Identifying Potential Ecotourism Sites Among the Hotspots of Livestock Kills by Major Predator Species in Bhutan

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Disclaimer: The findings, interpretations and conclusions expressed in this study do neither necessarily reflect the views of Department of Forest and Park Services of Royal Government of Bhutan nor of the employer.

Abstract: Every year farmers living in and around protected areas in Bhutan suffer huge financial losses due to crop damage and livestock predation by wildlife, yet there was no sustainable solution in mitigating human-wildlife conflicts. The number of livestock kills at national level may not be very significant but the impact of rural poor household is huge. Using secondary data, top three hotspots of human-wildlife conflicts for identified and map for each predator species, namely Tiger, Snow Leopard, Himalayan Black Bear and Common Leopard. The hotspots species was assessed using four major attractions indicators like natural attractions, cultural attractions, recreational activities and historic and heritage attractions. Nabji, Korphu, Pashi, Toko and Buli *chiwogs* were found to be the most potential ecotourism sites in Bhutan. These sites have high mean scores for all indicators of tourist attraction. However, the finding has to be interpreted with caution, as there was no consideration given to effects of attraction sites located nearby these hotspots.

1. Introduction

1.1 Country Background

Located in the Eastern Himalayas Kingdom of has an area of 38,394 km^2 and population of more than 0.783 million (NSB, 2016). It rises sharply from Indo-Gangetic plains in the south, east and west at an altitude of about 200 m to more than 7,500 m in the Himalayas that form a natural northern border with China.

Bhutan can be divided into three distinct physiographic zones: the southern foothills (200 m to 2,000 m), the inner Himalayas (2,000 m to 4,000 m), and the great Himalayas (above 4,000 m). The extreme variation in altitude has created a corresponding range of climatic conditions varying from hot and humid tropical and subtropical conditions in the southern foothills to cold and dry tundra conditions in the north. Latitude, precipitation, slope gradient, and exposure to sunlight and wind further influence these conditions. Consequently, the nation features an equally amazing diversity of vegetation. Grierson and Long (1983) have distinguished 11 vegetation zones.

About 70 percent of the kingdom is covered with forests; 7 percent with year-round snow and glaciers; nearly 3 percent is cultivated or agriculture areas; and 4 percent as meadows and pastures, while rest of the land is either barren, rocky or scrubland (NSB, 2016). Predominantly agrarian, 79 per cent of the population practice subsistence agriculture, livestock rearing and use of forest products (NCD, 2004).

1.2 Ecotourism in Bhutan

Bhutan's tourism industry began in 1974. It was introduced with the primary objective of generating revenue, especially foreign exchange; publicizing the country's unique culture and traditions to the outside world, and to contribute to the country's socio-economic development. Since then the number of

tourists visiting Bhutan has increased from just 287 in 1974 to 155,121 arrivals in 2015 (Dorji, 2001; TCB, 2016). Contribution from tourism industry was US$ 71.04 million in 2015 that was significant increase from only 2 million in late 1980s (NSB, 2016; TCB, 2016).

A majority of tourists (85 percent) visited Bhutan for cultural sightseeing and related activities with most frequented months in October, March and April. Every year the western districts of Paro, Thimphu, Punakha and Wangdue Phodrang received the largest share of tourist arrivals. In comparison, Tsirang, Sarpang, Zhemgang, Gasa, Lhuntse, Trashi Yangtse, Samdrup Jongkhar, Trashingang, Mongar, Haa, and Chukha received fewer tourists, but saw a growth since 2014 (TCB, 2016).

Unlike management approach of the protected areas elsewhere around the world, in Bhutan local communities reside within the protected areas. Often the livelihood of these rural communities is completely dependent on the natural resources. Thus Bhutan local communities are acknowledged by the management of the protected areas network as critical for maintaining environmental and cultural values of the protected areas (DoFPS, 2012).

While benefits from these protected areas are indirect and for greater good for general Bhutanese people and global community, the stringent conservation policies and rules are often known to adversely impact these local communities. Frequent wildlife predation of livestock and crop damage affects their subsistence livelihood. Thus to achieve both community development and conservation goals, an integrated approach has been identified as one of the most important conservation and development tools to support protected area management. Promotion of ecotourism was identified as one of the main entry points to achieve Bhutan's goal of Integrated Conservation and Development Programmes (ICDPs) (DoFPS, 2012).

1.3 Human-wildlife conflict

Human-Wildlife Conflict (HWC) is growing global concern posing serious threats to endangered species and affecting livelihood of thousands of poor people (Distefano, 2005). Wildlife population in the protected areas inflict heavy losses on nearby communities. In turn the local residents retaliate exacerbating the conflict and undermining conservation efforts. They do develop negative attitude towards protective areas and wildlife species depredating their crops and livestock. There is need to protect the sources of rural livelihood, reduce their vulnerability and foster community-based conservation. Wang (2006) analysed the trend of crop damage from 1991 to 2005 by wildlife in communities around Jigme Singye Wangchuck National Park (JSWNP) in Bhutan and has found that there was an increasing trend in crop damage by various wild animals.

Tiger and other big cats frequently predate on livestock in central Bhutan while elephants rampage the crops in the south. People in eastern and western Bhutan suffer heavy losses from other wild animals like wild boar, monkeys and many others (Wang et al., 2006). In 2002 tiger compensation schemes was established providing temporary solution. However it had many limitations. Realizing that the scheme was unsustainable, Ministry of Agriculture and Forests (MoAF) of Royal Government of Bhutan came up with endowment fund for human-wildlife conflict (HWC) management, which will establish a viable funding mechanism so that HWC mitigation activities are sustained. Currently MoAF is already facing huge challenge in raising the fund for seed money (MoAF, 2012). Given the high degree of HWC in Bhutan, immediate management intervention is necessary. However optimal management strategies must consider both the costs and benefits of wildlife resources.

Various management strategies for combating human-wildlife conflict have been practiced under diverse demographic, economic and social circumstances. Managing HWC are integral parts of wildlife management (Schuhmann & Schwabe, 2000). Since the issue of HWC cuts across various sectors to reduce its impact contribution from various stakeholders is very necessary. Distefano, 2005 reviewed various management practices around the globe in combating HWC and reported that often management practices were ineffective while others were financially unsustainable or technically complex and costly for marginalized rural communities to implement. Nevertheless HWC is known to be reduced through management practices involving low cost technologies like electric fencing, community based natural resource management schemes, incentive and insurances programmes. The author also recommends that short-term mitigation tools have to be combined with long-term preventive measures.

When low cost and less environmental impact and traditional strategies were not effective, other measure like regulated harvesting, wildlife translocation and human resettlement were other available mitigation options. For instance the majority of households around JSWNP guard their crops by spending night at the field while others resort to wooden fencing (Wang et al., 2006).

Royal Government of Bhutan with support from donors has implemented various strategies like electric fencing and alarm fences around the agricultural fields to reduce crop rampages by wild animals. Such strategies were further supported by pilot projects of livestock and crop insurance schemes implemented by DoFPs (MOAF, 2012). However both the strategies are becoming unsustainable and ineffective due to huge financial implications. Often crude electric fences claim lives of farmer and their livestock. Thus this study would like to promote ecotourism as an alternative to compensation of lost crop and livestock to wild animals.

Using secondary data, hotspots of HWC for major predator species in the country was identified and mapped. Study was supposed to be focused on animals like big cats, dhole, elephant, deer, boars and primates as they were identified as main animal groups responsible for the damage. However the data was only available for major predator species like Tiger, Snow Leopard, Himalayan Black Bear and Common Leopard. Top three hotspots for each of the species were the assessed for ecotourism potentiality. The most potential ecotourism sites for each was then identified for promotion as ecotourism sites.

2. Methods

2.1. Identification of Hotspot sites

Secondary data on human wildlife conflict (HWC) from Department of Forest was acquired and analyzed. The 13-year data (2002 to 2015) maintained by Nature Conservation Division under Department of Forest and Park Services of Royal Government of Bhutan was used for the study. The data was maintained mainly for compensation payment to livestock kills by protected wild animals like Tiger, Snow Leopard, Himalayan Black Bear and Common Leopard. Based on total number of kills by each of these species, top three kill sites based on total number of kills over the period of 13 years was identified. The hotspots sites were identified to the lowest administrative units, *chiwog* (block level) as per data maintained at the Forestry Department. Then all three hotspot sites for the four main predator species were assessed for the potentially to be promoted as an ecotourism site in the country.

2.2 Identification Potential Ecotourism Sites

As per the standard methodology suggested by Conservation International (CI, 2005) the first step for understanding an ecotourism potential of a site was to make an attraction inventory relating to; (1) Natural attractions (2) Cultural attractions (3) Recreational activities and (4) Historic and heritage attractions. A natural attraction includes landscapes, lakes, forests, parks, caves, waterfalls, climates, unique and endangered species, birds, reptiles, and other animals. Biodiversity and nature in general are considered big tourism attractions particularly for ecotourism. Cultural attractions assessment was based on traditional lifestyles, rituals, religious ceremonies, festivals, large events, arts and crafts, music, dances, traditional cuisine, and local economic activities such as fishing, farming, etc. These attractions will allow the visitor to learn about the culture of the destination. Recreational activities comprised of boating, trekking, mountain climbing, hiking, camping, biking, river rafting, wildlife viewing, bird watching, picnicking, sunbathing, relaxing and swimming. While historic and heritage attractions encompassed of assessing the forts, castles, sacred places museums, temples, distinctive architecture, archaeological sites, monuments, memorials, burial grounds,

birthplaces/homes of famous people, early settlements, historic town centers and districts, landmarks, shrines, historic tours, and interpretation.

The four main categories of attractions mentioned above has been evaluated and rated based on the indicators like uniqueness, aesthetic value, biodiversity, cultural value, historical value, use and activities, community participation, ability to control tourism at the site, access and potential for product development. Each top three-hotspot site of a species was assessed and evaluated by the principal investigator and field assistants, who are rangers with knowledge of ecotourism and also trained for this particular assignment. The ratings for each site for all attraction indicators were an average rating of five or more field evaluators. Each of the criteria was rated from one to five with five being the most positive rating. The highest score was five; three for average and one as the least value for these various indicators to maintain uniformity while rating.

SWOT analysis was used for comparing three hotspot sites of each of the predator species and the most probable site with higher potential for ecotourism development was suggested.

3. Results and Discussions

3.1 Total Livestock Kills

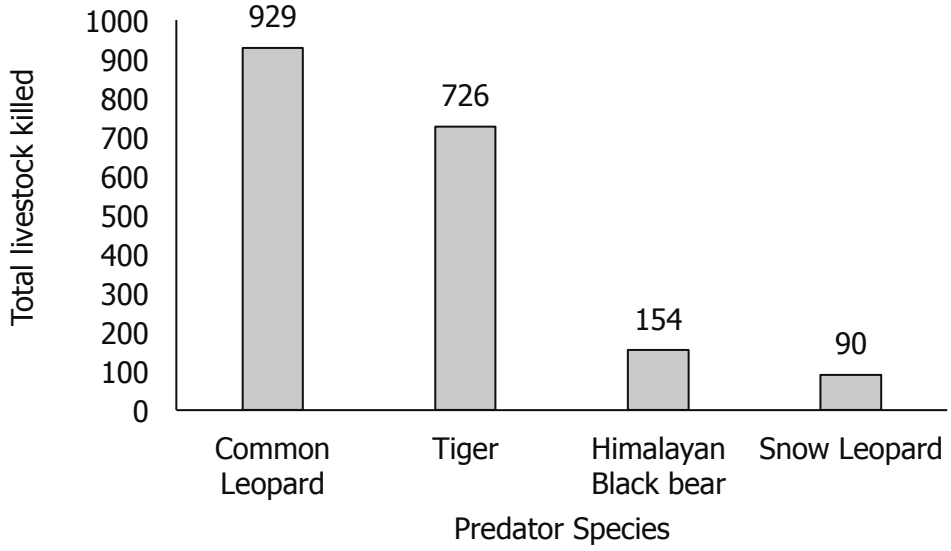


Figure 1: Total Livestock Kills by Major Predators from 2002 to 2015

Common leopard was found to be the major livestock predator in Bhutan. During the past 13 years nearly half of the livestock kills were by Common Leopard while tiger was responsible for almost 38 percent of the total kills. Together these two big cats have killed almost 90 percent of the livestock during the period.

3.2 Hotspots of Tiger Kills

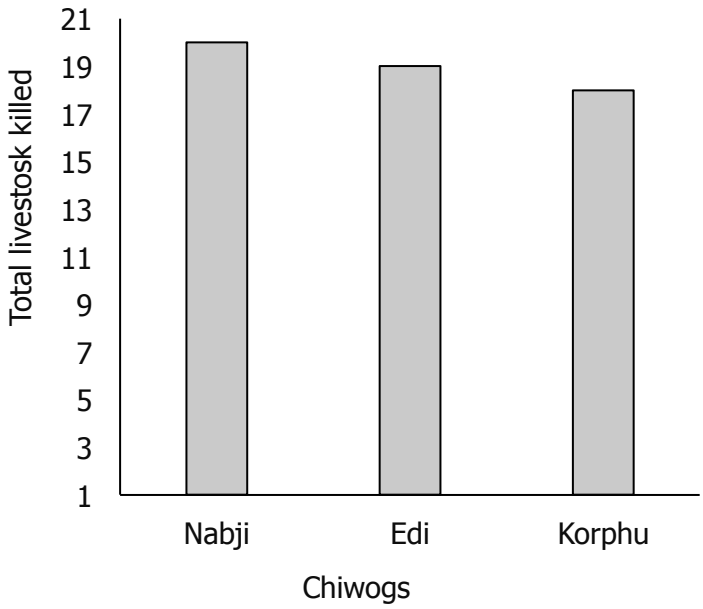
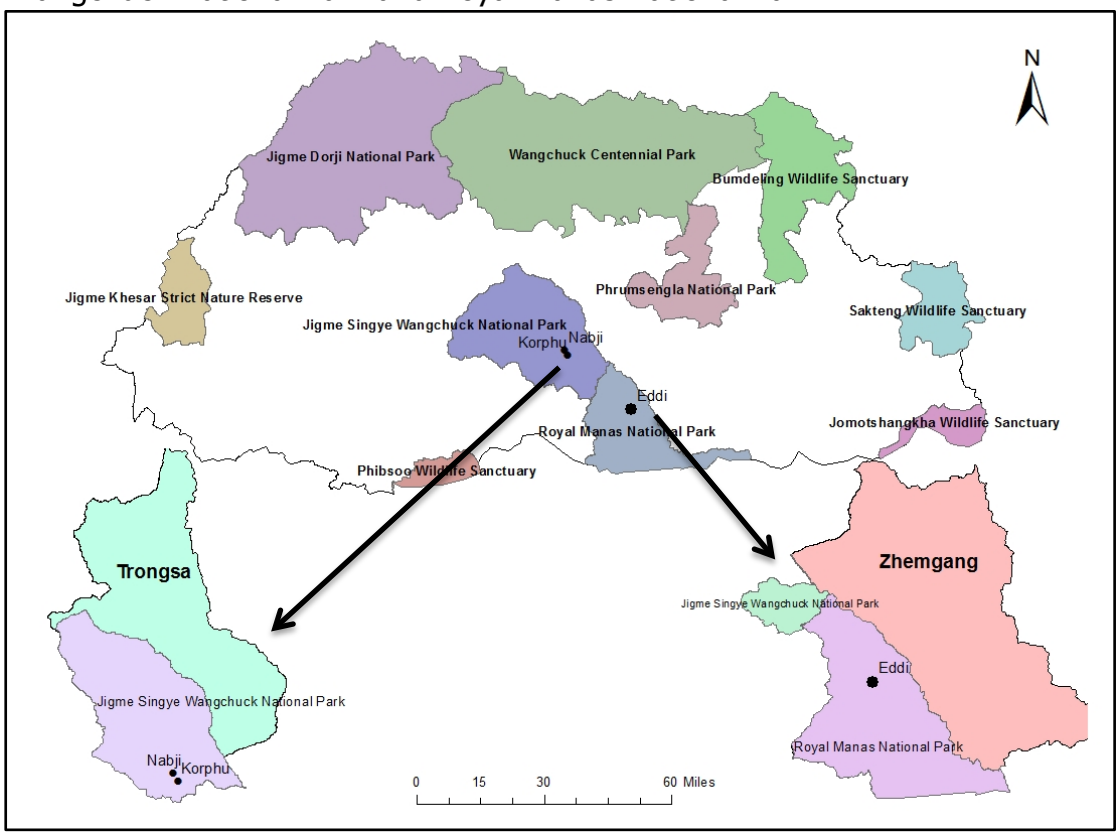


Figure 2: Hotspots of Tiger Kills

Maximum Tiger kills over the past decade happened in Nabji and Korphu under Trongsa *dzongkhag* and Edi *chiwog* in neighboring Zhemgang *dzongkhag*. Both these district are located in central Bhutan within the mid-Himalayan range with thick evergreen forest and rich in biodiversity a perfect habitat for Tigers. All three sites are located in and around Jigme Singye Wangchuck National Park and Royal Manas National Park.



Map 1: Showing location of Tiger Hotspot Kills

Main Attractions in Top Three Tiger Kill Sites

All three sites have extreme rich forest cover and biodiversity thus this would serve as a great natural attraction. Nabji and Korphu adjacent *chiwogs* near Jigme Singye Wangchuck National Park while Edi is located next to Royal Manas National Park. Consequently all three sites were known habitat of endangered animals like Clouded leopard, Tiger, Golden Languar, Himalayan Black Bear, Musk deer and Leopard cat. The three sites were also extremely rich in orchids and many other flowering plants as reported in the management plans of the two parks.

The cultural attraction of the sites was also catalogued. Nabji and Korphu have higher number of cultural attraction sites with special reference to the revered 8th century Indian Buddhist saint, Padmasambhava who introduced Buddhism in the country. Further these *chiwogs* also has communities of indigenous people known as *Monpas*, often referred to as the original people of Bhutan. On the other hand, the only cultural attraction at Edi were few indigenous bamboo crafts and local cuisines, which were not much different to what was being observed in other two sites. Maybe case of Edi as a potential eco-tourist site might be helped by a historic and heritage attraction like ruins of ancient fortress at Pranabi. However, it needs major restoration before it could become a touristic site.

Assessment of Tourist Attraction at Tiger Kill Sites

The mean score for each of the four main categories were shown in figure 3 to 5. Both actual score and the percent of total score were presented. The ratings were subjective but based on at least five evaluators including the principal investigator.

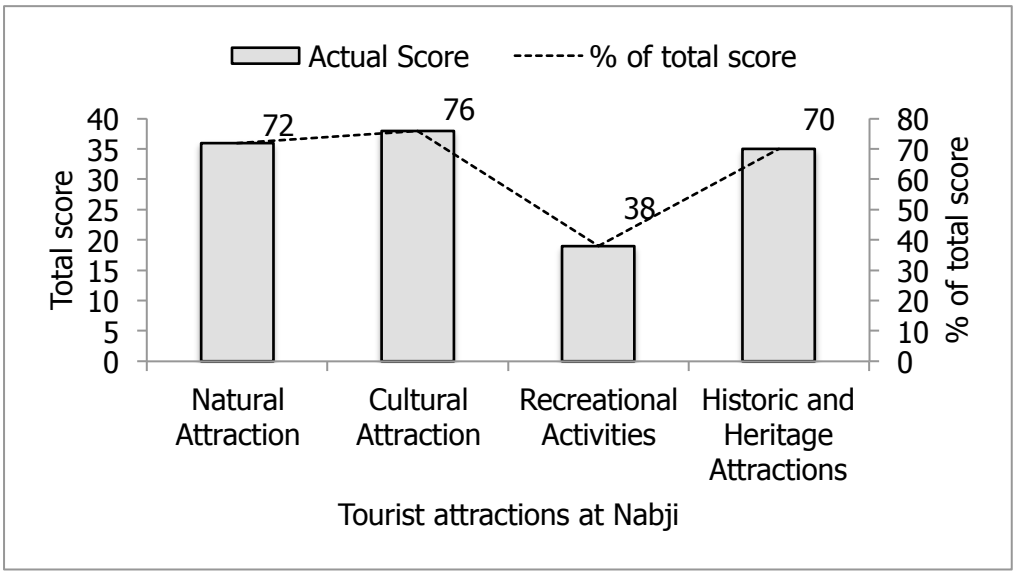


Figure 3: Mean Score for Attractions at Nabji

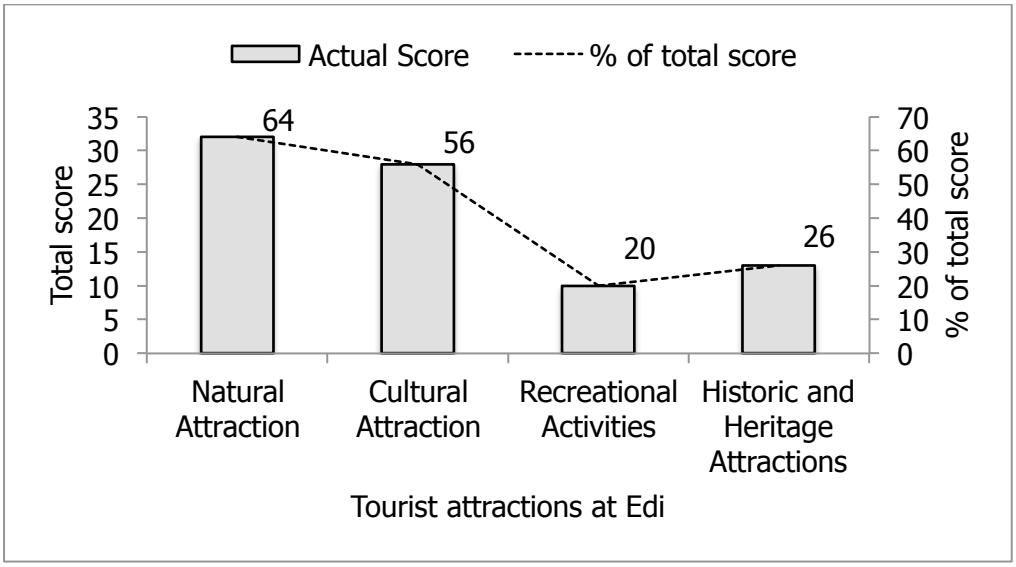


Figure 4: Mean Score for Attractions at Edi

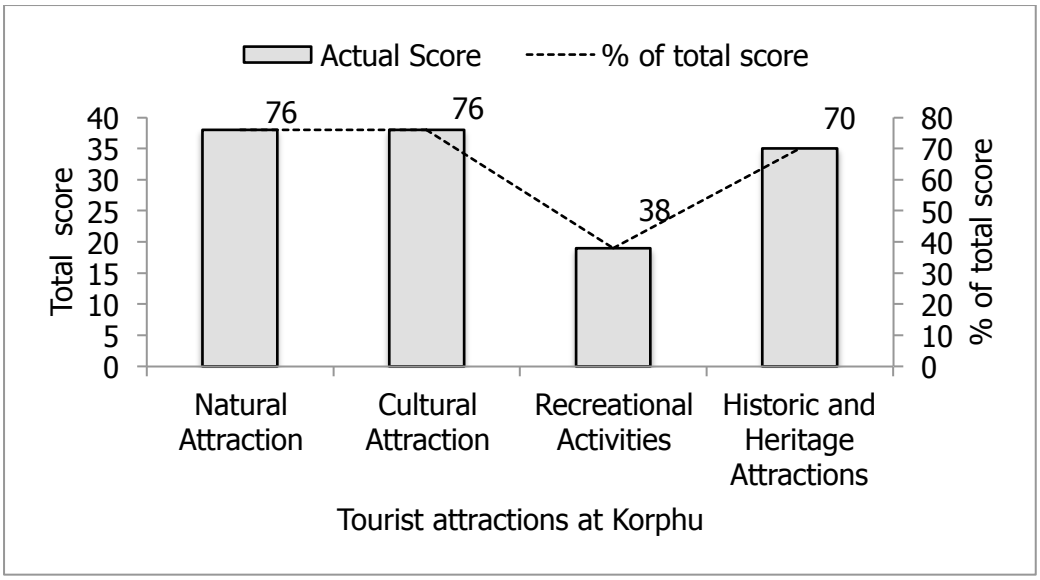


Figure 5: Mean Score for Attractions at Korphu

Comparison of Three Hotpots of Tiger Kills

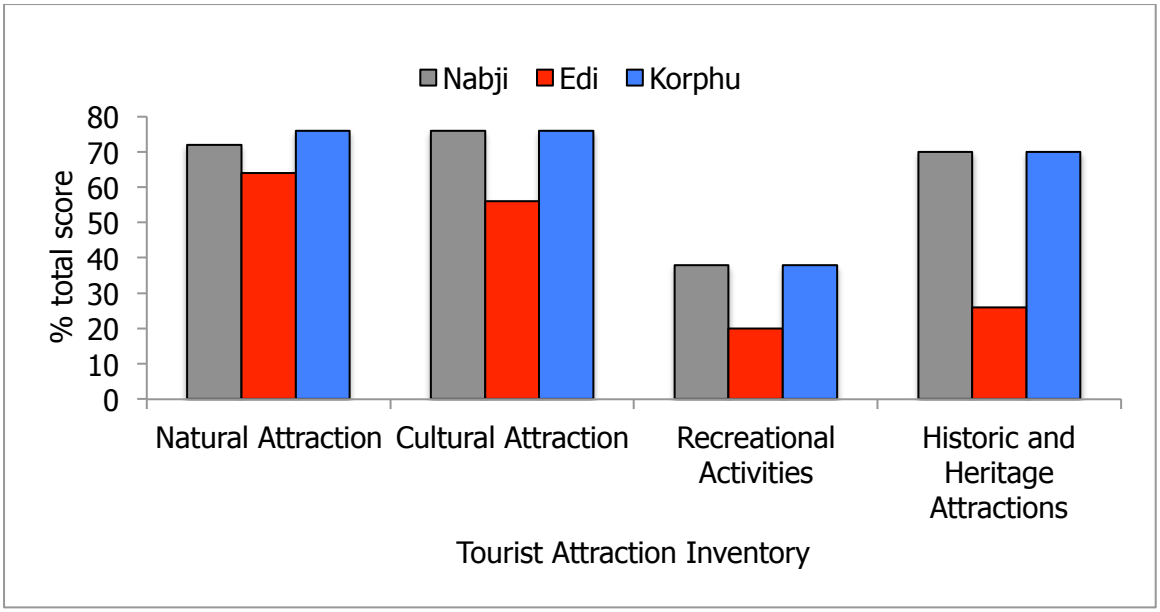


Figure 6: Comparing Attractions of Three Sites of Tiger Kills

Nabji and Korphu have similar scores as they are the adjacent communities located with the same altitude and people have similar lifestyles. Further, in terms of recreational activities, in 2006 a pilot project for community-based ecotourism has been implemented in the area that developed walking trails, campsites, and viewpoints for bird and wildlife viewings.

On the other hand, Edi under Zhemgang scored lowest in all categories of tourist attractions. Huge difference in score among the three sites was recorded in historic and heritage attractions and recreational activities. Edi a remote site in Zhemgang *dzongkhag* didn't have any historical sites that were attracting local and international visitors. Absence of visitors has also resulted in non-availability and no development of any tourist related activities like walking trails or camping sites. So Nabji and Korphu with ecotourism initiatives started in 2016 backed by the adjacent Jigme Singye Wanghuck National park has higher potential as an ecotourism site than Edi. The latter also has low accessibly which would be another major hurdle in developing as a touristic place.

3.3 Hotspots of Snow Leopard and Himalayan Black Bear Kills

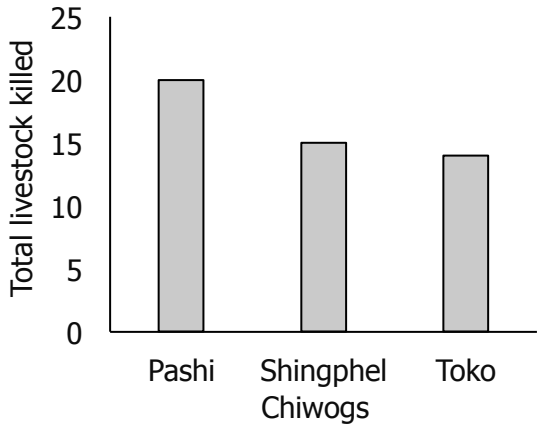


Figure 7: Hotspots of Snow Leopard Kills

Incidences related to Snow Leopard occurred in same *chiwogs* as the Himalayan Black Bear as shown in figure 8. However, in case of Snow leopard, Pashi under Gasa has experienced the most kills. Shingphel under Trashi Yangtse *dzongkhag* has recorded the second highest Snow Leopard kills. All these three communities are pastoralist located in the northern mountainous region of the country.

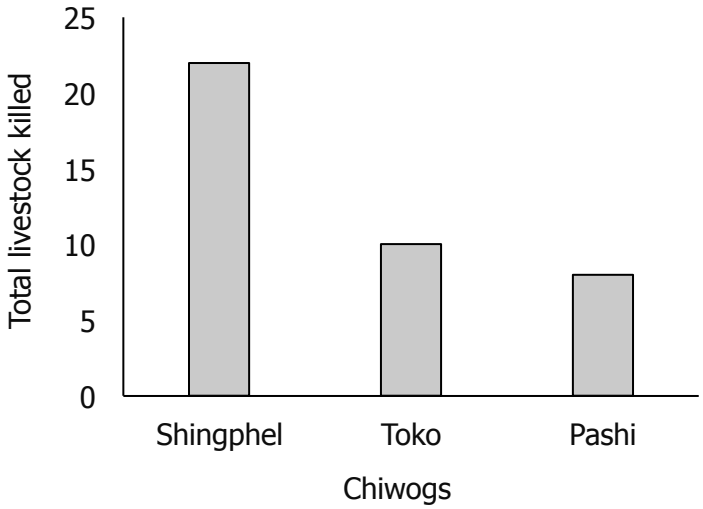
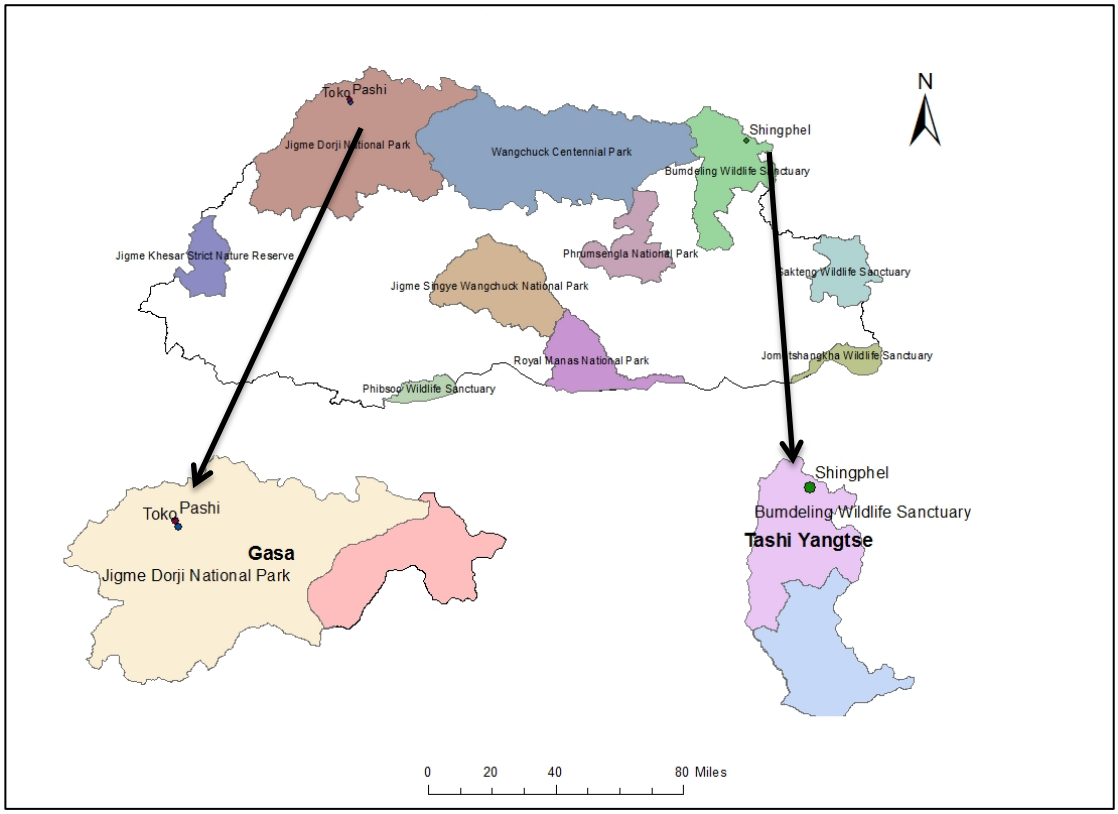


Figure 8: Hotspots of Himalayan Black Bear Kills



Map 2: Hotspot Kill Sites of Snow Leopard and Himalayan Black Bear

Main Attractions in Top Three Snow Leopard and Himalayan Black Bear Kill Sites

Pashi and Toko *Chiwogs* under Gasa have similar natural attractions. Probably it is the only place on earth where a thriving population of tiger and snow leopard has overlapping habitats. Frequent sightings of endangered Asiatic wild dog, Dhole was also reported by many of the local residents. Large areas of mountain meadows mostly used as grazing sites for yaks by local nomads and good view of the Himalayan mountain range is one of the major attractions for the tourists visiting the areas. Mean scores for attraction at Pashi ad Toko are presented in figure 9 and 11.

Shingphel the second hotspot for snow leopard kills is in the eastern Bhutan under Bumdeling Wildlife Sanctuary. The main natural attraction of Shigphel was migrating flocks of Black-necked Cranes from its summer habitat in Tibetan plateau to wintering grounds at the wetlands along Kholung Chu River. Recently Ludlow's Bhutan Swallowtail (*Bhutanitis ludlowi*) the butterfly that was thought to be extinct after its first discovery in 1933 and was rediscovered in 2009 in the locality. This endemic butterfly has a potential to serve as one of the main natural attractions in the area. The area is similar to two hotspots sites in Gasa, as it too is a habitat to a great variety of wildlife

including many endangered and threatened species, such as Tiger, Snow Leopard, Red Panda, Himalayan Musk Deer, etc. The totally protected plants such as Himalayan yew and Blue poppy and endemic species of plants like East Himalayan Pine are also found here.

Similar to Pashi and Toko under Gasa, the unique life of nomadic people rearing migratory herds of yaks dominates the area. Since Shingphel is very far from Trashi Yangtse town, till now there is limited visitation by international tourists. Further the area is very close to India, Bhutan and China border with military presence restricting the tourism industry. However, many local visitors come every year to visit sacred religious site in the area. Mean score for attraction at Shingphel is shown in figure 10.

Assessment of Tourist Attraction at Snow Leopard and Himalayan Black Bear Kill Sites

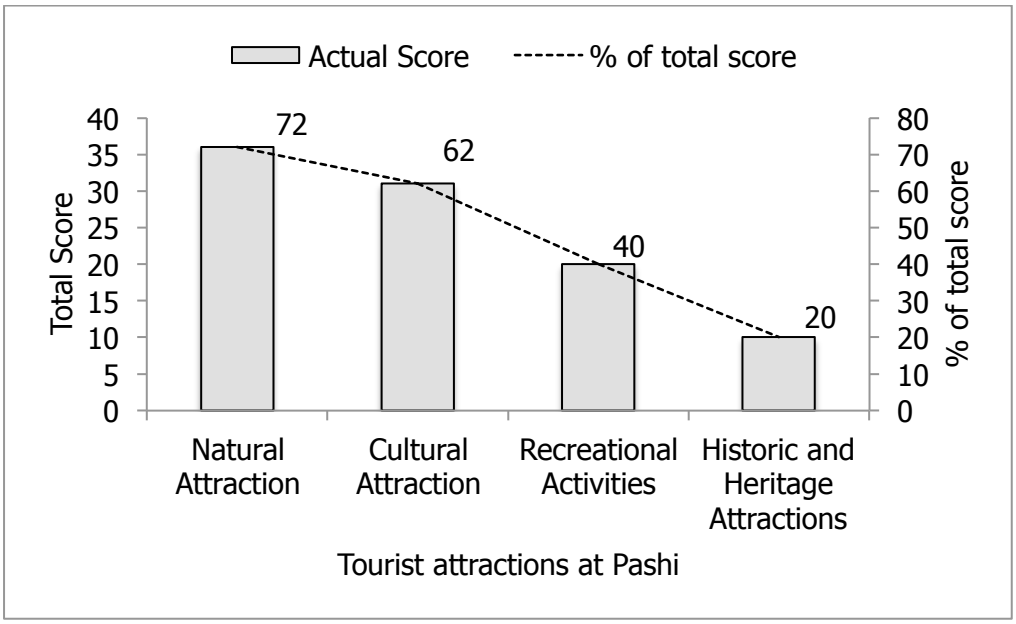


Figure 9: Mean Score for Attractions at Pashi

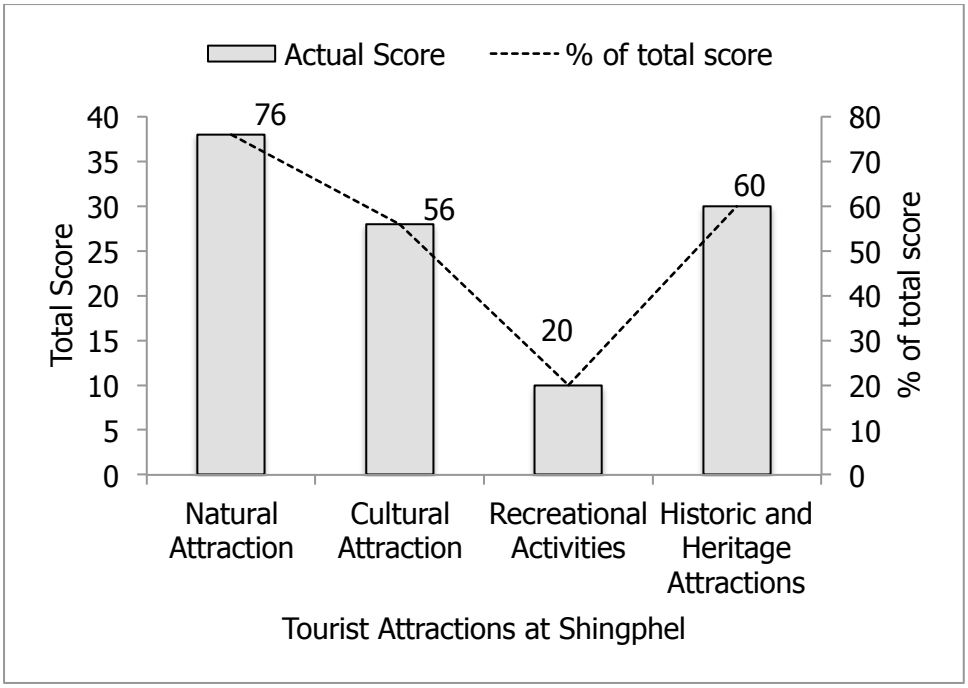


Figure 10: Mean Score for Attractions at Shingphel

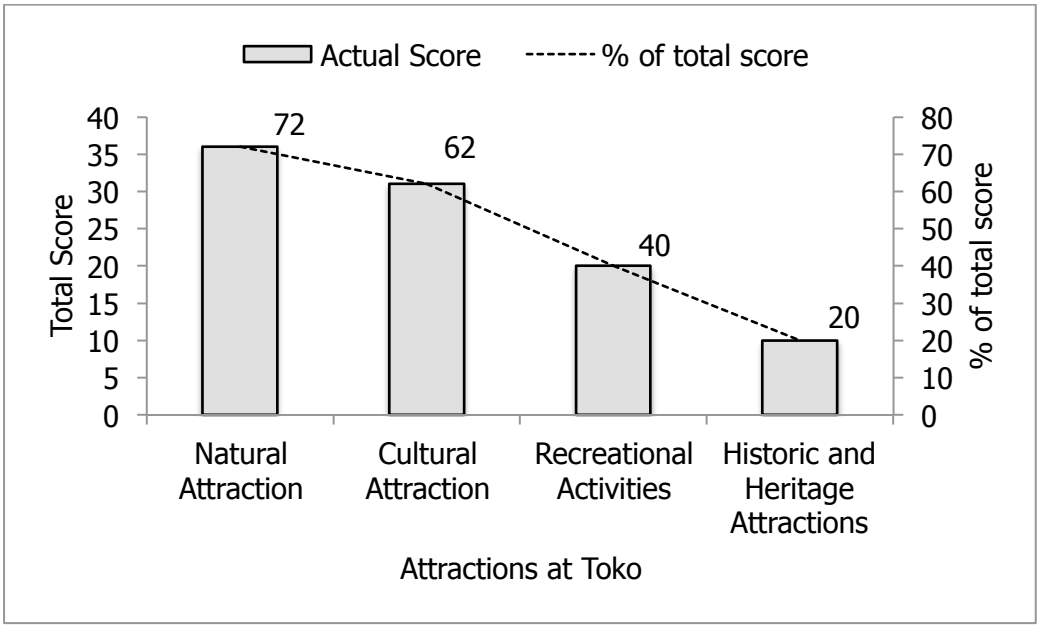


Figure 11: Mean Score for Attractions at Toko

Comparison of Three Hotpots of Snow Leopard and Himalayan Black Bear Kills

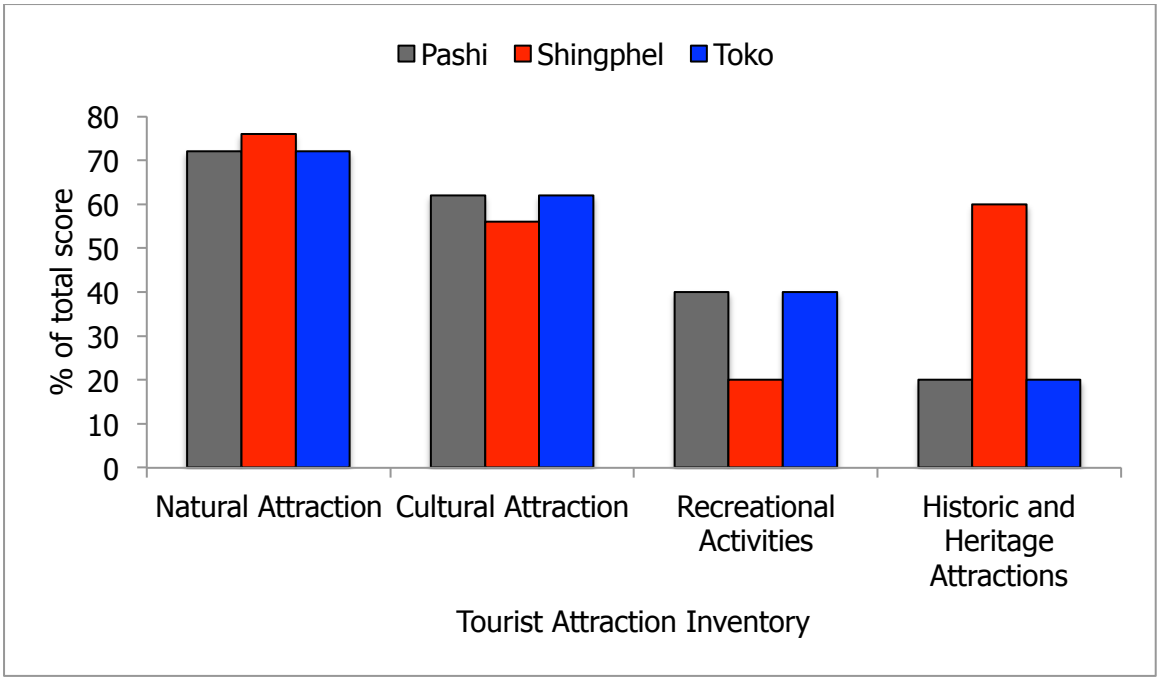


Figure 12: Comparing Attractions of Three Sites of Snow Leopard and Himalayan Black Bear Kills

The majority of kills by Snow Leopard and Himalayan Black bear have occurred in similar sites. Among the top three sites for these two species, Pashi and Toko had similar score in all tourist attraction categories, as they are located at same altitude level and same region. In addition presence of recreational facilities like trekking, camping and suitable sites for bird watching and wildlife viewing in those two sites has resulted in high scores in recreational activities category as shown in figure 12. Both national and international tourists have been visiting Pashi and Toko over the past decades. All these attributes make two sites very suitable for promoting it as potential ecotourism sites.

Shingphel has high scores for historic and heritage category due to present of religious pilgrimage sites like Pema Kyod for the local tourists. Such site was non-existent in the other two-hotspot sites of Snow Leopard and Himalayan Black Bear kills. Shingphel might have similar scores for cultural and natural attraction categories, but scored very less in recreational activity category. This could be mainly attributed to limited road connectivity and almost no record of international tourist visiting the site. Partly it could be due to location of Shingphel near international border disputed areas particularly between India and China.

3.4 Hotspots of Common Leopard

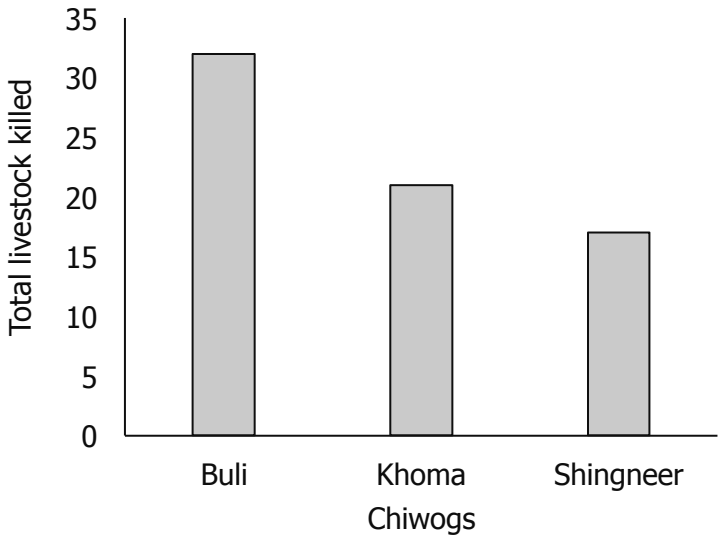
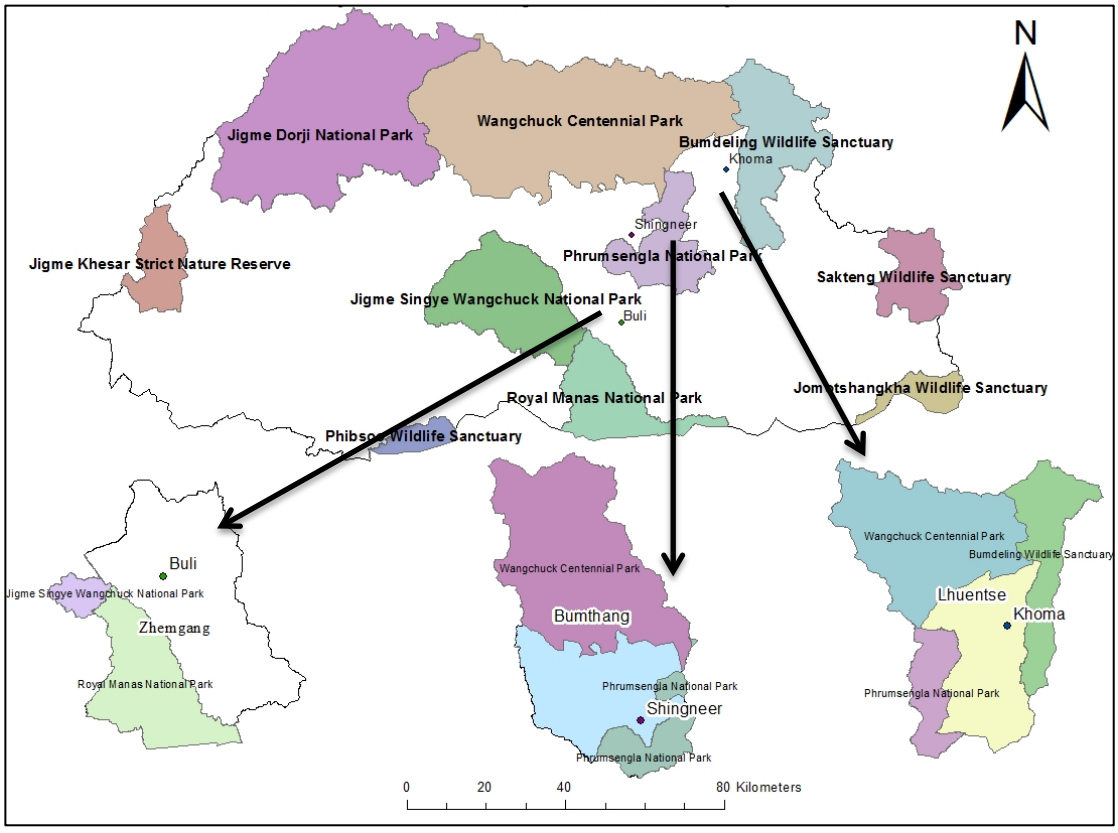


Figure 13: Hotspots of Common Leopard Kills

Majority of kills by Common Leopard has occurred in remote *chiwogs* like Buli under Zhemgang *dzongkhag*, followed by Khoma under Lhuntse *dzongkhag* and Shingneer under Bumthang *dzongkhag*. The incidences have occurred mostly in central Bhutan. Shingneer is located at higher altitude with dominant vegetation cover of Spruce trees while other two sites are has evergreen forest cover and located at lower altitude.



Map 3: Hotspot Kill Sites of Common Leopard

Main Attractions in Top Three Common Leopard Kill Sites

Buli in central Bhutan in the recent years has captured the attention of tourism industry in Bhutan. The most popular attraction for the local tourist is the popularity of the picturesque Buli Lake, which has spiritual attachment to the local people. There were also frequent sightings of endangered primate species like Golden Langur. Buli is also located along the buffer zones of Jigme Singye Wangchuck National Park. The rich biodiversity of the area also includes rare animal and plant species such as Gangetic Dolphins and the Asian One-horned Rhinoceros that cannot be seen anywhere else in the world.

Culturally Buli and the neighbouring areas are notable for being one of the last regions where ancient Bon religious practices are still carried out. Bon priests known as Bonpo are considered respected religious leaders. There is also a famous Buddhist temples Buli temple widely visited by people in the locality. The local people are also famed for their skill at crafting various goods out of bamboo such as *Bangchungs* (matted bamboo bowls), *Palangs* (alcohol containers), *Balaks* (hats), mats and boxes. They are also adept potters and their earthenware products were highly prized throughout the country in the past. However with all those potential natural, cultural, heritage and spiritual attractions there were limited recreational activities for both local and international tourist. Very few of the international tourists have visited the site the recent past. Mean score for attraction at Buli is shown in figure 14.

Khoma *chiwog* is located within the buffer zones of Bumdeling Wildlife Sanctuary. The natural attraction includes recording of many endangered and threatened species, such as Tiger, Snow Leopard, Red Panda, Himalayan Musk Deer, etc. The main cultural attraction, in particular Khoma village is known throughout the country for its production of *Kishuthara*, an extremely intricately patterned silk textile. Producing and selling *Kishuthara* has become the primary occupation of many of the villagers. This is already on every tourist's agenda visiting Lhuntse *Dzongkhag*. The village too have some religious sites like Gonpa Karpo and it is also located on the way to famous local pilgrimage site Singye *Dzong* where hundreds of local pilgrim visits the site every year. However there were limited recreational facilities for both local and international tourists as depicted by means score for this category in figure 15.

Of the top three hotspots of Common Leopard, Shingneer is located at higher altitude than two the sites namely, Buli and Khoma. Shingneer *chiwog* doesn't have specific natural attractions, however it very close to Phrumsingla National Park, which harbours rich plant and animal species. The Shingneer village has only one temple and no other cultural and religious sites. Further the lifestyle of the country is not different to any other places in and around Bumthang. Thus most often tourists visit touristic sites in Chokhor valley and then travel to Ura passing though Shingneer with rare stop over. Mean score for attractions at Shingneer is presented in figure 16.

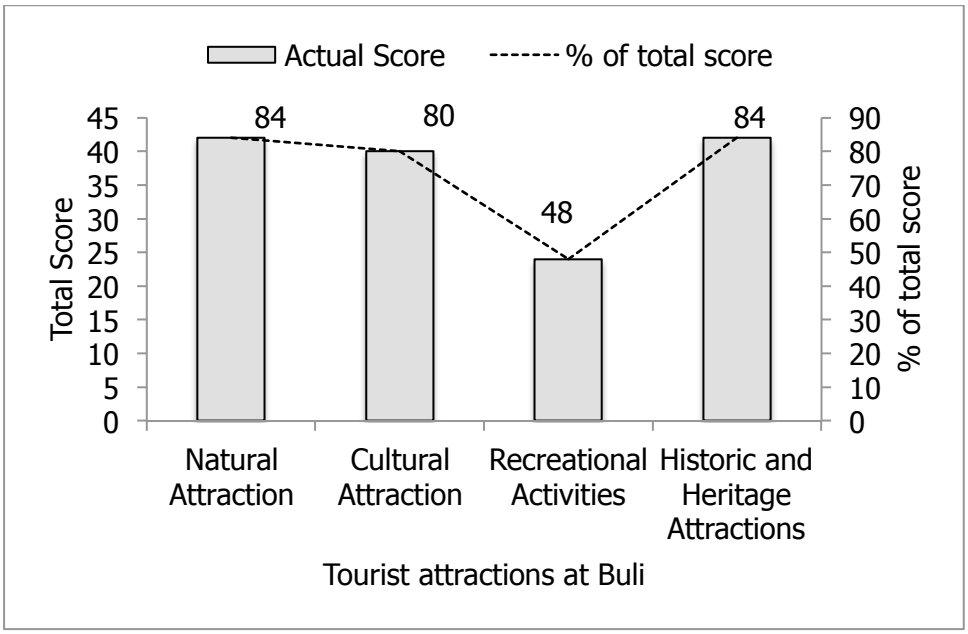


Figure 14: Mean Score for Attractions at Buli

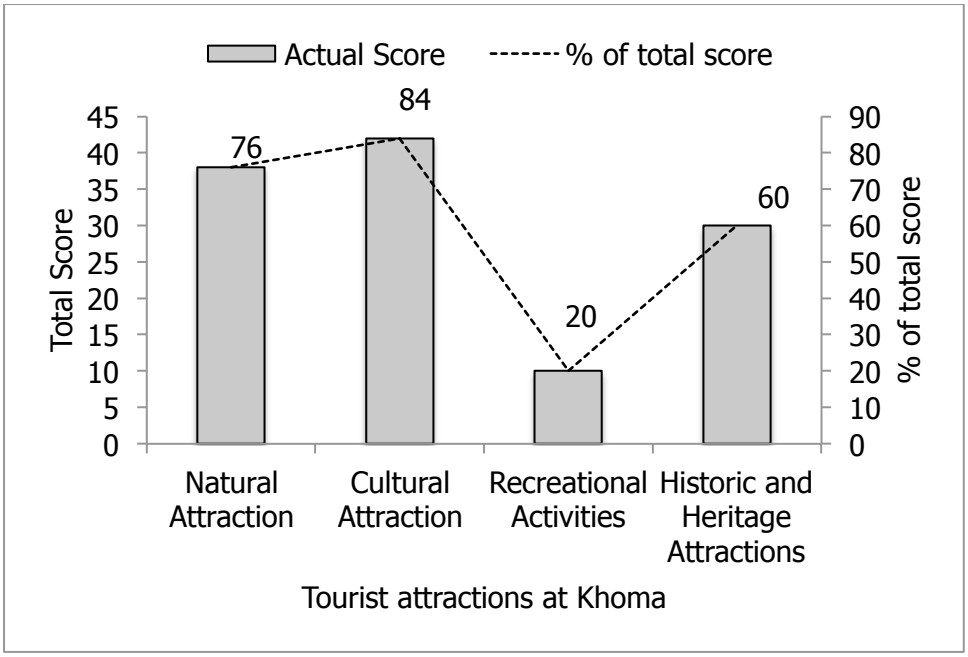


Figure 15: Mean Score for Attractions at Khoma

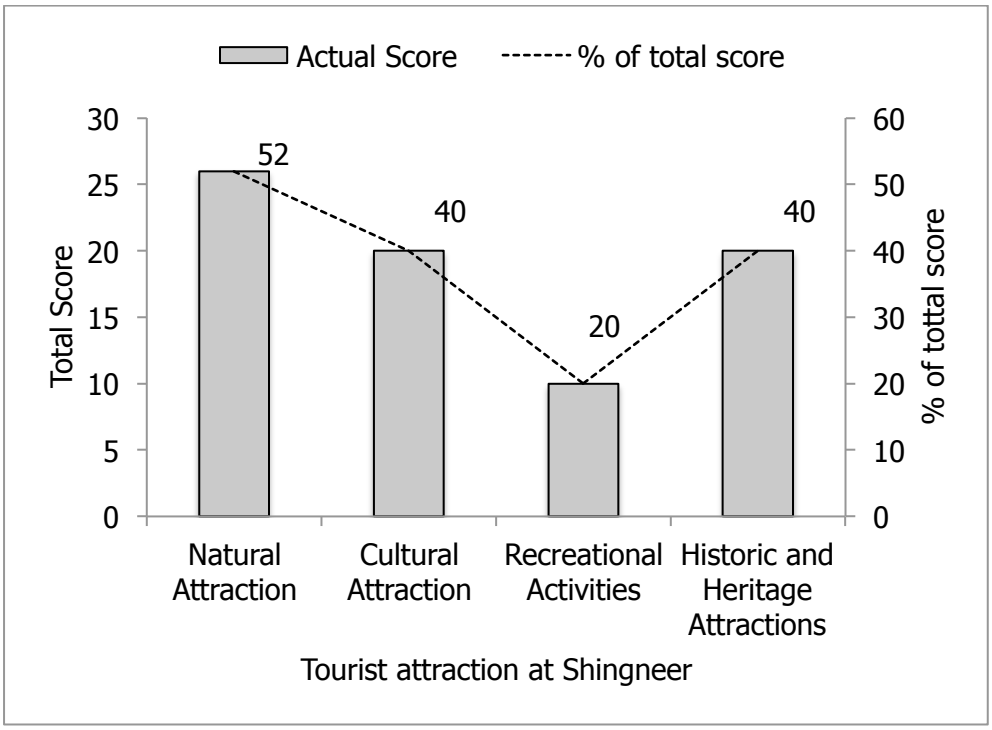


Figure 16: Mean Score for Attractions at Shingneer

Comparison of Three Hotpots of Snow Leopard and Himalayan Black Bear Kills

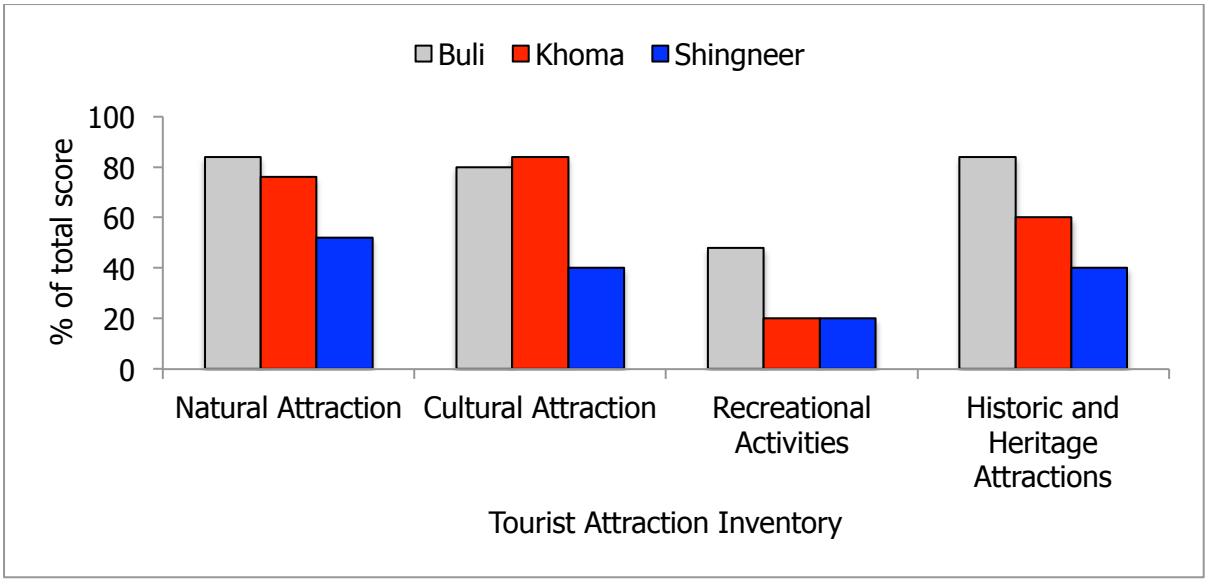


Figure 17: Comparing Attractions of Three Sites of Common Leopard and Himalayan Black Bear Kills

Among the three sites for Common Leopard, Buli scored highest in all categories of tourism attractions. Shingneer although located in touristic *dzongkhag* like Bumthang, there has been not much attraction at the Shingneer *chiwog*. Culturally Khoma and Buli has similar scores but overall Buli under Zhemgang *Dzongkhag* has the better score due to its equally high score rich natural, historic and heritage attractions.

4. Conclusion

Nabji and Korphu, which are the adjacent communities with already some ecotourism projects being implemented, would serve as a potential ecotourism sites among the top three tiger kill sites. Viewing elusive animal like tiger might be difficult even at these sites, however, tourist would feel the sense of excitement and enjoyment for being able to walk or camp through the tiger habitat. Besides the natural experiences, visitors would be able to experience interaction with the indigenous *Monpa* communities. Consequently they would have an opportunity to visit scared sites in and around the community. Edi, the remote village has similar natural attractions but has limited accessibility.

Pashi and Toko again are communities with very similar communities located close by in the higher Himalayan region. The area already receives higher number of trekkers. While Shingphel, the other hotspot site of Snow Leopard and Himalayan Black Bear has security issues and limited accessibility particularity for the international tourists.

Of the three hotspots sites for Common Leopard, Buli stands out as the better choice for promoting it as a potential ecotourism site due to balanced score for all components for tourist attractions. All of the conflict zones were located nearby one of the protected areas of Bhutan as shown in map 1 to 3.

However the results of the study should be interpreted with caution, as there is limitations like the effect of attraction from neighbouring places on hotpots were not considered, as it was beyond the scope of objectives of this research. Further the hotspot sites were determined based on total number of livestock kills over the past 13 years and which hasn't account for livestock density, nature of cattle herding and other factors that would heavily influence the number of kills by predators.

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Few Pictures from the fieldwork