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Kaziranga National Park, India**

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Conflict or Conservation? A Roadmap for Management of Kaziranga National Park, India*

Daisy Das[†]

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Keywords: protected area, addition area, resentment, KNP, resource extraction, eco development committee, crop protection committee, park people conflict

JEL classifications: Q23; Q57

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Conflict or Conservation? A Roadmap for Management of Kaziranga National Park, India

1. Introduction

Designation of protected areas is arguably an effective wildlife management strategy for biodiversity conservation and provision of ecosystem service benefits to enhance human well-being (Kim *et al.* 2014).¹ The objective of such measure is to restrict land and resource use to counteract threat towards biodiversity. There are a number of benefits of such conservation effort that accrue to the people living in the areas surrounding the protected areas. The wildlife in such protected areas may be an important tourist attraction and a source of income and employment generation (Dong *et al.* 2012; Hussain *et al.* 2010; Angulo-Valdés and Hatcher 2010). There are instances when people extract various resources (although such activities are mostly illegal under the legal provision of protection) such as fuel wood, fodder and other natural resources for direct use or sale (Thapa *et al.* 2010, Albers 2010, and Babulo *et al.* 2008, Samant *et al.* 2000; Job and Paesler 2013; Nepal 2000; Sims 2010). The development of infrastructure in protected areas creates externalities for people living around the protected areas. Furthermore, the protected area authority often initiates and implements eco-development programs for the welfare of neighboring people (Rishi *et al.* 2008; Mahanty 2002).

However, rural people often resent conservation efforts because legal protection of a natural forest area may cause several disadvantages for them. For example, it reduces economic wellbeing of the people by depriving them of natural resources and imposing restrictions on land use (Sims 2010). Moreover, people and their properties are at the risk of wild animal attacks that cause economic losses (Mackenzie and Ahabyona 2012; Ogra, 2008). Establishment of wildlife park under the protected area designation often causes displacement and impoverishment of people. The population displacement may also compromise the cause of biodiversity conservation (Cernea and Soltau 2006; West *et al.* 2006; Colchester 2004).

The imminence of these costs overshadows the long-run benefits and that leads to people's resistance against conservation (Dixon and Sherman 1991). Such asymmetry in benefits and costs is more pronounced in developing countries because people in and around the designated areas have

¹ In general, protected areas or conservation areas are locations which receive legal protection because of their recognized natural, ecological and/or cultural values. There are several kinds of protected areas, which vary by level of protection depending on the enabling laws of each country or the regulations of the international organizations involved.

to bear proportionately larger costs than the benefits that accrue to them in the long-run (Arjunan *et al.* 2006). Kaziranga National Park (KNP, henceforth) is a protected area located in Assam, a state in the northeastern region of India. This park has a long history of conservation and conflict. The park authority and local people accuse each other of being insensitive to their respective problems. The remedy to the situation demands a baseline study to assess how park and local people are impacting on each other. To that end, the study identifies and evaluates the costs and benefits of living around KNP. It further examines the resource extraction patterns. Finally, it evaluates the park people relation and proposes policy framework to resolve conflicts.

The discussion and analysis presented in this paper are primarily based on data collected through a sample survey of villages located in neighboring areas of KNP. The data have been analyzed with numerical comparison and chi square tests. The study shows that people hardly collect any natural resources from the park but sometimes, especially during floods, they collect firewood from the buffer zones. People have been experiencing damages to life and property from wild animal attacks. They are of the opinion that their welfare issues have been hardly addressed by the park authority. In recent years, the prospects of tourism have been reasonably good, particularly around the central zone of the park and have benefitted the local people.

This paper contributes to the literature by highlighting some of the issues specific to wildlife conservation efforts at KNP that have caused conflicts between people living around the park and the authority. A protected area has a unique location, a particular ecosystem, specific social norms and a unique man environment relationship. Thus, different protected areas represent spatially and socially heterogeneous conservation units. They are often assessed and managed using spatially homogeneous approaches (Nagendra *et al.* 2010). However, 'same size fits all' policy is not going to help and needs understanding of the particular context of the protected area system at different levels along with their advantages and disadvantages (Dearden 2005). Therefore, it is important to identify and understand the specific problems of KNP before formulation of appropriate policy measures to resolve them.

The rest of the paper is organized as follows. Section 2 describes the study area. A discussion on the history of conservation and conflict at KNP is included in Section 3. Section 4 describes the methodology and the data. An analysis of the survey data and its findings are presented in Section 5. Section 6 discusses the findings and make policy recommendations. The last section includes our concluding remarks and policy implications.

2. The study area

Kaziranga National Park (KNP) is located in Assam, a state in the northeastern region of India, and refers to a vast forest area spreading across two districts: Golaghat and Nagaon. It is a 'World Heritage Site' with two-thirds of the world's one horned rhinoceroses and hosts a very highly dense tiger population. The park has an area of 430 square km between the latitude of 26°33'N – 26°45'N and the longitude of 93°9'E – 93°36'E. An additional area of 429 square km along the present boundary of the park has been added to the park at different points of time in order to provide extended habitat for increasing wildlife population (UNEP 2013). Figure 1 shows a map of KNP.

[Insert Figure 1]

In the last couple of decades tourism activities have developed around KNP. The total revenue from tourism in the park has increased from Rs. 2,197,068 in 1997-98 to Rs. 11,220,689 in 2008-09 (GOA 2009). These activities have become important as an alternative source of livelihood for the people living in neighboring areas (Hussain *et al.* 2012). Various eco-development programs were introduced in 2008 to provide with an institutional base for negotiating incentives and reciprocal commitments for conservation by the village communities. People also benefit from extraction of fish, timber, fodder and grazing of animals in the park (Shrivastava *et al.* 2007; Vasu 2002; Bhatt 2005).

One major problem of living around KNP is the damage caused by wildlife (Di Fonzo 2007). There is frequent animal depredation of crops, livestock, and property. Sometimes human life is lost too. Such damages cause considerable hardship for the people residing in the boundary area of KNP. There is prohibition on the use of resources from the park. People are often skeptical about the conservation measures that have been implemented around the park. Consequently, there are conflicts between people and the park authority (Mathur *et al.* 2005; Saikia 2011; Heinin *et al.* 2009).

3. History of conservation and conflict at KNP

The history of wildlife conservation in Kaziranga is more than one hundred years old. Until the end of the 19th century, Kaziranga was a game forest for the elites from the British colonial period. In the beginning of the 20th century, the issue of conservation started drawing attention, particularly when the government of Assam failed to accept a lucrative proposal for the supply of adult rhinoceros to the Zoological Garden in Calcutta. A preliminary enquiry revealed that rhino population was

dwindling and there was a need for protection. This realization on the part of the state coincided with the concern of the imperial government under the initiative of Lord Curzon towards wildlife. As a result, Kaziranga was notified a game reserve in 1905 by the Assam Secretariat Proceedings No. 2409(G), dated Guwahati the 4th November, 1902, to implement rules for regulating sports inside the forest. Later on, it was declared a reserve forest in 1908 and a game sanctuary in 1916. The status of Kaziranga was again changed to Wildlife Sanctuary in 1950 and upgraded to national park in 1974 (Saikia 2009). In 1985, the UNESCO declared Kaziranga a 'World Heritage Site' for its unique natural environment. In 2006, the park was declared a 'Tiger Reserve' that provides additional impetus to wildlife conservation.

In the past, people did have customary rights over natural resources and limited exploitation of some renewable resources was allowed through *fishery mahals* and *thatch mahals* (Bhatt 2005).² Besides hunting and fishing, people living in the surrounding areas used the fertile lands of Kaziranga for raising cattle and collecting timbers. There were settlements with permanent cultivation in the neighboring areas. However, with the acceleration of conservation efforts under successive Acts, their access to Kaziranga and its resources was declining gradually. The first 'Forest Act' was introduced during 1865 in India to regulate forest exploitation, management and preservation. This was a maiden attempt to regulate practices of resource use pattern of local people by law. Subsequently, another act was introduced in 1878 with the provision for reserved forest, protected forest and village forests. The 'Assam Forest Regulation of 1891' also retained the basic thrust of the '1878 Act' in matters of wild animals. But all these did not have any significant impact on the forests of Assam until the early 20th century. It was only on March 16, 1905, that shooting rules came into force to prohibit hunting, shooting, trapping and fishing within a game forest. Kaziranga was extended by adding an area of 16,347 acres in 1911 mainly to protect one horned rhinoceros which was on the verge of extinction. With the designation of reserve forest in 1908 and inclusion of new areas, prohibition on grazing as well as agricultural practices came into force in the forest of Kaziranga. Between 1908 and 1914, three villages were removed from inside the park. This was the first case of relocation in India (Lasgorceix *et al.* 2009).

People living in the neighboring areas of Kaziranga were skeptical of the protectionist measures. It stemmed from their concern over restrictions on grazing, fishing, and extracting cane, grass and firewood etc. The European community of tea planters tried to contest the idea of reserved forest on

² *Mahal* is a well-defined area wherefrom certain types of forest produce (renewable) are sold.

the ground that it would reduce their hunting area (GOA 2009). In 1924, there was a strong and collective demonstration against the establishment of reserve forests. This protest was combined with the demand for permission to practice agriculture in the forest land with the support from political leaders of the neighboring areas. Conflicts also broke between Assamese landless peasants and Nepali as well as Assamese grazers (Saikia 2009). The Forest Department failed to resist the demand of the protesters and the neighborhood areas were gradually opened for grazing and cultivation mainly in the unclassified state forest. The anthropogenic pressure on the park and its resources was increasing with time. There was extensive grazing in the forests of Kaziranga and the privileged class was allowed limited hunting. But there was also increasing pressure from the government of independent India on the Forest Department to accelerate its efforts on wildlife preservation.

The situation remained unchanged until 1974. However, during this period, there was a shift in the priority of the government on wildlife. The designation of Kaziranga as a wildlife sanctuary in 1950 was intended to make conservation more meaningful by including not only the animals, which were often shot in game reserve, but all living creatures found in the forest. Subsequently, the Forest Department of the Government of India submitted a proposal for converting wildlife sanctuaries into national parks in 1953. Simultaneously, the Indian Board of Wildlife stressed on increasing the number of wildlife sanctuaries. The Board emphasized complete prohibition of grazing and decided to stop allowing foreign and other dignitaries to hunt inside the sanctuaries (Saikia 2009). As a result of the consensus regarding the deplorable condition of wildlife and for its prevention, Kaziranga was declared a National Park in 1974 under the “The Assam National Park Act of 1968” vide notification No. FOR /WL/68/ dated 11th Feb, 1974 (GOA 2009). This heralded a period of stringent measures for conservation that prohibited all unauthorized uses of resources available in the park. During the period from 1985 to 1999, six additions to the park area were notified (Figure 1). While the first addition, a part of the second addition, and the fourth addition have been brought under the control of the park authority, the third, fifth, sixth and the remaining part of second addition are still outside the park management mainly because of the protest by the people living in these areas (TI, 2013; GOA, 2009). The protest has become stronger after the passage of the “Forest Rights Act” in Indian parliament on December 18, 2006, that recognizes the rights of the people living in forest lands.³

³ Under the Forest Rights Act, 2006 people have right to land who "primarily reside in forests" and who depend on forests and forest land for livelihood. Further, either the claimant must be a member of the Scheduled Tribes scheduled in that area or must have been residing in the forest for 75 years if people are “Other Traditional

People have tried to resist the Tiger Project introduced in 2006 in KNP on the ground that it would adversely affect tourism. They anticipate more damage by animal raids and eviction as well. At the core of recent conflict is the attempt made by the park authority to evict people from newly added areas. People often resist such land acquisition and this conflict has become more intense after the introduction of the Forest Rights Act 2006 which is intended to give land rights to indigenous people living in and around forest areas. Thus, conservation strategies are often contested by local people and the root of all such conflicts is the fear of losing land and livelihood. If such fear and uncertainty persist in the minds of people, conservation related policies cannot achieve the desired goal. This is evident from the rapid increase in the cases of poaching of rhinoceros in Kaziranga (Lopes 2014). Local support can be obtained if protected areas can generate incentives in the form of income from rural development based on wildlife resources (Kiss 1990, Swanson *et al.* 1992). An increase in economic benefits may lead to a change in the attitude of the local communities towards the protected area in their vicinity, reduce poaching, timber felling and other consumptive land uses (Kruger 2005, Sharma *et al.* 2011).

Against this backdrop, the current study examines the economics of living around the park so that it gives an idea about the feedback in the relationship between household economics and existence of protected area. It also examines the extent of people's dependence on natural resources of the park and their relation with the management authority in order to devise more effective conservation strategy

4. Methodology

The main source of data for this study is a household survey conducted in the peripheral villages of KNP in 2012-13 using multistage sampling. In the first stage, 10 villages are selected based on their distances from the central zone of the park.⁴ Three of these villages are located within one kilometer (km) of the central zone, three are located at a distance of 1 to 2 km, and four villages are at a distance of more than 2 km from the central zone. Altogether 205 households are surveyed randomly from these 10 villages.

Forest Dwellers". The main aim of this Act is to promote conservation of nature by providing land rights to neighbouring people.

⁴ There are four ranges of KNP and the Kohora range comprises the central zone. This is the most easily accessible area from the range office. The area is vibrant and tourism activities are concentrated in this area.

On an average, the interview took at least one hour to complete. The section on demographic information includes questions on the respondents' age, gender, ethnicity (caste), and religion, and the duration of stay in the locality. To understand the socio-economic status respondents are asked about their income, source of drinking water and lighting, size of land holding, types of cultivation practices, and ownership of livestock. The questionnaire also includes several questions on the respondents' involvement in tourism activities, gains from welfare programs introduced by the park authority. There are several questions on losses due to wildlife attacks, crop protection measures and compensation for damage caused by wildlife.

The variables for which data are collected through the survey are both quantitative and categorical in nature. The quantitative variables include the value of different types of damages caused by animal raids, compensation for such damages, income from tourism and other activities, compensation for land acquisition and the value of agricultural production. The rest of the variables are categorical. The analysis of quantitative information primarily involves chi square test and simple cost-benefit calculations. To examine the relationship between categorical variables, Pearson's chi-squared test is used. This test is useful in evaluating the randomness of the observed differences between sets of variables.

The survey involves a few sensitive issues like the pattern of illegal resource extraction from the park and migration status. The respondents may be reluctant to give information on the nature and pattern of resource extraction from the park as such activities are deemed illegal under the relevant protected area laws. However, their willingness to disclose their direct involvement in such illegal activities depend on how strictly laws are enforced (Leones & Rozelle 1991 and Heinen 1993 as quoted in Shrivastava and Haenin, 2007). Since the illegal immigration from neighboring countries, particularly from Bangladesh, has been a socio-politically volatile issue in Assam since the late 1970s, people who may have immigrated illegally will not truthfully disclose their immigration status for the fear of backlash. To understand the extent of illegal resource extraction from the park, indirect and informal methods are used. For example, to obtain information on the pattern of resource extraction, observations are made about the pattern of livestock herding. They are asked if fish and fuel woods are available inside the park and if security guards allow them to collect these items from inside the park. In order to obtain information about immigration status, respondents are asked about the place of residence of their paternal relatives or grandfather. This study includes those benefits and costs of living around a protected national park, which are tangible and can be quantified in monetary terms

directly. They are: income from tourism and allied activities, benefits from animal vaccination and compensation for damage caused by wildlife. The representative price of vaccine administered is Rs. 65. This is the market value of HS+BQ (Hemorrhagic Septicemia, Blackleg Disease) vaccine (vaccine for cattle usually administered under such programs). Note that people living in the fringe areas of KNP also enjoy benefits from welfare measures implemented by the park authority but incidence of such benefits is very rare and estimation of such benefits would require separate in-depth study.

The valuation of damage caused by animal raids include the market value of crop loss, repairing costs of houses and market value of other properties destroyed by animals. The present study does not take into consideration what people used to collect before Kaziranga was declared a national park as people may not remember exactly. Not a single instance of eviction or fine for illegal entry into the park has been reported by the households in the survey. Therefore, cost of protection includes only the cost of animal damage.

5. Analysis of the survey data

5.1 Demographic and socio-economic characteristics of respondents

As Table 1 indicates, the majority of the respondents belong to the other backward castes (OBC), described as “socially and educationally backward classes” in the Indian constitution. Respondents belonging to the Scheduled Tribes (ST, communities that are scheduled in accordance with Article 342 of the Indian Constitution) constitute the second largest cast category.⁵ These two categories together account for more than two-thirds of the households surveyed. Households belonging to the Scheduled Castes (SC) and others are relatively smaller in our sample. This demographic distribution by caste is very interesting.⁶ The religious distribution of the respondents is extremely skewed with 94% of them belonging to the Hindu religion. About one-third of the respondents migrated from

⁵ The essential characteristics, first laid down by the Lokur Committee, for a community to be identified as Scheduled Tribes are

- indications of primitive traits;
- distinctive culture;
- shyness of contact with the community at large;
- geographical isolation; and
- backwardness

⁶ Caste is a system of social stratification which historically separate communities into different social groups on the basis of birth.

outside the KNP area. This indicates that the areas around the park has borne some population pressure caused by migration.

[Insert Table 1]

While a majority of the respondents are farmers, about one-fifth of them consider tourism as the main source of their income. Besides about 35% of the farmers consider tourism as an additional source of income. About 20 % of the respondents work primarily as daily wage manual laborers in agriculture and construction. The average family income per month is Rs.4001.00. There is considerable disparity in the size of land holdings among the farmers. Interestingly, 45% of the respondents do not grow rice which is the staple crop of Assam and accounts for about 62.63 percent of the total cultivated land in the state. They use their lands for home gardening. This may be primarily due to flood or damage by wild animal attack.

5.2 Resource extraction from KNP

The findings of the field survey indicate that the people living around KNP are engaged in very limited resource extraction from the park. During the survey it is observed that most livestock have neck collar and are tied with a rope in open space or in the backyards of houses or homesteads. Barring a few stretches of fence and natural boundaries created by water bodies, the park boundary is largely without proper demarcation. Despite such easy access villagers do not rely on the park for fodder (except 3.4 percent). The villagers reveal that they have stopped leaving animals free to graze for the fear of predators (mainly tigers). Some respondents indicate that they catch fish occasionally when there are floods and restrictions are a bit lax. In fact, the park authority seems to allow villagers to fish in the water bodies inside the park boundary during the '*Bihu*' festival.

The villagers usually do not collect fuelwood from the forest for the fear of animal attack. Only 3.3 percent of the respondents report to have collected fuelwood from inside the protected area. However, the forest guards sometimes allow villagers to collect uprooted trees for special occasions like wedding ceremony or cremation. Furthermore, about 18 percent of the respondents state that they collect fuelwood and bamboo during floods from the Karbi hills that comprise a buffer zone of the park on its southern border. Note that flood is a recurrent natural occurrence in the park and about 90 percent of the respondents are affected by it ever year.

Overall, the study finds little evidence of illegal resource extraction by the neighboring people at KNP. This finding resembles that of Niedzialkowski *et al.* (2014) who conclude that the people living around Biatowienza National Park in Poland do not depend on forests for their livelihood. Similarly, Nagothu (2001) finds that people extract resources from forests in the semi-arid regions of Rajasthan but these resources primarily comprise dry woods and grasses which cannot be a threat for forest. This form of resource extraction without a profit motive does not lead to forest destruction (Ali *et al.* 2004). This is contrary to the mainstream view that forest is destroyed by local resource utilization and cutting of trees.

The attitude of local people towards wild animal is interesting. They are very kind to the animals and help the park authority to rescue distressed animals during floods and other circumstances. There are instances when people worship stray wild animals from the park. This is not uncommon in Hindu religion. Animals like lions, elephants, cows, bulls, monkeys, dogs, rats, snakes, and birds are an integral part of Hindu mythology. These animals are often associated with different deities and are given protection.

5.3 Economics of living around KNP

People living around protected areas rear livestock as it contributes to household income (Hedge and Enter, 2000). Approximately 90 percent of the households in the neighboring areas of KNP rear livestock. The respondents in our survey state three reasons for this: to use in agriculture, to produce milk for household consumption as well as for market, and to sell as a source of meat. However, about 85 percent respondents report to have faced difficulty in collecting fodder for these animals. Such shortage of livestock feed may have an adverse impact on people's attitude towards the park (Newmark, 1993). Traditionally, the forest and its surrounding areas have been the source of animal feed. However, a majority of respondents (82 percent) have come to realize that there has been a gradual decline in grassland for livestock. There are several supply and demand-side factors that are responsible for this decline. *First*, as the population in the neighboring areas grows, the available grazing area is shrinking. *Second*, the restrictions imposed by the park authority on grazing has also contributed to this decline. *Third*, the livestock population is also growing and it has created additional demand increasing the pressure on the available grazing areas. More than one-third of the respondents (36.6 percent) report non-availability of veterinary doctors as another problem. A large majority of the

respondents (84.4 percent) think that although rearing livestock was a good business in the past, it is no longer profitable.

In order to shed some lights on the potential conflict between conservation efforts and the perceived decline in profit, we now conduct the Pearson's chi-square test. The maintained null hypothesis is that the perception of declining profit and that of restriction on grazing by the park authority as a major problem for rearing livestock are independent. The estimated test statistic and the associated p -value, reported in Table 2, indicate that the null hypothesis is strongly rejected. This result seems to indicate that people may have seen conservation efforts as detrimental to their livelihood. Among the problems listed by the respondents, non-availability of veterinary doctors is one area where the park authority may provide help to the people living around the park and may thereby reduce conflict. To assess if that could be a potential area of intervention, we further test the null hypothesis that the perception of declining profit and that of non-availability of veterinary doctors as a major problem for rearing livestock are independent. As Table 2 shows, they are strongly associated and we may conclude that providing for veterinary doctors may be a way for the park authority to earn people's goodwill and support in conservation.

[Insert Table 2]

A common problem of living around KNP is life and property damages caused by animal attacks. Often herds of elephants raid crops, destroy houses and sometimes take human life too. The number of human lives lost to animal attacks has been reported be only three in recent years. The livestock damage is stated to be nominal. This is primarily because people rarely let their animals graze freely in the open. Most killings of livestock occur when animals are left for grazing in wild habitats (Rao *et al.* 2002). Table 3 shows that the damages due to wild animal attacks rampant around the park and about 78 percent of the respondents have suffer damages at least once during last few years. The most common damage is related to crop. Many a time flocks of birds (such as parrots) or monkeys come from inside the park and destroy crops.

[Insert Table 3]

The value of damages caused by animal attacks is the highest (Rs. 9984.22) for those who suffer multiple damages, say, to residence and to crops. Table 4 shows that damages are the most severe (in terms of their value) within 1 km from the central zone. This finding is consistent with those of Mackenzie and Ahabyona (2012) and Linkie *et al.* (2007). These studies find that households living

very close to the protected area incur the highest losses. The differences in the value of damages at different distances from the central zone are found to be statistically significant ($F_{2,202} = 4.269$, p -value = 0.015). This indicates that there is a relationship between distance from the central zone and the extent of damages (Rao *et al.* 2002). Local people take preventive measures by keeping a watch on crops at night but it has become less effective as wild animals often come in a large groups.

[Insert Table 4]

Taking into account the problem of animal raids, it is really important to implement measures for crop protection. Fences that were installed in three villages are found to be inadequate for a lack of maintenance. The survey finds that only 11.7 percent of the respondents have crop protection committees in their localities.⁷ More than half of these committees are formed by the local youths with no support from the park authority or any other organizations. Under the existing law, there is a provision of compensation for damages caused by wild animals. But only 6.8 percent of the respondents received compensation in recent years. But such low rate of compensation is not common in other protected areas (for example, the protected areas of the Western Ghats in India studied by Karanth *et al.* (2013), and protected areas of Ghana as discussed in Harich *et al.* (2013). The villagers find the claim process complicated: they have to submit a photograph of the scene of wildlife destruction. People often fail to do so and suffer monetary losses due to animal raids. However, this finding is confirmed by Pechacek *et al.* (2013).

The findings of the survey suggest that tourism holds ample promises of gainful livelihood opportunities for the people living around KNP. According to the study, about 35 percent of the households participate in various types of tourism activities like elephant safari, jeep safari, employment in hotels and resorts, group dancing and singing for the entertainment of the tourists, and production and sales of handicraft items. The average annual household income from tourism and related activities is about Rs.5667. This figure is higher than the average income from all other types of income-generating activities (Rs. 4001). In several instances, the respondents state that they supplement their household income by working part time in the tourism industry. These findings accord well with those reported by Alet *et al.* (2012). They find that the villagers around KNP are

⁷ It is a committee formed by local people to protect crop, property, and life from animal raids. The KNP park authority usually trains these people and supply lights, crackers, burn oil, mega phones to chase away animals and to alert villagers.

largely independent of the agricultural sector for livelihood as it is very common for them to have at least one nonfarm job in addition to cultivation.

The people living around a protected area like KNP often stand to gain from the welfare measures implemented by the park authority under eco-development program. Contrary to this expectation, the study finds that about three-fourth of the respondents never availed of any welfare benefits. The remaining one-fourth of the respondents received benefits in the forms of community hall (1.5 percent), animal vaccination (14.6 percent), drinking water filters (0.5 percent), health camps (6.8 percent), and establishment of school in the locality (0.5 percent). The study finds that 96 percent of the respondents are not even aware of the eco-development programs nor are they associated with any Eco-Development Committee (EDC). Only about 2 percent of the respondents state that fisheries were dug under eco-development programs but they remained incomplete. Such failures of Integrated Conservation and Development Project are not uncommon (Wells *et al.* 2004; Mahanty 2002). Almost 89 percent of the respondents have reported that they are not satisfied with the welfare measures implemented by the KNP authority.

The discussion above shows that there are both costs and benefits of living around KNP. By aggregating these costs and benefits, we can have a rough assessment of the net welfare gain that accrues to the people living at different distances from the central zone of the park. Table 5 shows that the total monetary value of costs and benefits that accrue to the people living within one kilometer, between one and two kilometers, and beyond two kilometers away from the central zone. The benefits are divided into three components: income from tourism, costs of animal vaccination provided by the park authority, and compensation paid in case of damages caused by animal raids.⁸ In contrast, costs include the total costs of all types of damages caused by wild animals. The last row of the table presents the net benefits. Note that the net benefits are about four times higher within one kilometer from the central zone than those in areas beyond two kilometer.

[Insert Table 5]

The average value of net gain per household is estimated to be about Rs.995. The net gain arises primarily due to surplus income from tourism activities. Hussain *et al.* (2012) finds that people's income from tourism in KNP accounts for about 40 percent of the total expenditures incurred by the

⁸ Note that the benefits do not take into account the life time income from tourism and the life-time benefits of vaccination. Thus, the values reported in Table 5 are conservative estimates.

tourists in the park. The value of aggregate net gain declines with an increase in the distance from the central zone of the park. This finding confirms the inequality in distribution of gain reported by Albers *et al.*, (2007). Overall, the study shows that although there are costs of living around protected areas due to various restrictions, still there are positive net benefits of protection primarily because of the gain from tourism activities (Mackenzie *et al.*, 2012; Job *et al.*, 2013; Dong *et al.*, 2012).

5.4 People-park relationship in KNP

When respondents are asked about their relationship with the KNP authority, about 88 percent of the respondents report to have harboured a negative attitude towards the authority. Musavi (2011) and Tomićević *et al.*, (2011) also report similar responses in their respective studies of protected areas in India and Serbia. There is a widespread feeling of resentment in people's minds and it is apparent in their responses. Such negative attitude may be attributed to the conflicts between the park authority and the people living around the park (Shyamsundar and Kramer 1997; Gillingham and Lee 1999). In order to shed lights on the relationships between people's negative attitude and various benefits and costs-related factors, we now present the Chi-square test results in Table 6

[Insert Table 6]

The Chi-square test results presented in Table 6 suggest that the negative attitude harbored by the people living in the neighboring areas of KNP is associated with three variables: participation in tourism, availability of crop protection committee and damages caused by animal raids. Except for its association with damages, the statistically significant association with other two factors is somewhat counterintuitive. It may be the case that since only about 35 percent of people in our survey are employed in tourism related activities, the test result is picking the negative feeling of the majority who do not work in the tourism industry and therefore do not benefit from it. With the expansion of tourism, more people are likely to benefit from it and they are likely to develop a positive attitude towards the park authority. Furthermore, the damages caused by animal raids have been so common and costly that the few crop protection committees that exist have not been effective in preventing damages. This may explain the significant association between people's negative attitude and the existence of crop protection committees.

6. Discussion and recommendations

Despite conflicts and protests, establishment of protected areas is a very important and desirable measure for biodiversity conservation because global gain from protection always outweighs local costs. The local communities typically earn little income but incur substantial costs due to eviction and exclusion, crop and livestock losses and experience a general deprivation of resource access (Vedeld *et al.* 2012; Adam *et al.* 2007; Mackenzie *et al.* 2012). This is true for most of the protected areas and KNP is not an exception. The long history of conservation has shown that with the increase in level of protection, the underlying dimension of socio-economic problems around the landscape has also changed. These problems are so intertwined with the protection measures that any change in protection policies may have severe impact on biodiversity conservation.

In case of Kaziranga, the current study shows that rearing livestock is no longer a profitable business due to several problems like scarcity of fodder and veterinary doctors. The park authority provides for vaccination of cattle in the surrounding villages but this service provision has been very limited. The authority may hope to build a better relationship with the people living in these villages by creating more animal care facilities. Mobile veterinary hospitals and periodic animal health camps may go a long way in this direction. Besides, the park authority may arrange to allow villagers to collect grass from selected areas inside the park once a week. This may have double benefits as it will help the authority maintain the park at low or no cost (Vedeld *et al.* 2012; Shrestha *et al.* 2006). This would allow regulated use of forest resources (Shah 2007) and may help reducing conflicts between people and the park.

The implementation of welfare measures has been meagre and ineffective. Except for the benefit of vaccination, there is hardly any tangible benefit that the people enjoy. There barely exists any effective crop protection measure. Crop depredation can reduce farmers' tolerance towards wildlife (Linkie *et al.* 2007; Dragos 2012). The provision of compensation for damage caused by wildlife exists but the process is so cumbersome that people rarely apply for such compensation. Since the policy behind such welfare schemes aims at obtaining local support for the preservation of biodiversity, a serious and sincere review of such measures and their implementation is essential before local people lose faith on the park authority.

The study finds that the net gain from living around KNP is positive but concentrated in the central zone. Therefore, there should be extensive development of tourism activities as a whole and

there should be a thrust on expanding such activities to the far-flung areas in the periphery. These areas may become the breeding grounds for anti-park activities if better livelihood opportunities are not created for the local people. The households evicted from the designated park areas should be rehabilitated in model villages that are established with the goal of promoting tourism and creating employment for the displaced people. This strategy may help develop a healthy park-people relationship and may minimize resistance to conservation in the long run. The development of ecotourism may go a long way in achieving this goal (Nyaupane *et al.* 2011). By integrating ecotourism into a broader array of sustainable livelihoods, it is easy to gain support from local people for conservation efforts (Banerjee 2010). This will not only provide sustainable livelihood but also reduce the pressure of tourism from the central to the peripheral areas.

7. Concluding Remarks

This study examines the pros and cons of living around KNP, a protected area, by conducting a primary survey among the people who live in the neighboring villages. It finds no evidence of eviction or pecuniary punishment by the park authority against the households as feared by the villagers. The resource extraction pattern shows that it cannot be a cause of conflict between people and the park. Our findings show that potential conflict arises primarily because of the fact that people suffer damages due to animal raids but the park authority rarely takes any effective measures to contain it or to compensate for those damages. Besides, the eco-development programs are not effectively implemented to improve wellbeing of the people living in the neighboring areas. Furthermore, the gainful employment opportunities in tourism-related activities are confined to a relatively small segment of the local population. Consequently, people harbor a negative attitude towards the park authority. However, the study also shows that tourism and related activities generate substantial benefits (including income) that offset the losses caused by animal raids. Thus, tourism holds the promise of eliminating the negative attitude among people towards conservation and resolving potential conflicts. The government may go ahead with eviction of households from the designated areas as long as appropriate compensations are paid and sustainable livelihood is ensured. Development of tourism in and around the park may help achieving this goal. However, utmost care should be taken to ensure that the tourism activities do not hinder the efforts to conserve biodiversity of the park. The construction of tourism infrastructure should not destroy the flora and fauna of the park and should be sensitive to the ways of wildlife living.

This study has several limitations. First, it presents only a snapshot measure of tangible costs and benefits of living around a protected area and, therefore, ignores the long-run dynamic aspects. Furthermore, there may be non-quantifiable costs and benefits that haven't been considered here. Second, the survey excludes the six areas that have been newly added to the park. Legally, they belong to the park but most people who have been living there have refused to cede these areas. These additions are excluded from the survey since the park authority is not responsible for the welfare of the people living in those areas. Despite these limitations, this study highlights some of the important issues on the people-park relationship and thereby is suggestive of ways to resolve potential conflicts.

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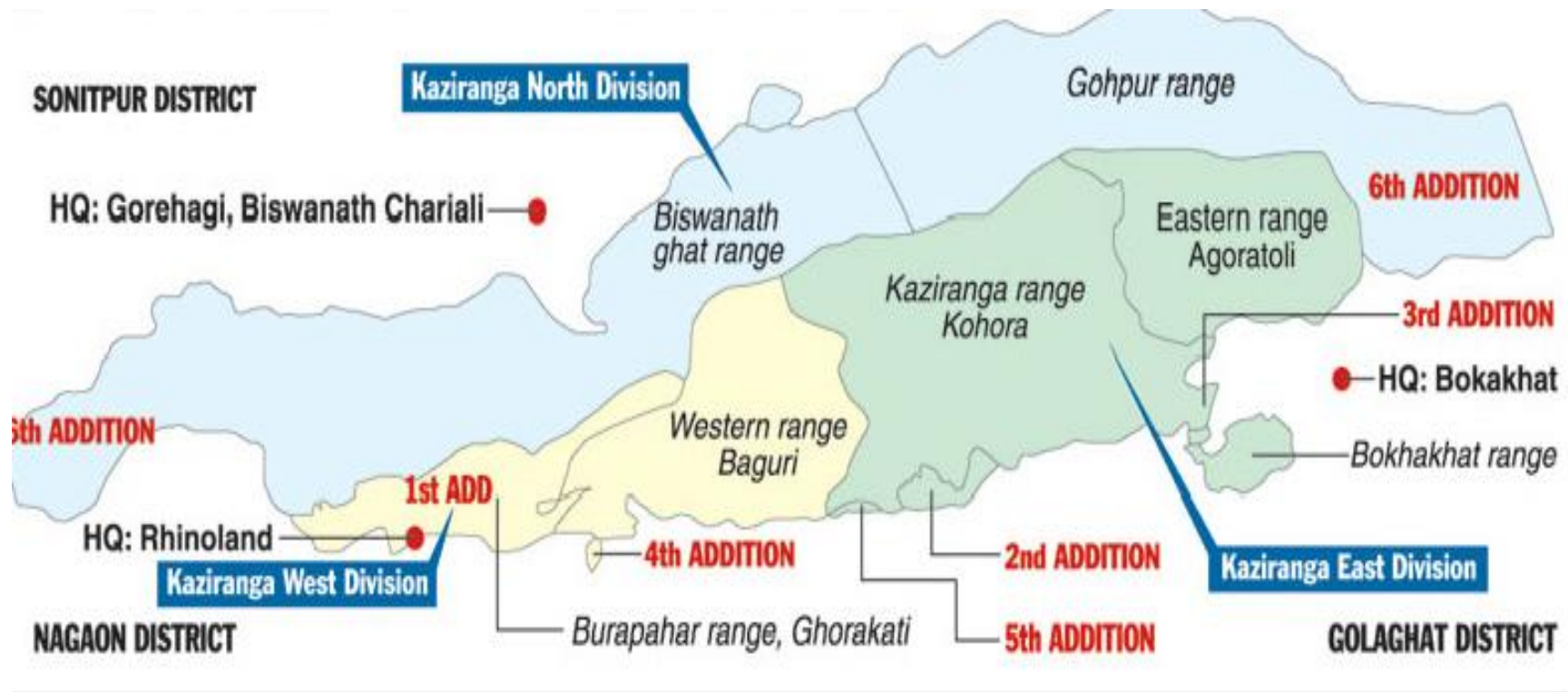


Figure 1: Map of Kaziranga

Note: It has been proposed by the Forest and Environment Department, Government of Assam in 2013 that there will be four divisions to protect rhinoceros: the west division with Burapahar and Baguri ranges; the north division with Biswanathghat and Gohpur ranges; the east division with Kohora and Agoratoli ranges and the Kaziranga eco-development division (not seen in the map).

Source: The Telegraph, 10th February, 2013

Table 1. Demographic and socio economic characteristics

Variables	Categories	Frequency distribution of respondent (in percentage)
Caste	Other backward caste	39
	Scheduled caste	11.7
	Scheduled tribe	30.2
	Others	19
Religion	Hindu	94.1
	Muslim	3.9
	Christian	2.0
Place of origin	Aboriginal	65.9
	From nearby villages	2.4
	From other village within the district	7.3
	From other district	7.3
Occupation	Farmers	42.5
	Farmers engaged in tourism for additional income	15
	Laborer	21.5
	Tourism business	20.20
	Job	9.8
	Other activities	6
Types of farmer*	Marginal farmer (average holding size=.5950 ha)	16.8
	Small farmer (average holding size=.1.6016 ha)	18.5
	Semi medium farmer (average holding size=3.3320 ha)	14.6
	Medium farmer (average holding size=6.7631 ha)	17.1
	Large farmer (average holding size=26.5942 ha)	32.9

Source: Author's calculation based on primary household survey data

Note: The definitions for various types of farmers are taken from NABARD Rural Pulse (2014) available at <http://www.nabard.org>.

Table 2. Pearson’s chi-square test result for potential link between the perception of declining profit in livestock rearing and conservation effort

Null hypothesis	Estimated chi square value	Degrees of freedom	<i>p</i> -value
The perception of declining profit and that of grazing restriction as a major problem in rearing livestock are independent	196.3	2	0.008
The perception of declining profit and that of non-availability of veterinary doctors as a major problem in rearing livestock are independent	284	2	0.001

Source: Author’s estimation based on survey data

Table 3: Distribution of respondents suffering damages due to wild animal attacks

Types of damage	Frequency (in percentage)
Destruction of house	22.0
Crop damage	28.8
Livestock killed	.5
Destruction of both house and crop	26.3
No damage by animal raids	22.4

Source: Author's calculations from survey data

Table 4. Value of damages caused by animal attacks at various distances

Distance from the central zone of KNP	Mean value of damage (in Rs.)	Std. dev.
Less than 1 km	6653.82	9430.611
More than 1 km	2846.41	4083.427
2 km and more	4424.34	5559.403
Mean value of damage	4694.69	6713.956

Source: Author's calculation from survey data

Table 5: Estimated costs and benefits of living around KNP (values are in Rs.)

	Items	Within 1km(56 households)	Between 1km to 2 km(44 households)	Beyond 2 km and more(105 households)
Costs	Aggregate value of damages caused by animal raids	962412.00	497856.00	464556.00
	Aggregate income from tourism	1145550.00	650670.00	514000.00
Composition of benefits	Aggregate benefits from vaccination	1950.00	1170.00	780.00
	Aggregate value of compensation	8500.00	7500.00	1000.00
Net benefit		193588.00	161484.00	51224.00
Per household net benefit	995.30	3456.93	3670.09	487.85

Source: Author's calculations based on survey data

Table 6. Negative attitude versus various benefits and cost-related factors

Variables	Chi square value	Degrees of freedom	Significance level
Compensation for damage caused by wildlife	0.407	3	0.235
KNP facilities	0.068	1	0.415
Participation in tourism	6.671	1	0.013
Authority does not allow for grazing	1.063	2	0.151
Availability of crop protection committee	7.323	1	0.007
Damages caused by animal raids	6.981	4	0.097

Source: Author's estimation