts, and about 117,633 people live in 16,619 households (DNPWC, 2011). Greater one-horned rhinoceros were translocated there from Chitwan National Park in 1986, 1991 and 1999 (DNPWC, 2006). With 86 species of mammals, 550 bird species, 47 herpetofauna, 126 species of fish and over 2100 flowering plant species, species diversity is high in BNP (Baral et al., 2003). Seven major vegetation types have been identified inside the park, including four types of forest and three different grassland habitats. About 70% of the forest consists of sal trees (*Shorea robusta*) with a mixture of grassland and riverine forest (Dinerstein, 1979; Pokharel, 1993). The park is home to endangered animals such as the Bengal tiger, Asian elephant, greater one-horned rhinoceros, swamp deer (*Rucervus duvaucelii*), and black buck (*Antelope cervicapra*). Other endangered species include gharial (*Gavialis gangeticus*), marsh mugger (*Crocodylus palustris*) and Gangetic dolphin (*Platanista gangetica*). Since the early 1990s, there have been several ongoing community-based conservation programs funded

by a number of international donors (Heinen & Mehta, 2000; Heinen & Rayamajhi, 2001).

### *Chitwan National Park*

Established in 1973, CNP was the first national park established in Nepal. CNP is one of the world's most unique protected areas, renowned for its variety and abundance of precious and rare fauna and flora, as well as its rich cultural heritage (Mishra & Jefferies, 1991). CNP covers 932 km<sup>2</sup> and is situated in the subtropical inner Terai lowlands of south-central Nepal (Fig. 4.2). The park boundaries are delineated by the Narayani and Rapti rivers in the north and west, and the Reu River and Someshwor Hills in the south and south-west. It shares its eastern border with Parsa Wildlife Reserve. In 1996 the buffer zone was established in response to the need for landscape-scale conservation and also to address the conflicts between communities and the park (Straede & Helles, 2000). The buffer zone spreads over 750 km<sup>2</sup> with four districts, 37 VDCs and over 250,000 people live in the area surrounding the park (DNPWC, 2011). CNP supports the highest density of tigers in Asia, features a high ungulate and carnivore diversity, and provides habitat for several endangered species (Dinerstein, 2003; Nepal & Weber, 1993). The park was initially formed under a people-free approach, and all communities were consequently resettled outside the boundaries of the park (McLean & Straede, 2003). DNPWC and its non-governmental partners have since initiated programs to support conservation within and around CNP and improve the economic conditions for local people. Training, park infrastructure improvements, revenue sharing and community forestry are among the capacity-building projects undertaken in the buffer

zone (DNPWC 2006). The park and the local people also jointly initiate community development activities and manage natural resources in the buffer zone. The government of Nepal has made a provision to reinvest 30-50% of the park revenue for community development in the buffer zone (DNPWC, 2006). However, research has shown that the exploitation of fuelwood in CNP is unsustainable, challenging the good park-people relations (Straede & Helles, 2000).

### Parsa Wildlife Reserve

Established in 1984, Parsa Wildlife Reserve (PWR) is situated in the Terai lowlands with an area of 499 km<sup>2</sup> adjoining Chitwan National Park in the west (Fig. 4.3). The government of Nepal officially declared the buffer zone of Parsa Wildlife Reserve on 27 June 2005. The buffer zone covers an area of 298 km<sup>2</sup>. It includes 11 VDCs in three districts and around 85,000 people live in 13,447 households (DNPWC, 2011). The reserve has a sub-tropical monsoon climate. The Churiya hills dominate from east to west ranging from 750 m to 950 m in elevation (DNPWC, 2006). The forests of the reserve consist of tropical and subtropical vegetation, 90% of which are sal trees. Other trees found are sissou (*Dalbergia sissoo*) and the silk cotton tree (*Bombax cebia*). The reserve supports a good population of the Asian elephant, tiger, leopard (*Panthera pardus*), sloth bear (*Melursus ursinus*), gaur (*Bos gaurus*), and Blue bull (*Boselaphus tragocamelus*). There are about 300 species of birds found in the reserve. Some of the common birds include giant hornbill (*Buceros bicornis*), peafowl (*Pavo cristatus*), red jungle fowl (*Gallus gallus*), and woodpeckers (*Picus squamatus*) (DNPWC, 2006).

### *Data Collection*

Sixteen VDC's were selected representing the three protected areas from diverse social and economic strata (Chapter 2). In Bardia, eight VDC's (Neulapur, Shivpur, Baniyabar, Magaragadi, Dhadhwar, Thakurdwara, Bakuwa & Bagnaha) (Fig 4.1), in Chitwan, four VDC's (Kumrose, Bacchauli, Gardi & Meghauri) (Fig 4.2), and in Parsa, four VDC's (Nirmal Basti, Mahadev Patti, Amlekhjung & Suwarnapur) (Fig 4.3) were selected. Eight VDC's were chosen in Bardia as compared to Chitwan and Parsa since Bardia is the largest National Park in the Terai region.

Field research was conducted by questionnaire surveys. Among the N = 600, only 578 surveys (BNP N = 178, CNP N = 240 and PWR N = 149) were included in the analysis; 22 were excluded because of some missing values. One adult ( $\geq 18$  years old) in each household was interviewed. The population within each VDC was randomly selected based on the ethnicity, gender, income, etc. In the absence of the adult household member, a neighboring household was selected to produce the sample size required for that respective VDC. The respondents were all local people occupying the buffer zone communities, and the questionnaire was self-administered. Each questionnaire (Appendix B, Section A) was divided into several parts: 1) economic activities such as annual average income; 2) ethno-religious background; 3) socio-demographic variables such as gender, age, occupation; 4) education level; and 5) conservation attitude (attitudes toward conservation). For conservation attitudes, a series of statements was presented (Appendix B, Section B), and respondents were asked to choose among alternative answers (for example: "strongly agree"/ "agree"/ "neutral"/ "strongly disagree" and "disagree").

Similarly for behavior, a series of behavior statements was presented (Appendix B, Section C) and respondents were asked to choose among alternative answers (for example: “never”/ “seldom”/ “occasionally”/ “often”/ and “always”). Also for participation in EEPs, respondents were asked whether the participation was in school or NGOs/INGOs (Appendix B, Section D). Questionnaires were prepared in English, but were translated into Nepali. Taking into account the high illiteracy rate in rural Nepal, questions were clarified by the researcher or research assistant if the respondents had any trouble or doubt understanding the questions.

#### *Instrument*

Researchers have developed various attitude and behavior scales in context to conservation. Among many, Maloney et al. (1975) with revised 45 items developed an Ecological Attitude-Knowledge Scale with four subscales. Others include the 16 items Environmental Concern Scale by Wiegel & Wiegel (1978) and an 8 items Ecological Social Paradigm Scale by Dunlap et al. (1992). Similarly, a 12 items Environmental Paradigm Scale by Dunlap & Van Liere’s (1978), which was later revised by Dunlap et al. (2000) and renamed as the New Ecological Paradigm (NEP) scale, has been used widely to measure environmental concern. Orams (1997) compared the attitude of participant and nonparticipant visitors in an EEP using a three items scale. Similarly, a nine items scale was used by Infield and Namara (2001) to measure community attitudes and behavior toward conservation in Lake Mburo National Park, Uganda. These efforts, however, have certain limitations. For example, environmental attitude scales are commonly focused on ecological aspects of the environment. For my research, some



items from Kaiser et al. (1999) and Thapa (2010) were revised and some were added to develop three subscales with 14 items to measure the attitude of local people residing in buffer zones bordering BNP, CNP and PWR (See Chapter 2). The attitude scale for biodiversity conservation was developed using three subscales (attitudes toward biodiversity conservation, attitudes toward the establishment of buffer zone and attitudes toward wildlife conservation) consisting of three or more items related to each subscale. The scales were developed to make the instrument locally relevant with inputs from park staff, local residents, and NGOs and INGOs officers (personal communications, 2011). Fourteen items were used during the survey, but based on the feedback from the respondents residing in the buffer zone of the protected areas, only 10 items were used for analysis. There were three items in the category attitudes toward biodiversity conservation, four items in attitudes toward the establishment of buffer zones, and three items in attitudes toward wildlife conservation. Attitude toward wildlife was treated as a separate category since the local people of the buffer zone considered rhino and tiger as wildlife and all the others as biodiversity. Each item was measured on a 5-point Likert scale with responses ranging from *strongly disagree* (1) to *strongly agree* (5).

Similar to attitude, much research has been done to study environmental behavior from several theoretical perspectives. Among them, value-belief-norm theory states that performance or pro-environmental behavior is based on personal values, beliefs about environmental condition and individual agency (Stern et al., 1995; Stern, 2000). The theory of planned behavior uses intention as a composite of attitudes, norms and perceived behavior control to predict pro-environmental behavior (Ajzen, 1985). Some

self-developed scales have been used to assess environmental behavior (Beaumont, 2001; Orams, 1997; Tarrant & Green, 1999). A five-item scale to measure people's behavior after being exposed to EEPs was developed by Orams (1997). The items in the scale included behaviors like: "became more involved in environmental issues" to "make a donation to an environmental organization." For the purpose of my study, I adapted some items such as "I am a member of an environmental organization" and "I contribute financially to environmental organizations" from Kaiser and Wilson (2004) and Kaiser et al. (2007). With the addition of items related to poaching and other environmental behavior, 13 behavioral items were developed. The behavioral items were measured using a 5-point Likert scale ranging from *never* (1) to *always* (5). However, only 10 items were used for analysis due to the similarity in the statement of two items and unwillingness of the participants to answer some statements.

The scale for participation in EEPs was based on conversation with the local people of buffer zone communities about how frequently they participated in EEPs (personal communications, 2011). The participation in EEPs was measured in 5-point Likert scale ranging from *never* (1) to *always* (5). The items for EEPs included different activities conducted by different institutions like schools, governmental organizations, non-governmental organizations and international non-governmental organizations. The items were developed with communication with officers of NGOs and INGOs (personal communications, 2011).

### *Data Analysis*

Data were analyzed with SPSS version 21. Attitude was measured by 10 related questions, and similarly behavior was measured using 13 related questions. Multiple linear regression was used to determine the correlation between the dependent variable, i.e., conservation attitude and conservation behavior and the independent variable, i.e., degree of participation in an EEP conducted by schools and NGOs/INGOs. Principal component analysis with varimax was conducted to explore the dimensions of the items in the attitudes of local people. The analysis revealed a three-component solution that accounted for 60% of the total variance in the data (Chapter 2, Table 2.3). The first component, attitudes of local people toward biodiversity conservation ( $\alpha = 0.72$ ), consisted of three items related to attitudes of local people toward general biodiversity (Appendix B: Section B Questions 1, 2, and 4). The second component, attitudes of local people toward the establishment of buffer zone ( $\alpha = 0.71$ ), consisted of four functions related to buffer zones (Appendix B: Section B Questions 3, 5, 8 and 9). The third component, attitudes toward wildlife ( $\alpha = 0.73$ ) consisted of three functions that are related to the conservation of wildlife (Appendix B: Section B Questions 10, 11 and 12) (See Chapter 2). Similarly, to determine whether participation in EEPs carried out by schools and NGOs/INGOs changed the behavior of the respondents toward conservation, behavior was grouped under six categories: 1) behavior toward general biodiversity ( $\alpha = 0.76$ ) (Appendix B: Section C Questions 9, 11 and 13); 2) behavior toward making a contribution for conservation (Appendix B: Section C Questions 7 and 8); 3) behavior toward anti-poaching group/activity (Appendix B: Section C Questions 4 and 5); 4)

behavior toward collecting fuel wood (Appendix B: Section C Question 2); 5) behavior toward killing wildlife to support family (Appendix B: Section C Question 12); and 6) behavior toward killing wildlife to protect their property/farm (Appendix B: Section C Question 3). Participation in EEPs by schools (Appendix B: Section D Question 2) and NGOs/INGOs (Appendix B: Section D Question 3 and 4) were also measured by a 5-point Likert scale ranging from *never* (1) to *always* (5).

## Results

### *Respondents' Characteristics*

A final sample of 578 respondents were surveyed (BNP = 189, CNP = 240 and PWR = 149), among which a little over half were male participants in BNP and CNP. PWR had almost equal participants of males and females in the survey. The age of all participants ranged from 18 years to 75 years in BNP and CNP and from 18 to 88 in PWR. Income level was high in CNP ( $\bar{X}$  = NRs. 90,450) compared to BNP and PWR. The local people in PWR had lowest income with a minimum of NRs. 6,000 annually. PWR also had the lowest literacy rate; 60% of the local residents had not attended school compared to CNP and PWR. 25% of the respondents were illiterate in CNP and 33% in BNP (Table 4.1).

### *Attitudes toward Biodiversity Conservation*

Attitudes of local people residing in the buffer zone of BNP who participated in EEPs conducted by schools did not change ( $t = -.83, p = 0.4$ ) with regard to biodiversity conservation. However, local people who had participated in EEPs given by

NGOs/INGOs had a more positive attitude toward biodiversity compared to those who had not participated ( $t = 3.89, p < 0.001$ ) (Table 4.2). Respondents in CNP who had been exposed to EEPs in schools expressed positive attitudes toward biodiversity conservation ( $t = 2.12, p < 0.05$ ) (Table 4.2) compared with those who had not. However, no positive attitudes were found between the local people who participated in EEPs given by NGOs/INGOs and those who did not ( $t = -0.26, p = 0.79$ ). These results were the opposite of those found in BNP buffer zones.

In PWR, similar to BNP, no positive attitude toward biodiversity conservation was found between the local residents who had participated in EEPs in school ( $t = 1.58, p = 0.12$ ) and those who had not. On the other hand, participants who were exposed to EEPs given by NGOs/INGOs reported a lower attitude toward biodiversity conservation than those who had not participated in these programs ( $t = -2.67, p < 0.05$ ) (Table 4.2). These results yielded a third different outcome of responses in attitude toward biodiversity conservation compared with respondents from the other protected areas.

#### *Attitudes toward Establishment of Buffer Zones*

Attitudes of local people in BNP toward the establishment of buffer zones were changed after their participation in school-based EEPs ( $t = 2.45, p < 0.05$ ) and NGO/INGO-based EEPs ( $t = 2.22, p < 0.05$ ) (Table 4.3). However, the attitudes of local people in CNP who participated in EEPs conducted by schools ( $t = 1.92, p = 0.06$ ) (Table 4.3) did not show any attitude change toward the establishment of buffer zones. However, local people of CNP who had been exposed to EEPs by NGOs/INGOs ( $t = -2.49, p < 0.05$ ) did show a significantly negative change in the attitude toward establishment of

buffer zones. In PWR, neither participation in EEPs given in schools nor those given by NGOs/INGOs (Table 4.3) resulted in any change of attitude toward the establishment of buffer zones.

#### *Attitude toward Wildlife Conservation*

In BNP, positive attitudes were found in local people who had participated in EEPs given by NGOs/INGOs toward the conservation of wildlife ( $t = 2.21, p < 0.05$ ) (Table 4.4). However, local people who had been exposed to EEPs in schools were less likely to have a positive attitude toward animals compared with those who had not participated in these programs ( $t = -2.09, p < 0.05$ ). The local residents of CNP who had participated in EEPs by NGOs/INGOs did not show a positive attitude toward wildlife conservation ( $t = -0.32, p = 0.75$ ) (Table 4.4) compared with those who had not participated. However, there was a significant positive difference in attitudes found ( $t = 2.27, p < 0.05$ ) between the people who had participated in EEPs given by schools and those who had not participated in EEPs given by schools. On the other hand, EEPs given by the schools or by NGOs/INGOs were ineffective in determining the attitudes of the residents in PWR toward wildlife conservation.

#### *Behavior of Local People Toward Biodiversity Conservation*

In BNP, local people expressed positive conservation behavior toward biodiversity conservation ( $t = 4.85, p < 0.001$ ) (Table 4.5) who took EEPs given by NGOs/INGOs. On the contrary, local residents receiving EEPs in schools led participants to behave negatively toward biodiversity conservation when compared with those who had not been exposed to this training ( $t = -3.49, p < 0.001$ ). Residents residing in the

buffer zone adjacent to CNP who had participated in EEPs given by schools had a positive conservation behavior ( $t = 2.18, p < 0.05$ ) compared with residents who had not been exposed to EEPs. Yet, there was no positive behavior ( $t = -0.29, p = 0.76$ ) (Table 4.5) found between the local people who had participated in EEPs given by NGOs/INGOs and those who had not participated in their behavior toward biodiversity conservation. EEPs delivered by schools and by NGOs/INGOs had no effect upon the behavior of PWR residents toward biodiversity conservation.

*Behavior of Local People Toward Contribution for Conservation*

The local people residing in the buffer zone of BNP ( $t = 4.29, p < 0.001$ ) (Table 4.6) and CNP ( $t = 2.58, p < 0.05$ ) (Table 4.6) who had attended EEPs given by NGOs/INGOs were more likely to make a contribution for conservation than those who had not participated in EEPs. However, local people who had received EEPs through schools did not show any positive behavior toward making a contribution for conservation in BNP ( $t = 1.49, p = 0.14$ ) and CNP ( $t = 1.08, p = 0.28$ ). In PWR, the local people residing in the buffer zone did not show any positive behavior toward making a contribution for conservation among those who had attended EEPs from schools or those who had attended EEPs given by NGOs/INGOs (Table 4.6).

*Behavior of Local People Toward Anti-poaching Activities/groups*

The local people in BNP did not get involved in anti-poaching activities/groups whether they took EEPs from schools or NGOs/INGOs or had not participated in EEPs (Table 4.7). However, in CNP local people who received EEPs given by NGOs/INGOs ( $t = 4.29, p < 0.001$ ) (Table 4.7) were more likely to participate in anti-poaching groups

compared with local people who had not participated in EEPs. Local people who had or had not participated in EEPs given by schools were equally likely to have participated in an anti-poaching group. On the contrary, local people from PWR who participated in EEPs given by schools were more likely to have joined anti-poaching activities/groups compared with those who had not participated in such programs ( $t = 2.02, p < 0.05$ ). However, those who participated in EEPs given by NGOs/INGOs did not show involvement in anti-poaching activities/groups.

*Behavior of Local People Toward Collecting Fuel Wood from the Forest*

Local people in BNP who had attended EEPs given by schools were more likely to have collected fuel wood from the forest ( $t = 2.38, p < 0.05$ ) (Table 4.8) than those without this experience. However, EEPs delivered by NGOs/INGOs did not have any effect on behavior of collecting fuel woods. However, in CNP and PWR collecting fuel wood from the forest occurred as frequently among respondents who had either received EEPs from schools or NGOs as those who had not had those experiences.

*Behavior of Local People Toward Killing Wildlife to Support Family or to Protect their Farm*

In all the three protected areas, participants were equally likely to kill wildlife to support their family whether or not they had participated in EEPs given by schools or NGOs/INGOs (Table 4.9).

In BNP, local people residing in the buffer zone who had attended EEPs at school were more likely to kill wildlife to protect their farm ( $t = 2.22, p < 0.05$ ) (Table 4.10) than those without EEPs. However, no association was found among those who had



attended EEPs from NGOs/INGOs and their likelihood to kill wildlife. In CNP, participation in EEPs in either schools or from NGOs/INGOs did not influence the behavior of killing wildlife in order to protect their farm (Table 4.10). On the other hand in PWR, participants of EEPs given by NGOs/INGOs were more likely to kill wildlife to protect their farm than those without EEPs ( $t = 3.54, p < 0.001$ ) (Table 4.10). On the other hand, local people who received EEPs from schools were less likely to kill wildlife to protect their farm than those who had not participated in school EEPs ( $t = -2.63, p < 0.05$ ).

## Discussion

Conservation is a high priority in Nepal where people are generally impoverished (The World Bank, 2013) and also have a relatively low literacy rate (CIA, 2013). Traditional approaches in conservation such as creation of national parks have evolved to include awareness of the diverse benefits provided by protected areas and also the need to address the opportunity costs of conservation among rural poor (Rands et al., 2010). Environmental education has acted as an avenue for enhancing the understanding of environmental issues and affective commitment to the environment (O'Brien & Stoner, 1987). Education is one of the factors among many which influence people's attitude and support for conservation (Mehta & Heinen, 2001). However, my findings did not support EEPs alone to be a significant predictor of conservation attitudes and behaviors. I found only small percentage of people attending EEPs given by NGOs/INGOs had a positive conservation attitude toward biodiversity conservation, establishment of buffer zones and

wildlife preservation compared to those who had not attended the programs (i.e., only 3 out of 18 responses was positive). This result indicates that the change in the knowledge and attitude toward conservation was small. One plausible explanation can be that the EEPs did not reach an appropriate target audience. The programs conducted by NGOs/INGOs usually target communities involving youth, elder people and women. The EEPs approach used by NGOs/INGOs for biodiversity conservation is usually through the active participation of local people in local resource management and improving their economic welfare (Songorwa, 1999; Infield and Namara, 2001; Mehta and Heinen, 2001). In my study it is clear that EEPs provided by NGOs/INGOs have failed to convince the local people about the benefits of conservation. The perception of a local community toward protected areas is influenced by the kinds of interactions people have with them which eventually effect conservation (Allendorf et al., 2006; Ormsby & Kaplin, 2005; Ramakrishnan, 2007). The feeling of losing what once was theirs is one of the perceived reasons for posing a negative attitude by the local people, since many national parks leave communities out of their planning activities (Mukanjari et al., 2013). Similarly, EEPs provided by schools did not make a significant impact on conservation attitude. Only a small percentage of people favored positive conservation attitudes in the three different protected areas (i.e, only 3 out of 18 responses was positive). While many EEPs are conducted through schools in the form of eco-clubs, such programs are able to reach only a small group of people. Attitudes are very difficult to change over a short period of time. In Nepal the EEPs conducted by schools mostly include students from high school (8<sup>th</sup> grade), the students leave school in two years and the program becomes

less effective. I suggest that to accomplish a long lasting, significant and effective change in the attitude of students, it is necessary to implement a range of teaching strategies that address student's knowledge and attitude orientations as part of an integrated long-term program.

Where local people rely heavily on forests for sustenance in Southeast Asia (Rao et al., 2002; Sodhi et al., 2008), many conservation programs including protected areas have been relatively unsuccessful (Curran et al., 2004; Linkie et al., 2008). In my findings, EEPs given by both schools and NGOs/INGOs failed to show a consistent positive behavior change toward conservation by the local people residing in the buffer zone. However, the local residents who had participated in EEPs given by NGOs/INGOs did make some contribution for conservation compared with those who did not participate in EEPs. This result shows that the local NGOs and INGOs are able to persuade the local communities about how small contributions can make big change in conservation. The EEPs from these organizations generally focus on economic benefits related to wildlife conservation which draws the attention of the local people. On the other hand, the insignificant relationship between the behavior of collecting fuel wood, whether the participation in EEPs was from schools or NGOs/INGOs, could be attributed to the lack of alternative resources in their area. Fuel wood is a very important resource for the local people in BNP, CNP and PWR. Although the local people are allowed to collect fuel wood from the forest for few days each year (Heinen & Kattel, 1992), the amount they can gather is insufficient for them for an entire a year. Lack of alternative

resources forces them to illegally collect fuel wood from the forest, thus they express a negative conservation behavior.

Conflicts between humans and wildlife represent one of the most critical threats faced by many wildlife species today. Many studies have shown that wildlife is killed as a result of conflict with human activities, especially when it comes to livestock production; farmers kill wildlife to minimize actual or perceived losses from depredation (Bagchi & Mishra, 2006; Mishra & Fitzherbert, 2004; Oli et al., 1994; Zimmermann et al., 2005). My results indicate that participation in EEPs from schools or NGOs/INGOs did not affect the behavior of local people when it came to killing wildlife to support their family. Local people who attended EEPs at schools were as likely to kill wildlife as the ones who had not participated in EEPs at schools or NGOs/INGOs. The case was similar where EEPs did not affect the likelihood of killing wildlife in order to protect their farm. People with both low and high income levels reside in the buffer zone, but both suffer from crop damage and loss of livestock due to wildlife. It is important to outline the benefits of wildlife to the communities. Wildlife ranching in Zambia is an example where communities have benefitted from wildlife ranching. The ranching industry included several benefits such as employment and business relations (Lindsey et al., 2013). In CNP, eco-tourism has provided opportunities for self-employment. Many people around the national park have established new businesses with low investments, e.g. opening souvenir shops, small-scale poultry farms, and small bed-and-breakfast-type inns (Nyupane & Poudel, 2011). Also, CNP received \$816,571 as revenue, 90% of which comes from tourism, in fiscal year 2007–2008 (DNPWC, 2008). Of this revenue, 34.77%

(\$283,934) was allocated to buffer zone development. The EEPs given by both schools and NGOs/INGOs should be able to highlight such programs where it has been successful and reduced illegal hunting.

### Conclusion and recommendations

I conclude that EEPs alone cannot be a predictor for a positive conservation attitude and conservation behavior. However, my study cannot address whether attitudes and behaviors that benefited conservation would have received less support in the absence of any EEPs. Socio-demographic variables play an important role in expressing conservation attitude and behavior along with EEPs. According to Kamal Jung Kuwar (DNPWC, personal communication), the buffer zone of most protected areas carry out various conservation and local development activities such as community wildlife patrolling, using the 50% revenue received back from the government. Out of that 50%, 20% of it is used in EEPs such as board display and group discussions. Environmental education remains potentially a very important aspect to reduce the ongoing conflict between human and wildlife. There has to be better cooperation between schools, governmental agencies and, non-governmental and international non-governmental organizations when it comes to making effective EEPs in buffer zones of the protected areas. EEPs for the local communities, along with economic incentives, should enhance conservation support among the local people residing in and around the protected areas. While EEPs are being provided in the buffer zone, it is essential that everyone gets the chance to make their voices heard and have opportunity to actively participate. In this

way every aspect of conservation issue can be put forward toward conservation goals. Illegal hunting will continue as long as poorer communities see benefits in this activity. Thus, it is important for schools and NGOs/INGOs that provide EEPs to point out alternatives such as tourism to be more sustainable and successful. Examples from Tanzania have shown that people have set aside land for conservation as a result of tourism and direct revenues (Bunnefeld et al., 2013). It is hard to achieve a perfectly balanced win-win situation between the communities and conservation programs when poverty is a key factor. It is therefore vital to try and get to the bottom of the problem to conserve biodiversity.

TABLE 4. 1. Socio-demographic characteristics of respondents from CNP, BNP and PWR (N=578, January – May, 2012). Gender is recorded as a dummy variable with female ‘1’ and male ‘0’. Age, education, and income are recorded as continuous variables.

\* NRs/Yr = Nepalese Rupees per year

Characteristics		Bardia NP	Chitwan NP	Parsa WR
Gender				
	<i>Mean</i>	0.44	0.43	0.52
	<i>(SD)</i>	0.5	0.5	0.5
	<i>Minimum</i>	0	0	0
	<i>Maximum</i>	1	1	1
Age				
	<i>Mean</i>		36.98	39.26
	<i>(SD)</i>	13.65	14.18	13.65
	<i>Minimum</i>	18	18	18
	<i>Maximum</i>	88	75	88
Income (NRs.*)/Yr				
	<i>Mean</i>	90,451	158,847	65,340
	<i>(SD)</i>	80,568	207,370	66,373
	<i>Minimum</i>	60,000	60,000	6,000
	<i>Maximum</i>	480,000	1,800,000	420,000
Education				
	<i>Mean</i>	5.76	7.18	3.03
	<i>(SD)</i>	4.71	5.15	4.22
	<i>Minimum</i>	0	0	0
	<i>Maximum</i>	15	17	15

TABLE 4. 2. Analysis of the attitude of local people toward biodiversity conservation in the buffer zones of BNP, CNP and PWR. The variables are participation in an environmental education program (EEP) given by schools or NGOs/INGOs.

<i>Parks</i>	<i>N</i>			<i>Schools</i>		<i>NGOs/INGOs</i>	
	<i>Total</i>	<i>School</i>	<i>NGOs/INGOs</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
Bardia	189	116	54	-0.83	0.4	3.89	0.001**
Chitwan	240	137	86	2.12	0.03*	-0.26	0.79
Parsa	149	31	35	1.58	0.12	-2.67	0.01*

Note: N = number of respondents; School = Number of respondents participating in school; NGOs/INGOs = Number of respondents participating in NGOs/INGOs; \* = P < 0.05; \*\* = P < 0.001



TABLE 4. 3. Analysis of the attitude of local people toward the establishment of the buffer zones in BNP, CNP and PWR. The variables are participation in an environmental education program (EEP) given by schools or NGOs/INGOs.

<i>Parks</i>	<i>N</i>			<i>Schools</i>		<i>NGOs/INGOs</i>	
	<i>Total</i>	<i>School</i>	<i>NGOs/INGOs</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
Bardia	189	116	54	2.45	0.02*	2.22	0.01*
Chitwan	240	137	86	1.92	0.06	-2.49	0.01*
Parsa	149	31	35	0.65	0.51	-1.81	0.73

Note: N = number of respondents; School = Number of respondents participating in school; NGOs/INGOs = Number of respondents participating in NGOs/INGOs; \* = P < 0.05

TABLE 4. 4. Analysis of the attitude of local people toward wildlife conservation in the buffer zones of BNP, CNP and PWR. The variables are participation in an environmental education program (EEP) given by schools or NGOs/INGOs.

<i>Parks</i>	<i>N</i>			<i>Schools</i>		<i>NGOs/INGOs</i>	
	<i>Total</i>	<i>School</i>	<i>NGOs/INGOs</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
Bardia	189	116	54	-2.09	0.04*	2.21	0.03*
Chitwan	240	137	86	2.27	0.02*	-0.32	0.75
Parsa	149	31	35	-0.44	0.66	-1.35	0.18

Note: N = number of respondents; School = Number of respondents participating in school; NGOs/INGOs = Number of respondents participating in NGOs/INGOs; \* = P < 0.05

TABLE 4. 5. Analysis of the behavior of local people toward biodiversity conservation in the buffer zones of BNP, CNP and PWR. The variables are participation in an environmental education program (EEP) given by schools or NGOs/INGOs.

<i>Parks</i>	<i>N</i>			<i>Schools</i>		<i>NGOs/INGOs</i>	
	<i>Total</i>	<i>School</i>	<i>NGOs/INGOs</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
Bardia	189	116	54	-3.49	0.001**	4.85	0.001**
Chitwan	240	137	86	2.18	0.03*	-0.29	0.76
Parsa	149	31	35	-1.01	0.31	-0.39	0.7

Note: N = number of respondents; School = Number of respondents participating in school; NGOs/INGOs = Number of respondents participating in NGOs/INGOs; \* = P < 0.05; \*\* = P < 0.01

TABLE 4. 6. Analysis of the behavior of local people toward making a contribution for conservation. The variables are participation in an environmental education program (EEP) given by schools or NGOs/INGOs.

<i>Parks</i>	<i>N</i>			<i>Schools</i>		<i>NGOs/INGOs</i>	
	<i>Total</i>	<i>School</i>	<i>NGOs/INGOs</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
Bardia	189	116	54	1.49	0.14	4.29	0.001***
Chitwan	240	137	86	1.08	0.28	2.58	0.01**
Parsa	149	31	35	0.71	0.48	1.10	0.27

Note: N = number of respondents; School = Number of respondents participating in school; NGOs/INGOs = Number of respondents participating in NGOs/INGOs; \*\* = P < 0.01; \*\*\* = P < 0.001

TABLE 4. 7. Analysis of the behavior of local people toward participation in anti-poaching activities/groups in BNP, CNP and PWR. The variables are participation in an environmental education program (EEP) given by schools or NGOs/INGOs.

<i>Parks</i>	<i>N</i>			<i>Schools</i>		<i>NGOs/INGOs</i>	
	<i>Total</i>	<i>School</i>	<i>NGOs/INGOs</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
Bardia	189	116	54	1.25	0.21	1.89	0.06
Chitwan	240	137	86	1.71	0.09	4.29	0.001***
Parsa	149	31	35	2.02	0.04*	0.85	0.39

Note: N = number of respondents; School = Number of respondents participating in school; NGOs/INGOs = Number of respondents participating in NGOs/INGOs; \* = P < 0.05; \*\*\* = P < 0.001

TABLE 4. 8. Analysis of the behavior of local people toward collecting fuel wood from the forest in BNP, CNP and PWR. The variables are participation in an environmental education program (EEP) given by schools or NGOs/INGOs

<i>Parks</i>	<i>N</i>			<i>Schools</i>		<i>NGOs/INGOs</i>	
	<i>Total</i>	<i>School</i>	<i>NGOs/INGOs</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
Bardia	189	116	54	2.38	0.02*	-0.18	0.86
Chitwan	240	137	86	0.65	0.52	0.41	0.68
Parsa	149	31	35	-1.57	0.12	-1.22	0.22

Note: N = number of respondents; School = Number of respondents participating in school; NGOs/INGOs = Number of respondents participating in NGOs/INGOs; \* = P < 0.05

TABLE 4. 9. Analysis of the behavior of local people toward killing wildlife to support their family in BNP, CNP and PWR. The variables are participation in an environmental education program (EEP) given by schools or NGOs/INGOs.

<i>Parks</i>	<i>N</i>			<i>Schools</i>		<i>NGOs/INGOs</i>	
	<i>Total</i>	<i>School</i>	<i>NGOs/INGOs</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
Bardia	189	116	54	1.57	0.12	-1.07	0.28
Chitwan	240	137	86	1.62	0.11	-1.38	0.17
Parsa	149	31	35	-0.52	0.59	0.88	0.38

Note: N = number of respondents; School = Number of respondents participating in school; NGOs/INGOs = Number of respondents participating in NGOs/INGOs.

TABLE 4. 10. Analysis of the behavior of local people toward killing of wildlife to protect their farm in BNP, CNP and PWR. The variables are participation in an environmental education program (PEE) given by schools or NGOs/INGOs.

<i>Parks</i>	<i>N</i>			<i>Schools</i>		<i>NGOs/INGOs</i>	
	<i>Total</i>	<i>School</i>	<i>NGOs/INGOs</i>	<i>t</i>	<i>Sig.</i>	<i>t</i>	<i>Sig.</i>
Bardia	189	116	54	2.22	0.03*	1.17	0.24
Chitwan	240	137	86	1.25	0.21	-1.22	0.22
Parsa	149	31	35	-2.63	0.01*	3.54	0.001**

Note: N = number of respondents; School = Number of respondents participating in school; NGOs/INGOs = Number of respondents participating in NGOs/INGOs; \* = P < 0.05; \*\* = P < 0.01



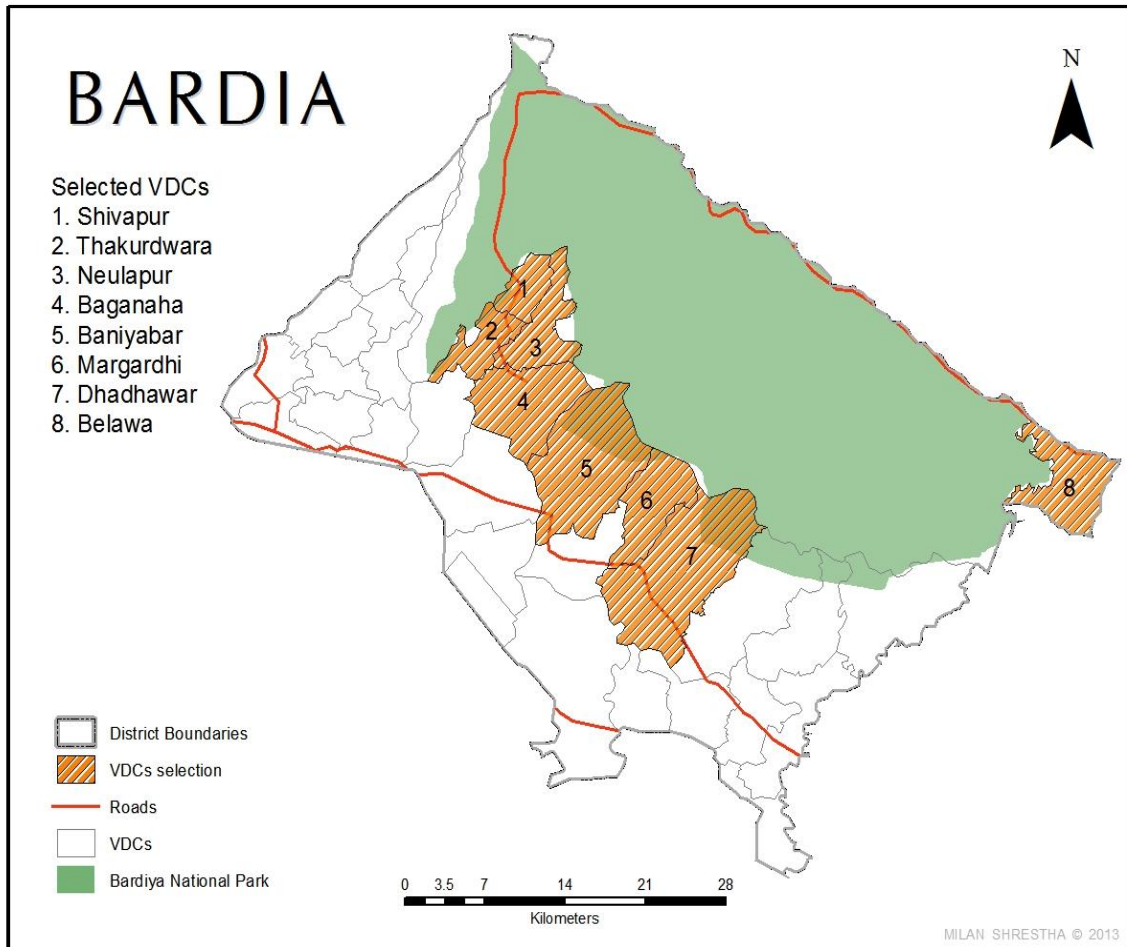


Figure 4. 1. Bardia National Park and the buffer zones. The number represents the VDCs of the buffer zone where the study was conducted.

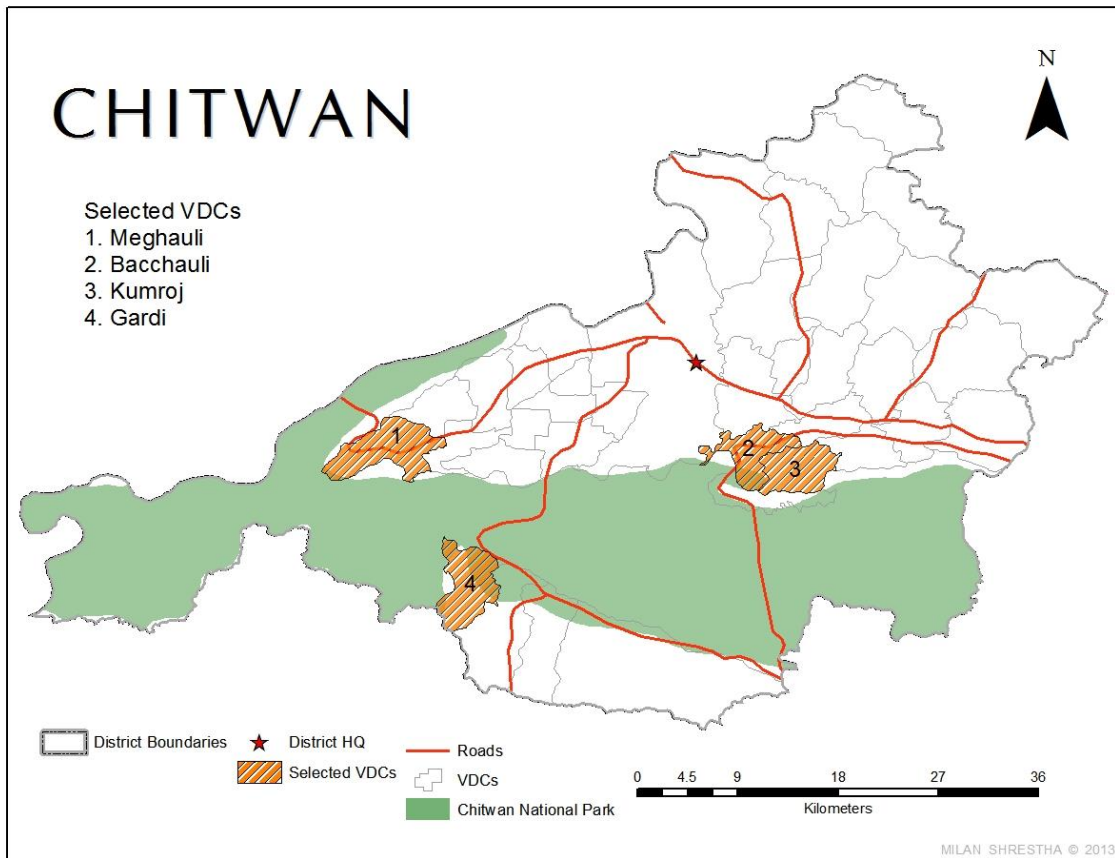


Figure 4. 2. Chitwan National Park and the buffer zones. The number represents the VDCs of the buffer zone where the study was conducted.

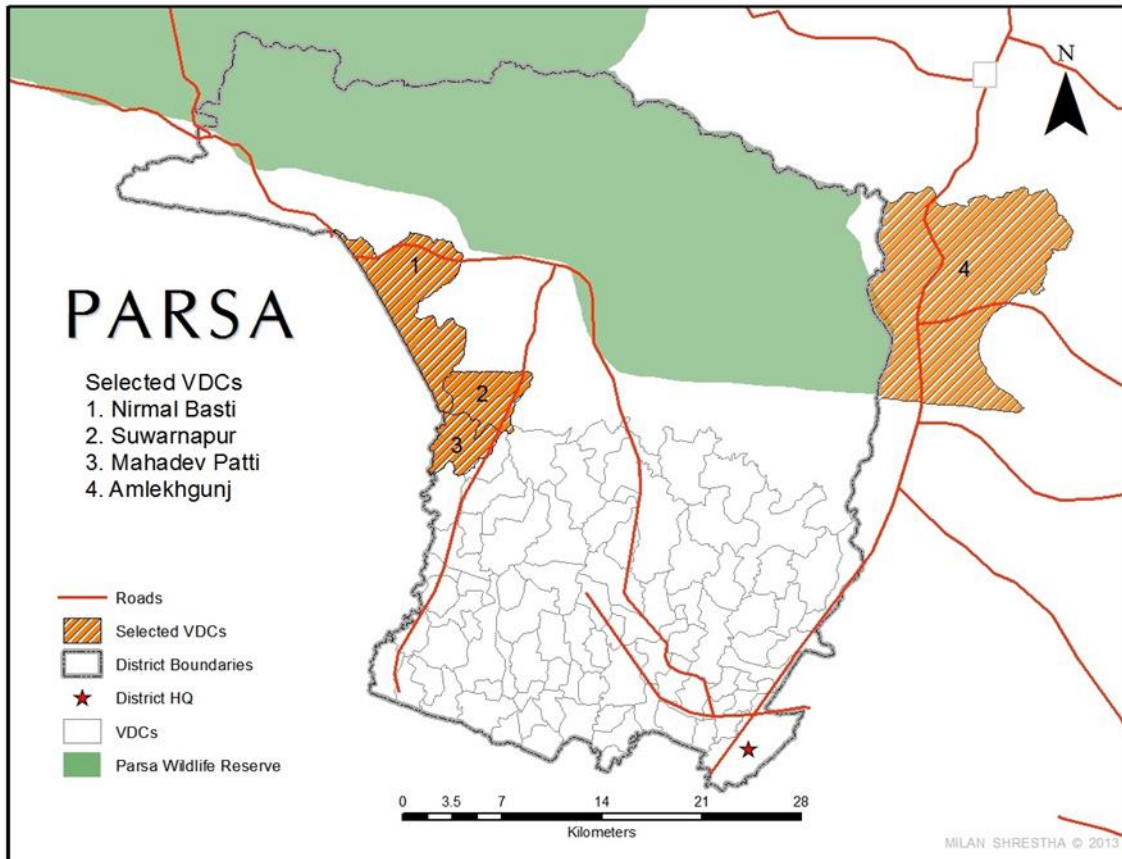


Figure 4. 3. Parsa Wildlife Reserve and the buffer zones. The number represents the VDCs of the buffer zone where the study was conducted.

## CHAPTER 5

### Impact of Environmental Education Programs on Wildlife Population

#### Introduction

Biodiversity conservation is getting more and more attention due to habitat loss, over exploitation, and species extinctions with the rising human population (Pratt et al., 2004). Large mammals are in continuous exposure to considerable pressure due to poverty in Asia where poaching is high because of the demand for medicinal products (Mayaka et al., 2005; Pratt et al., 2005). Biodiversity loss is often linked with people believing that illegal poaching will make them a profit and allow them to support their families (Maroney, 2005), or that it will help control populations of wildlife that damage their crops or kill livestock (Mayaka et al., 2005). In today's money-oriented economy, people of impoverished areas are leaning toward illegal hunting to support their families (Mukanjari et al., 2013), and poaching will continue in local communities if it benefits them more than conservation does (Mukanjari et al., 2013). Protected areas usually consist of protected national parks and buffer zones. Buffer zones are intended to minimize human pressure on national parks where human settlements are prohibited in the park (Watson et al., 2013). Johannesen-Borge and Skonhøft (2005) suggest that using local communities for cooperation and support is one strategy to protect wildlife and their habitat. Due to its focus on the local communities, this type of conservation is often called community-based conservation (Dzingirai, 2003; Haule et. al., 2002). Integrated Conservation and Development Programs (ICDPs) are often touted as examples of

community-based conservation programs where the local people participate in conservation programs to some degree and are provided with an income, which will hopefully motivate them to participate in conservation programs (Johannesen-Borge & Skonhoft, 2005). Watson et al. (2013) state that increased revenue to the local people may decrease poaching, but other factors must also be considered regarding all degrees of support for conservation coming from the communities. Winkler (2011) summarizes that ICDPs might fail if there is a lack of connection between the conservation of wildlife and community development along with the risk of giving too few incentives. Mukanjari et al. (2013) address another issue for ICDP failure, such as people that hunt illegally will continue to hunt as long as it is profitable or that they find the revenue as complementing their normal income. Local communities are more likely to participate in conservation if they are shown the ecological and ecosystem's importance provided by protected areas (Myint Aung, 2007). However, the feeling of losing what was once theirs is also believed to be a reason for wildlife poaching (Boonzaaier, 2009). The poachers involved in poaching of rhino or tiger do not necessarily belong to that area (Martin & Martin, 2006). In their study, five poachers were interviewed who were from the north part of Chitwan National Park (CNP) and extremely poor, while one was from Tibet but with Nepalese citizenship. Most of the rhino horns end up with wealthy traders from Kathmandu, Nepal. The poachers admitted selling the rhino horns to Tibetans in Kathmandu. They also admitted that the rhino horns are brought to Kathmandu from CNP, Bardia National Park (BNP), and also from India. Recently, Nepal has set an example for the protection of the greater one-horned rhino (*Rhinoceros unicornis*)

population declaring the years of 2011 and 2013 each as a “Zero Poaching Year” (IUCN, 2014). In 2012 only one rhino was poached in Nepal, while poaching was rampant in South Africa, Kenya, and Zimbabwe (Martin et al., 2013). Nepal with its own government departments, and with help from non-government conservation organizations and commitment from local people, has succeeded in protecting the rhinos.

This study provides insight on poaching of rhinos and tigers over the last decade and evaluates the role of environmental education programs (EEPs) being provided by schools, NGOs and INGOs. Particularly, this study focuses on other factors such as poverty that affect poaching in Nepal. This study is exploratory and generates general knowledge of poaching in Chitwan National Park (CNP), Bardia National Park (BNP) and Parsa Wildlife Reserve (PWR).

### Objectives

The purpose of this study is to examine how EEPs conducted by governmental, non-governmental organization (NGOs) and international non-governmental organizations (INGOs) correlate with actual levels of poaching in three protected areas of Nepal. The main objectives are:

- To determine the effect of EEPs on wildlife populations within the protected areas
- To find what other factors affect poaching in Nepal

## Methods

### *Study Area*

This research was conducted in Nepal, especially focusing in three different protected areas that lie in the Terai Arc Landscape. Nepal is one of the poorest and least developed countries in the world (World Bank, 2014). The most recent decade-long civil war between the Maoist insurgents and the government, and the political transition from a monarchy to a democratic republic, has greatly affected the social and economic progress of the country. Environmental and wildlife conservation progress has also been greatly impacted by this transition (Baral & Heinen, 2006; Oli, 2005). Twenty protected areas and their respective buffer zones cover an area of 23.23% of the total land area of Nepal. The core parts of the protected areas are protected by the Nepalese army and park officials, while local people and different conservation organizations are involved in conservation and management in the buffer zones.

### *Data Collection*

Fieldwork was carried out in CNP, BNP, PWR and Kathmandu from January 2013 to April 2013. On the basis of Bernard's (2006) qualitative research method, face-to-face interviews were conducted with park officials from CNP, BNP and PWR, along with non-governmental (NGO) and international non-governmental (INGO) officials involved in rhino and tiger conservation. Open ended semi-structured questionnaires were used for interviews. A purposive sampling method was used to select respondents from the governmental sector, NGOs and INGOs to cover all the organizations providing

EEPs. This sampling method is particularly beneficial when information cannot be obtained accurately by any other procedure (Bradburn et al., 2004). Similarly, Kumar (1989) suggests that the key informant interviewing method is useful to generate information, ideas, insights, and recommendations for project and program design, implementation, monitoring, and evaluation. The selection process for the key informants began with identification of different organizations involved in EEPs in the buffer zone areas. Organizations selected were: Department of National Parks and Wildlife Conservation (DNPWC), National Trust for Nature Conservation (NTNC), and World Wide Fund for Nature (WWF). Before I began any interview, I gave the background and objectives of my research. I asked them to stop at any point if they did not feel like answering the question. Interviews were started with their view on broad topic about EEPs and later followed by more specific questions. Interviews were recorded in a tape recorder with the permission of the interviewee. Data were also collected from published articles from governmental organizations and other journals. I reviewed the published data especially from Department of National Parks and Wildlife Conservation (DNPWC) focusing on the number of rhinos and tigers poached in the last decade.

### *Data Analysis*

A set of 19 questions (Appendix C) were asked to 10 officials regarding EEPs provided through their organization, effect of EEPs on the number of rhinos and tigers, and alternative resources and economic opportunities provided to the local people by their organization. A set of ten questions were made to make the questions locally relevant with inputs from park staff, local residents, and NGO and INGO officers. All



interviews were conducted in Nepali and were later transcribed in English for further analysis. Themes were created based on the repetition of words, and similarities and differences in each previous and following sentences of the interview questions (Ryan & Bernard, 2003). The themes provide information to help explain scattered and isolated issues (Bernard, 2006; Ryan & Bernard, 2003). Line by line coding (Bowen, 2008) of the data was carried out after the interviews were transcribed. Through coding statements line by line, I linked the statements to the themes. For example, if a respondent stated “*It is difficult to work with communities when they feel that they do not get a direct benefit,*” this statement was linked with a matching theme, “Alternative Resource and Economic Opportunity.”

## Results

### *Poaching of Rhino in Nepal*

The greater one-horned rhino is under Appendix I of CITIES due to its demand in the Chinese market. Rhino horns have been believed to have medicinal value in this region. However, an increase in the population of the one-horned rhino in Nepal and India has led to an upgraded status from Endangered to Vulnerable in the IUCN Red List (Milliken et al., 2009). In Nepal, the one-horned rhinoceros inhabits the southern plains of Chitwan National Park (CNP), Bardia National Park (BNP) and Suklaphanta Wildlife Reserve (SWR). With a total population of 2575 in 2010, the one-horned rhino is found in South Asia especially in Nepal and India (Talukdar et al., 2010). In Nepal, there has been an increase in the rhino population from 435 in 2008 to 534 in 2011 (WWF, 2011).

The population of rhinos has been fluctuating for several decades because of poaching and illegal trade within the region. The rhino population in Chitwan alone decreased from 800 in the early 1950s to 300 in 1959. Further the number there decreased to less than 100 by the late 1960s. Adhikari (2002) reported that the number of rhinos killed in 1954 and 1958 were 72 and 60, respectively. From 1973 to 1991, 53 more rhinos were killed, and 28 more were killed in 1992. Anti-poaching units helped decrease the rate of poaching from 1992 to 1999 (Adhikari, 2002). 76 poachers were arrested in 1994 with the help of anti-poaching units, and as a result the rhino population in Nepal increased to 612 in 2000 (Adhikari, 2002). Of these 612 rhinos, there were 544 in and around CNP and 67 in and around BNP (DNPWC, 2000) (Fig. 5.1). However, the population of rhinos in Nepal dropped in 2005 to 409, with only 372 in CNP. With the rise of the Maoist insurgency in the country, poaching increased from 2001 to 2005, and 108 rhinos were killed (Martin & Martin, 2006) (Fig. 5.2). Due to a lack of security (Oli, 2005), only 372 rhinos were left in CNP, BNP and SWR (Bhujju et al., 2009; Martin & Martin, 2006). 21 rhinos were killed by poachers in 2006 despite the peace process between the Maoist insurgents and the government in 2005. However, after the peace process only five rhinos were killed in 2007 resulting an increase of the rhino population from 372 to 444 in 2008 in CNP, BNP and SWR (Milliken et al., 2009). While many argue that there was an increase of rhino poaching due to the political unrest (Maoist insurgency) and disruption of law and order (Martin, 2004; Milliken et al., 2009; Oli, 2005), others believe that there were other factors involved in rhino poaching such as livelihoods of local people and high commercial value of rhino horn (Talukdar et al. 2010; Yi-Ming et al. 2000; Yonzon

2005). In 2011, the population in Nepal increased to 534, of which 503 were in CNP and only 24 remained in BNP. The year 2011 was declared as a 'zero poaching year' for the rhinos by WWF Nepal. And recently in 2013, Nepal celebrated a zero poaching year for the second time (IUCN, 2014). This success is a result of the support from different NGOs and INGOs and also continuous support from the local communities (Seidensticker, personal communication, 2014). He added that local communities and businesses (tourism departments) putting pressure on park management and government are some of the likely enablers of the recent 'zero poaching year.' The local army assigned to protect the park along with the formation of community-based anti-poaching units and youth mobilization also contributed to the success of both 'zero poaching years.' The success is also linked to an extensive awareness program initiated to engage the local communities, law enforcement, administration and judiciary (National Investigation Department, Department of customs, Department of Forest and DNPWC). The operational coordination in the field with local administrations, buffer zone committee and local youth leaders, among others, is also associated with the success of both 'zero poaching years' (Seidensticker, personal communication, 2014).

### *Poaching of Tiger in Nepal*

Tigers are listed as Endangered in the IUCN Red List and protected under Appendix I of CITES (IUCN Red List, 2014). With the demand of tiger skins and bones, the global population of all wild tigers is believed to have been reduced to about 3200 (Chundawat et al. 2010a; Walston et al. 2010). There are five subspecies of tiger that inhabit 13 different countries. Among them the Bengal tiger (*Panthera tigris tigris*) is

found in Bangladesh, Bhutan, India, Nepal and western Myanmar with a population about 1,532 to 2,351 (Chundawat et al. 2010b). Tigers in Nepal are protected by the National Parks and Wildlife Conservation Act of 1973. The 2008 tiger count was estimated to be 241-304 tigers, which was a decrease from 360-370 in 2005. In the years 1999/2000, the total estimated tiger population was 340-350 (DNPWC 2007). Tiger conservation in Nepal has been threatened since Nepal plays a transit role for illegal wildlife trade between India and China (Yonzon, 2005). Tiger skins and bones are traded for medicine and decorations in Southeast Asia, especially China. The driving factor for decline of tigers was found to be prey depletion along with illegal trade and poaching incidents (Karanth & Stith, 1999). A study conducted by Karanth et al. (2004) found that the existing level of prey population is adequate to support viable tiger populations, but that increased incidence of tiger poaching in BNP and SWR in recent times indicated that poaching is the most plausible reason for the decline in tiger numbers. However, Nepal has also seen a rise by 63% in its tiger population since 2009 (Rauniyar & Burke, 2013) (Fig. 5.3). There were 121 tigers in 2009, but a survey which was carried out between February and June 2013 found numbers had increased to 198 in all the national parks of Nepal (Rauniyar & Burke, 2013). The population of tigers in particular had increased in CNP, BNP (Table. 5.1) and Shukla Phanta Wildlife Reserve (SWR). Chitwan had the highest number of tigers, with 120 (adult), followed by BNP and SWR. In BNP, there was an increase from 18 tigers in 2009 to 50 tigers in 2013, and SWR had 17 tigers (M. Khadka, WWF Nepal, personal communication, February 2014). The numbers in Parsa Wildlife Reserve (PWR), however, remained same in 2009 and 2010 (Karki, 2011). An

increase in the tiger population in 2013 has been attributed to officials that have increased anti-poaching efforts in a bid to curb the illegal wildlife trade by strengthening protection for the species (M. Khadka, WWF Nepal, personal communication, February 2014).

### *Environmental Education Programs in the Parks*

Every organization that was selected to interview had EEPs through their organization (chapter 2; Fig. 2.2). The EEPs were conducted through eco-clubs or through workshops or groups such as community-forest user groups. Community-forest user groups are “local, self-governed institutions bound by written constitutions and operational plans that are developed in consultation with the government forestry office” (Sharma & Nightingale, 2013). Questions regarding the EEPs given by the organizations covered many issues, since these organizations did not have structured education programs despite conducting EEPs. Many officials claimed that the lack of design and budget made it difficult for them to reach their target audience. There was also a lack of assessment work. None of the organizations who conducted EEPs did a pre- or post-assessment of their work. The EEPs were carried out in schools and communities, but most of the VDCs closest to the park had never heard about these programs (personal communication, 2013). A park official mentioned:

*“There is no structured education program in the buffer zone, we just call people and do the program. There is no assessment of the work.”*

Moreover, most of the officials suggested that a clear updated EEP focusing on youth, community-forest user groups, and buffer zone community groups should be developed.

They also cited that they need to revisit the loopholes in their program and revisit the strengths and weakness to make better EEPs. An INGO official stated:

*“There needs to be a lot of change in EEPs that are being provided. New programs need to be launched to keep the community engaged.”*

#### *Effect of EEPs on Wildlife Numbers*

All respondents expressed that in their opinion EEPs are very important to change attitude and behavior of the local people toward wildlife conservation. However, they also stated that behavior cannot be changed overnight. The respondents talked about the EEPs provided by their organization and the change they have seen in the awareness level toward conservation as expressed by participants. Nepal celebrating its “zero poaching years” is an example of how organizations are working toward conserving rhinos claimed some of the respondents. An INGO official mentioned:

*“Zero poaching year was celebrated in 2011. The EEPs program has been initiated over two decades from our organization, and I can definitely say that it has helped to achieve the zero poaching year along with the police-wildlife crime unit.”*

However, the majority of the key respondents mentioned that lack of strict law enforcement, poaching, and unemployment were the reasons for the decline in wildlife numbers. They claimed that the increase or decrease in wildlife numbers cannot be based on EEPs alone. They added that the presence of EEPs with enforcement of strict rules and regulations will act as a win-win situation to conserve wildlife. A NGO official mentioned:

*“The increase or decrease of wildlife (rhino) population cannot solely be said it is because of EEP, but EEP has a lot to do with it. People who were poachers earlier and who received EEPs, now work as informants for the government. If EEP and stronger law go hand in hand then it’s a win-win situation for us.”*

Respondents stated that the instability during the time of the political insurgency also affected the numbers of wildlife in the past decade. Starting youth groups like “Chori Sikari Yuwa Jagaran” and about 38 community-based anti-poaching units should be credited for the promising result replied one of the respondents. Providing scholarships for education and EEPs have helped to change the perception of the children toward poaching claimed some of the officials. An INGO official stated:

*“The children of poachers have been provided with scholarships for education. This has helped to change the behavior of the children toward poaching. For example: children of poachers have become guides in Chitwan National Park.”*

#### *Alternative Resources and Economic Opportunity*

Local people rely on the forest for fuel wood and fodder. Local people believe that the protected areas are the property of the government, and it should be taken care of by them. A majority of the respondents explained how the local people asked for alternatives for fuel wood when they were told not to cut trees. The respondents feel that alternative sources of energy such as biogas (a gaseous fuel, i.e. methane, produced by the fermentation of organic matter), solar panels, etc., should be provided to the local people. So far only certain households have been provided with biogas, making the majority of them still dependent on the forest. An INGO officer mentioned:

*“Biogas project has been implemented in two Village Development Committees (VDCs) in BNP. BNP has 33 VDCs, which means that the local people residing in the remaining 31 VDCs may still go to the forest to get fuel wood. Providing alternative fuel resources is still a major challenge for many organizations working to improve conditions in these buffer zones.”*

Almost every respondent believes that the majority of the people living in the buffer zone of the parks live with no alternative sources to fuel wood forcing them to encroach on park resources. A government official mentioned:

*“The local people are poor, and if an alternative fuel wood option is not given, they are forced to go to the forest.”*

When asked about economic opportunity, the respondents did mention the need to develop programs that will make people less dependent on the forest. A government official mentioned:

*“The livelihood of the local people is directly dependent on the forest, so there have to be programs that can have a balance between them.”*

## Discussion

There have been significant contributions from governmental, national and international conservation organizations in providing EEPs. However, respondents have cited that loopholes in the programs have set drawbacks in conservation efforts.

Assessments of EEPs were not conducted by any organization that provided EEPs. An assessment of a target audience is needed to allow the organization to determine how to



adopt their conservation goals through EEPs. Allowing the participants to have a say in the development of the program and creating opportunities for interactive learning and sharing was mentioned by most of the respondents. This type of interactive communication between participants and organizations enhances common knowledge and awareness and also promotes an open dialog. It is important for the organizations that provide EEPs to accurately understand their target market and potential for changes in behavior by participants. Organizations that run EEPs should promote a pattern of behavior in a sensible way that does not cost the target audience time, money and effort (Hernandez & Monroe, 2000). Collecting fuel wood and deforestation is still a major problem in the buffer-zone areas. Different technologies to replace firewood have been introduced by the government and NGOs (Pobocik & Butalla, 1998), but a majority of the households have not yet received them. In this study I found that governmental, NGOs and INGOs have provided alternative fuel wood resources, although in insufficient amounts to reach every household. Unless a majority of the households get their hands on these technologies, it is difficult to project that they will stop collecting fuel wood from the forest. Resource collection is a significant daily activity of residents residing in the buffer zone. Bulte & Engel (2006) suggest that imposing restrictions on poor communities for the use of forest resources to which they previously had access can create economic hardship resulting in social conflicts. Poverty and lack of employment were stated as major factors in the poaching of rhinos and tigers despite EEPs being provided in the buffer zone area. Local awareness, employment and educational opportunities, and economic benefits to local people increase favorable conservation

attitudes leading to effective community-based conservation programs (Mehta & Heinen, 2001), which in turn helps to reduce poaching activities (Lewis et al., 1990). Conversely, people express unfavorable attitudes toward wildlife conservation in areas where they are extremely poor (Mehta & Kellert, 1998). However, some studies have shown that that the higher the level of off-farm income, the higher the level of conservation behavior (Camboni & Napier, 1993; Curtis & De Lacy, 1998) (chapter 2).

Political instability in Nepal is an important issue mentioned by the respondents when it came to documenting the decline in the numbers of wildlife. Political instability is prevalent in Nepal because of its recently-ended Maoist insurgency. Damania et al. (2004) stated that political instability and long transition periods bring weak judicial efficiency and promote corruption and non-compliance of rules and regulations. Martin et al. (2009) explained that the massive rhino poaching during the Maoist insurgency was mainly due to disruption of law and order which shifted the priorities of enforcement agencies. In Nepal, during the insurgency, national park army posts were reduced from 112 to 34 (70% reduction; Baral & Heinen, 2006). Adhikari (2002) reported that in CNP alone, 25 out of 32 posts were withdrawn, influencing the park security and leading to a significant increase in rhino poaching. Political unrest also affects the economy of the country because of a decline in tourist arrivals, fewer development activities, etc. Despite the heavy poaching over the last decades, Nepal recently celebrated a ‘zero poaching year.’ The anti-poaching activities/groups implemented by different organizations like WWF and DNPWC have resulted in reduced poaching over the years. EEPs provided to local people residing in the buffer zone by the government, NGOs and INGOs may not be

solely responsible for the decline in poaching, but every respondent claimed that it had a major role in it. For example, providing EEPs had helped change the perception of the poachers toward poaching and turn them into informants. Despite the claim made by the residents, my findings (chapter 4) did not support that EEPs alone are a significant predictor of conservation attitudes and behaviors. I found only small percentage of people attending EEPs given by NGOs/INGOs had a positive conservation attitude toward biodiversity conservation, establishment of buffer zones, and wildlife preservation compared to those who had not attended the programs.

### Conclusion

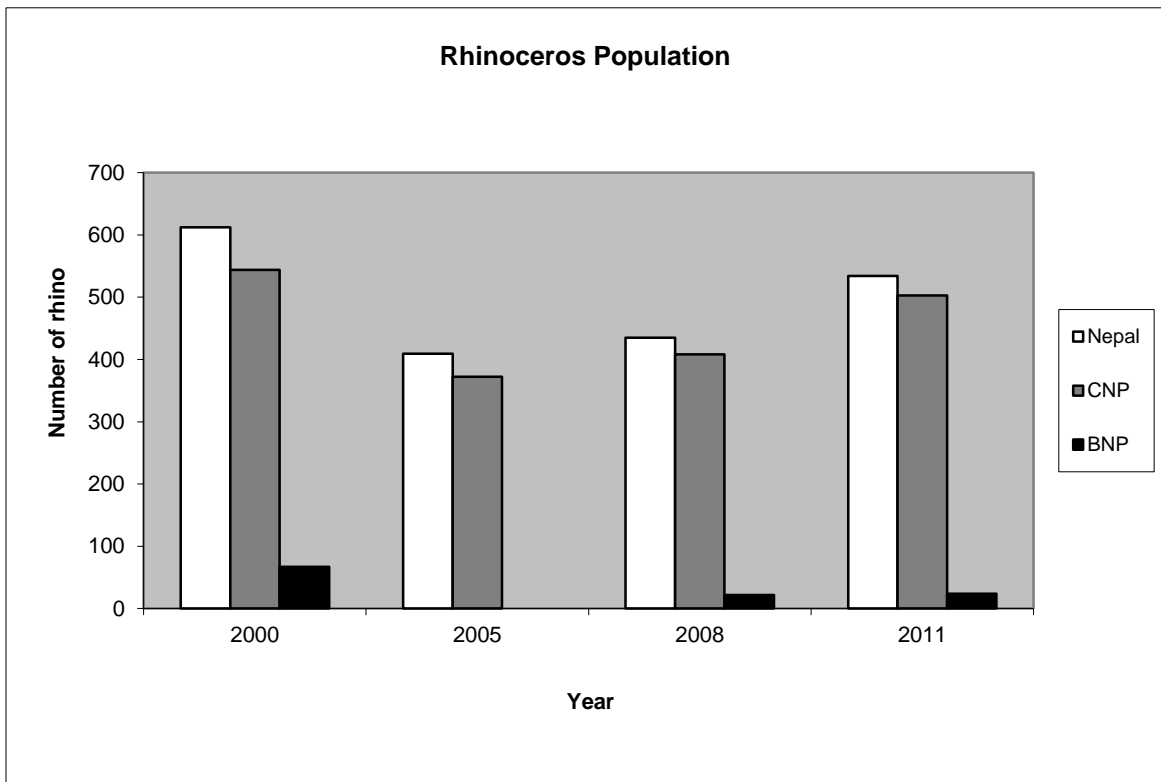
EEPs can be important in conserving wildlife along with strong law enforcement and economic incentive programs from all stakeholders working in biodiversity conservation. However, lack of structured EEPs, lack of assessment of these programs, and not being able to reach the target audience were drawbacks in implementing strong EEPs. A good network between NGOs, INGOs, the government sector and local people is needed, yet some respondents believe this cooperation is lacking. I found that political instability in the country highly negatively affected wildlife populations, particularly that of the rhino in the last decade. The decrease in number of security personnel from the parks caused major poaching of rhinos and tigers. Households who lacked alternative fuel wood resources like bio-gas still are driven toward the forest to collect fuel wood. Alternative resources must be provided to them in order to decrease the rate of deforestation. As many people residing near the protected areas are poor and illiterate,

they can be easily lured into illegal activities. Therefore, economic development programs along with awareness and education programs are necessary to build positive conservation attitude and behavior.

Table 5.1. Tiger population in the Bardia National Park (BNP), Chitwan National Park (CNP), Parsa Wildlife Reserve (PWR) and Shukla Phanta Wildlife Reserve (SWR) between 1999 and 2013.

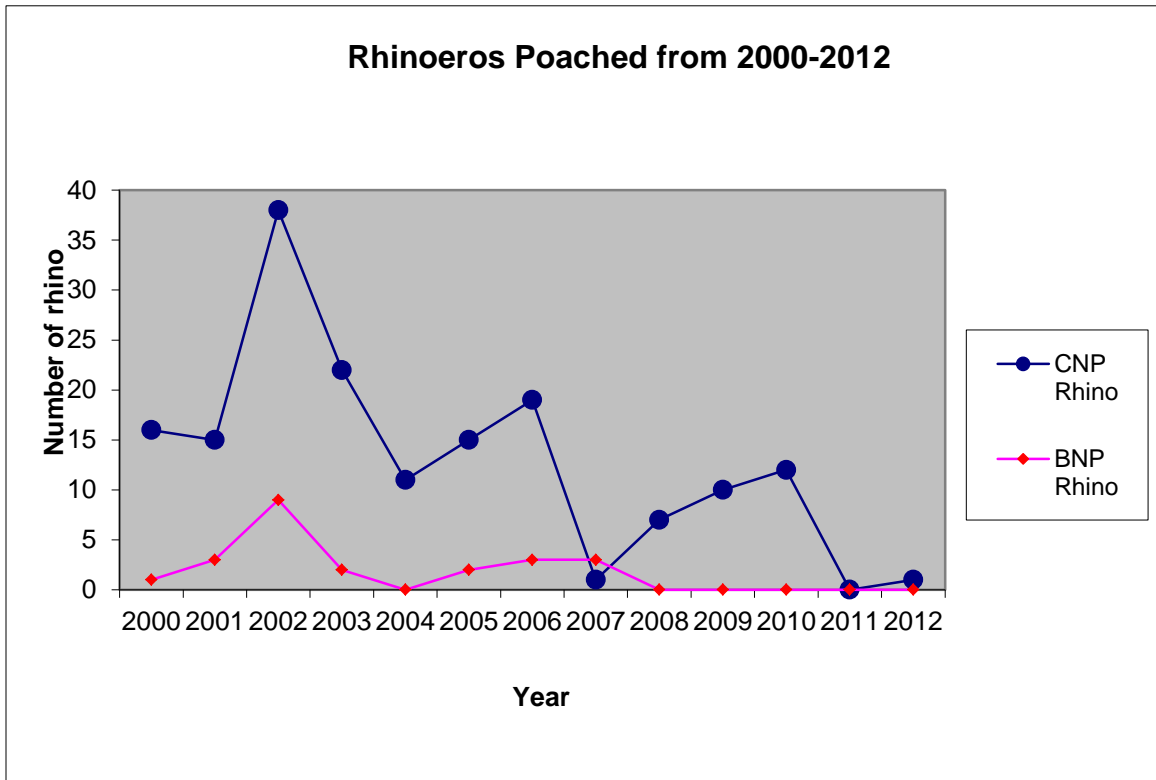
Year	1999/2000	2005	2009	2010	2013
CNP	50-60	50-60	91	125	120 (adult)
BNP	32-40	32-40	19	18	50
PWR			4	4	
SWR			8		17
Total	98-123	103-130	121 (100-191)	155 (95-185)	187 (187-198)

Source: Karki. J. (2011), M. Khadka, (WWF Nepal, personal communication, February 2014), Rauniyar & Burke (2013).



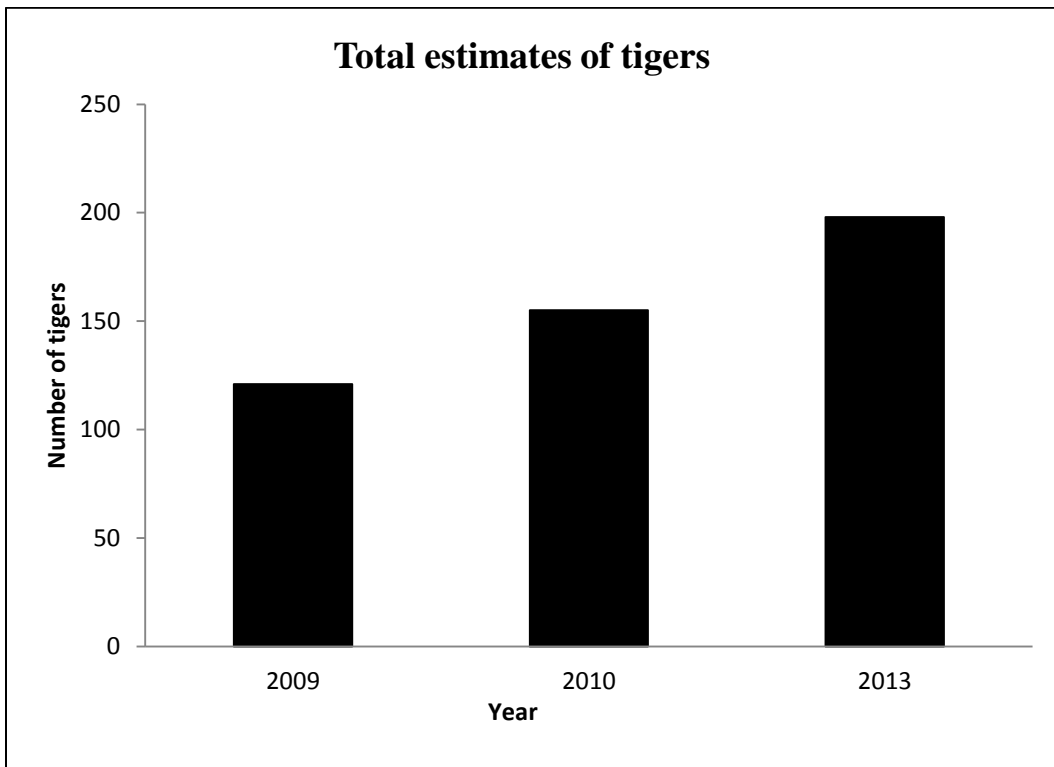
Source: Thapa et al., 2013

Figure 5.1. Total population of greater one-horned rhinoceros in Nepal, BNP and CNP from 2000 to 2011.



Sources: Martin & Martin, 2010, Thapa et al., 2013; DNPWC, 2011.

Figure 5.2. Annual mortality of greater one horned rhinoceros from poaching in CNP and BNP from 2000 to 2012.



Source: Karki. J. (2011); Rauniyar & Burke (2013)

Figure 5.3. Increasing population of tigers in Nepal from 2009 to 2013.



## CHAPTER 6

### CONCLUSION

Environmental education programs (EEPs) are an important component of Nepal's protected areas, and have been implemented in their buffer zone areas. EEPs are provided to local communities by schools, governmental agencies, non-governmental organizations (NGOs) and international non-governmental organizations (INGOs). This study examined EEPs in three protected areas in the Terai Arc belt of Nepal. My comparison of outcomes of EEPs in these three areas provides insight into aspects of these programs in need of improvement. I found that the number of EEPs held in the village development committees (VDCs) of each protected area made a difference in the conservation attitude and behavior of the local people. However, the specific impact of EEPs in Nepal is dependent on a number of aspects, ranging from the socio-demographic characteristics of the local people to the political instability within the country.

My findings showed that, of the local people who participated in EEPs, those who had a school education and high income were more inclined to show a positive attitude toward biodiversity conservation, as were males. Previous research shows more positive association between women and environmental attitudes than for males (Baral & Heinen, 2007; Formica & Uysal, 2001). However, my research finds that males were more supportive of biodiversity conservation than females, likely because most of the women I surveyed had never participated in EEPs. This lack of participation was probably due to household chores. These women believed conserving biodiversity was time consuming and prioritized family duties such as providing food to their children. As women are

responsible for decisions which impact biodiversity, including collection of fuel wood, ensuring women's participation in EEPs must be a priority. I found that poverty is a critical factor that triggers negative attitudes and behavior toward conservation. While up to 50% of the revenue generated by the parks is returned to the community, these benefits are not equally distributed, and local people often complain about how few benefits are received at the local level. In addition to this inequality within parks, some parks are wealthier than others, particularly Chitwan National Park (CNP). The number of EEPs provided in CNP was higher compared to Bardia National Park (BNP) and Parsa Wildlife Reserve (PWR), and the local people in CNP held a more positive attitude toward biodiversity conservation. This difference is perhaps due to the greater benefits to the CNP communities in terms of employment opportunities. These findings indicate that ecotourism should be strategically planned such that the benefits go to local communities by involving local people. Local people in PWR, where the fewest EEPs were offered, showed the least positive attitude toward conservation, but voiced an interest in participating in EEPs. Additionally, I found that EEPs are not evenly organized within the park regions. For example, in PWR, the VDC closest to the park was not offered any opportunity to hold EEPs, despite its critical location. Thus, the results of this study indicate that EEPs should be more evenly deployed both among protected areas and within their VDCs.

Some behaviors negatively affecting conservation, such as the collection of fuel wood from the forest or killing wildlife to support their family and farm, were not correlated with level of education, age, gender, or participation in EEPs. This appears to

be due to a lack of options, rather than to a negative conservation attitude. While alternative fuel wood resources are being introduced to the buffer zones, most local people have remained dependent on natural resources to meet livelihood needs. Providing alternative resources should be a priority for biodiversity conservation in this region. Similarly, unless the loss of livestock and damage to farms by wildlife is sufficiently compensated, local people will attempt to avoid such hardships by killing or deterring wildlife, thereby making it difficult for EEPs to achieve their goals.

My research into the impacts of EEPs on behavior and attitude shows that neither programs led by schools nor NGOs or INGOs showed a significant change in the attitude and behavior of local people. Poverty, lack of alternative resources, and political instability were highlighted by the local people as reasons for their weak conservation attitude and behavior. As mentioned above, some crucial audiences are not currently reached by EEPs, due to lack of coordination or planning. Additionally, none of the organizations that work to provide EEPs in the buffer zones of the three protected areas evaluated EEPs after they were conducted. This lack of quantified information makes accurate judgment of their efficacy of the programs difficult. To implement strong EEPs, better cooperation among the institutions that provide them (schools, NGOs/INGOs, and government agencies) is needed. Curricula should be tailored to the audience (e.g., schoolchildren or the adult community). To ensure that curricula achieve the goal of affecting environmental attitudes and behaviors, pre- and post-participant evaluation of these programs is necessary.

Importantly, I find that participation in EEPs alone does not predict a positive conservation attitude and conservation behavior. Because socio-demographic factors play an important role, EEPs should emphasize the benefits the local people could receive from conserving the forest and wildlife. Additionally, improving communication between the community and the protected area management will help facilitate conservation goals. Though the initiation of EEPs in Nepal's protected areas is to be applauded, there is much room for improvement.

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## APPENDIX A



Office of Research Integrity and Assurance

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**To:** Andrew Smith  
LSC

**From:** Mark Roosa, Chair  
Soc Beh IRB

**Date:** 05/08/2009

**Committee Action:** **Exemption Granted**

**IRB Action Date:** 05/08/2009

**IRB Protocol #:** 0904003965

**Study Title:** The Role of Environmental Education in

Biodiversity Conservation: A Comparative Study in the Protected Areas  
of Nepal

The above-referenced protocol is considered exempt after review by the Institutional Review Board pursuant to Federal regulations, 45 CFR Part 46.101(b)(2) .

This part of the federal regulations requires that the information be recorded by investigators in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects. It is necessary that the information obtained not be such that if disclosed outside the research, it could reasonably place the subjects at risk of criminal or civil liability, or be damaging to the subjects' financial standing, employability, or reputation.

You should retain a copy of this letter for your records.

APPENDIX B  
QUESTIONNAIRE SURVEY FOR LOCAL RESIDENTS

*Section A*

**Socio-Demographic Information**

- 1.1. Name of the Park:  
 1.2. Name of the VDC:  
 1.3. Ward No:

**1. Personal Information:**

**I.**

a. Respondent Name:

b. Age group :

18-25	<input type="checkbox"/>	26-35	<input type="checkbox"/>	36-50	<input type="checkbox"/>
51-70	<input type="checkbox"/>	over 70	<input type="checkbox"/>		<input type="checkbox"/>

c. Sex :

Male	<input type="checkbox"/>	Female	<input type="checkbox"/>
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d. Family Size :

e. Family structure :

Joint	<input type="checkbox"/>	Nuclear	<input type="checkbox"/>
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f. Ethnicity :

Tharu	<input type="checkbox"/>	Newar	<input type="checkbox"/>	Brahman	<input type="checkbox"/>
Chettri	<input type="checkbox"/>	Other	<input type="checkbox"/>		<input type="checkbox"/>

**II. Family Details**

S.N	Name	Relation to respondent	Sex	Age	Education	Occupation	Marital Status (M/UM)*

\* note: M=married UM= Unmarried

2.1 Residence Period: 0-5 years  6-10 years  10+ years

Since ancestral period

3. Income:

3.1 How many members of your family work on monthly salary or daily basis?

Name of the person	sex	Average monthly income	Mode of work duration		Place of service *
			Daily	Monthly	

\*Place of service: 01= inside protected area; 02=Outside protected area; 03= In urban areas, 04= Abroad

*Section B*

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Conservation Attitude

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The statements below are related to your attitude towards environment. Please circle a number from 1 (Strongly disagree) to 5(Strongly agree) to express your opinion in the following statements in 5-point scale.

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Statements	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
1 Biodiversity is important to us	1	2	3	4	5
2 We need to conserve wildlife and biodiversity	1	2	3	4	5
3 Establishment of buffer zone was fruitful	1	2	3	4	5
4 Education on biodiversity is needed	1	2	3	4	5
5 Conservation education program in the buffer zone has been beneficial	1	2	3	4	5
6 It is the responsibility of local people to protect the natural resources	1	2	3	4	5
7 If there is unlimited access to forest for fuel wood and fodder, forest will be disappeared soon	1	2	3	4	5
8 My living conditions improved since the protected area creation	1	2	3	4	5
9 After the establishment of buffer zone you don't have problem of access to resources	1	2	3	4	5
10 It is important to set aside a place for the animals to live	1	2	3	4	5
11 It is important to protect the animals	1	2	3	4	5
12 You are willing to contribute for conservation reserve	1	2	3	4	5
13 People who poach should be punished	1	2	3	4	5
14 Poachers are law-breakers	1	2	3	4	5

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*Section C*

Conservation Behavior

Below are some of the activities or behavior you might have conducted. Please circle a number to express your opinion in 5-point scale. You can choose Not applicable (NA) if the activity is irrelevant for you.

Statement	Never (1)	Seldom (2)	Occasionally (3)	Often (4)	Always (5)	Not Applicable (NA)
1 I have participated in Conservation related Program	1	2	3	4	5	NA
2 I collect fuel woods from the forest	1	2	3	4	5	NA
3 I kill wild animals if it comes to my farm/area	1	2	3	4	5	NA
4 I inform the authority if I know about the poachers	1	2	3	4	5	NA
5 I am involved in any anti-poaching activity/group	1	2	3	4	5	NA
6 I participate in education program related to biodiversity conservation	1	2	3	4	5	NA
7 I contribute for conservation cause	1	2	3	4	5	NA
8 I make donations for conserving endangered species	1	2	3	4	5	NA

9	I respect the tradition and culture of the area	1	2	3	4	5	NA
10	I attend the EEP given by the same organization	1	2	3	4	5	NA
11	I am local from this area so I should take care of the biodiversity of this area	1	2	3	4	5	NA
12	I kill wildlife to support my family	1	2	3	4	5	NA
13	I conserve wildlife for my children	1	2	3	4	5	NA

*Section D*

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Participation in Environmental Education Program

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Below are some of the activities you might have conducted. Please circle a number to express your opinion in 5-point scale. You can choose Not applicable (NA) if the activity is irrelevant for you.

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Statement	Never (1)	Seldom (2)	Occasionally (3)	Often (4)	Always (5)	Not Applicable (NA)
1 I participate in Environmental Education Program	1	2	3	4	5	NA
2 I participate in programs conducted by schools	1	2	3	4	5	NA
3 I participate in programs conducted by NGOs	1	2	3	4	5	NA
4 I participate in programs conducted by INGOs	1	2	3	4	5	NA

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APPENDIX C

INTERVIEW QUESTIONS FOR ORGANIZATIONS

*Interview Questions:*

Questions (staff of National Park and other organizations)

- What do you think about environmental education program in Buffer zone?
- Does your organization have such program?
- How did you plan it?
- What are the goals and objective of your program?
- Whom does the program focus and why?
- Does your organization have partners with local schools and community?
- Did you have a pilot test before implementing it?
- Do you see any changes in people's perception towards wildlife after the program?
- How was it evaluated?
- Did the target audience receive the message?
- What lessons were learned from your previous education program?
- What changes would you make to the current structure of the program?
- What was the response of the stakeholders regarding the program and its outcome?
- Has the number of three glamour species (Rhinos, Tigers and Elephants) changed after the start of the EEPs?
- Do you think EEP will change the perspective of the poachers?
- What actions will the organization take if they are informed about the poachers or poaching activity?
- What are the penalties for poaching?
- Do you think there is a benefit of having EEPs to conserve biodiversity conservation?
- Are the local people provided with an alternative economic opportunity?



Government park official giving a talk on the importance of wildlife at Parsa Wildlife Reserve to local communities.



Non-governmental park official talking about the bird species at Chitwan National Park (NTNC-Museum)



Survey of a local resident at Bardia National Park.



Field assistant conducting survey with local woman in the buffer zone of Bardia National Park.



Photo credit @WCN

School students of eco-clubs learning about plant species.



Photo credit @WCN

Students planting a tree as a part of eco-club activities.