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Human-Carnivore Conflict in Azad Jammu and Kashmir, Pakistan: A Review.

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ABSTRACT

Human-carnivore conflict is a natural phenomenon, and carnivore species have the natural right to live in this world; however, their extinction is at an alarming rate, e.g., the leopard. Due to the exponential growth of the human population, most of the world's forests have been converted to agricultural land or residential areas, in turn affecting the wildlife species, including carnivores. Moreover, it is becoming the major cause of the conflict between humans and carnivorous species. Pakistan's northern areas have a richer diversity of wildlife species, including the mammalian carnivores, but the majority of them are either threatened or endangered due to habitat degradation and conflict with humans. Eleven carnivore species were reported in different parts of Azad Kashmir, including common leopard (*Panthera pardus*), snow leopard (*Uncia uncia*), leopard cat (*Prionailurus bengalensis*), lynx (*Lynx lynx*), brown bear (*Ursus arctos*), Asiatic black bear (*Ursus thibetanus)*, grey wolf (*Canis lupus*), Asiatic jackal (*Canis aureus*), red fox (*Vulpus vulpus*), stone martin (*Martes foina*) and yellow-throated marten (*Martes flavigula*). Every year, thousands of livestock species are being lost due to diseases and carnivore predation. Both the Asiatic black bear and brown bear also cause damage to maize and potato crops, causing economic losses of millions. Depredation of livestock was greatly affected by four major factors: prey type, season of depredation, location of depredation and livestock guarding practices. Results show that there is a rich diversity of carnivores in AJK, but their survival is threatened due to conflicts with humans over excessive livestock depredation and crop raiding. Active livestock guarding practices can reduce carnivore attacks. Educating the local people about conservation, monitoring the carnivores, vaccinating their livestock and compensating affected families can greatly reduce the negative perceptions of the local people towards the carnivores.
Keywords: Forests, Wildlife, human-carnivore conflicts, livestock depredation

INTRODUCTION

The territory of Azad Jammu and Kashmir is a part of the great Himalayas, which branches off from Nanga Parbat (Negi, 1983). Crescent-shaped mountains and hillocks stretching from Qummary Heights in the North to Iftikharabad Plains in the South, bordering upon KPK and Punjab in the West, encircle it. The eastern belt jostles with the Shamsaburi Range and touches the famous ridges of Pir-Panjal (Qayyum, 1984). AJK is located in the northeast of Pakistan.

What are Human-Carnivore Conflicts?

Human-carnivore conflict is considered a significant issue for both society and politics (Athreya et al. 2004). Pakistan constitutes large forest areas that are suitable habitats for wildlife, e.g. big cats. For example, the range of the common leopard is from the Himalayan forest up to the tree line or low-altitude valleys in arid mountainous regions. In Azad Jammu and Kashmir, the leopard inhabits the valleys around Muzaffarabad (Roberts, 1997). The penetration of carnivores, e.g., leopards, into human landscapes may have multiple complexities and conflicts, but the main fear evoked due to their abundance leads to attacks on humans. It is commonly reported that the occurrence of carnivores in human landscapes causes livestock depredation (Patterson et al. 2004). This depredation of livestock often causes revenge killings of the key species by farmers, which we call human-carnivore conflicts.

Extent of Conflicts in Azad Jammu and Kashmir:

Pakistan is the home to 10 of 18 known mammalian orders, which reflects significant diversity matching overall trends (Sheikh and Molur, 2004). The diversity of large mammals in northern Pakistan is high compared to other parts of the country, yet the majority of these species are either threatened or endangered (Rao and Marwat, 2003). Neelum Valley in Azad Jammu and Kashmir, where two national parks (Ghamot National Park and Musk Deer National Park) are located, is known to have a rich diversity of large and small carnivores (Qamar et al. 2006).

There is hardly any inviolate space for the outside of the protected areas. However, the extent of conflict is raised when the species in question have a wide range and are highly adaptable, like the common leopard (Panthera pardus), as communicated by Daniel (1996). The presence of carnivore species like the common leopard in human-populated landscapes will differentially lead to predation on livestock. Carnivore density dependent on prey density (Karanth et al. 2004; Dickman, 2005). So, the areas where there is a large number of prey species, those areas have a large diversity of carnivores as well.

Conflict manifests in and around rural agricultural landscapes where human beings are bound by limited resources and knowledge in dealing with conflict. Although no empirical studies exist, the presence of thick forests, remoteness, low habitat degradation due to military presence, geographic location and strong evidence vouch for the presence of a diverse carnivore guild in AJK.

Magnitude of Conflicts in Azad Jammu and Kashmir:

Large carnivores are often considered keystone species because, as top predators, they play a role in regulating prey species, which in turn can potentially have significant impacts on habitats and other species via trophic cascades (Terborgh, 2010; Ripple and Beschta, 2012). Human-wildlife conflict is an emerging issue that has intensified with the passage of time. Many wildlife species have become threatened due to this conflict, especially large carnivores (Qamar et al. 2010). People living close to the conflict areas possess negative attitudes towards carnivores and, as a result, make biodiversity protection a challenging task (Woodroffe et al. 2005). Human-carnivore conflicts are exemplified by wolves (Canis lupus) in North America (Musiani et al. 2003), pumas (Puma concolor) and jaguars (Panthera onca) in South America, dingoes (Canis lupus dingo) in Australia, hyenas (Crocuta crocuta) and lions (Panthera leo) in Africa (Patterson et al. 2004; Kolowski and Holekamp, 2006) and snow leopards (Uncia uncia) in India and Pakistan (Hussain, 2003).

There are limited studies describing human-carnivore conflicts in Pakistan (Dar et al. 2009; Bibi et al. 2013) despite wide prevalence of the issue, particularly in the northern Pakistan where various large carnivores; common leopard (Panthera pardus), snow leopard (Uncia uncia), Asiatic black bear (Ursus thibetinus), brown bear (Ursus arctos), grey wolf and lynx (Lynx lynx) often come in contact with humans and contribute to significant economic losses. This issue is a major threat to the conservation of large carnivore species. The frequency of conflicts has increased in recent decades as a result of increased human activities in wildlife areas or on natural habitats.

Reasons for Human-Carnivore Conflicts:

Humans and carnivores have been living together in a close relationship for millions of years. This relationship plays a fundamental role in the co-existence of the partners, positively or negatively. When the needs and behaviour of wild carnivores exert negative influences on human lives or vice versa, then human-carnivore conflicts arise, which ultimately affect both. Human-carnivore conflict is now very common global phenomenon in rural areas and has become common on the urban fringe in both developing and developed countries (Dickman, 2008). Damage to crops, orchards, livestock, other property and people themselves generally leads to conflicts between carnivores and humans. Other most common reasons are competition for resources at different levels, fear as a threat to local people, and the trade of body parts of animals (Sillero-Zubiri and Laurenson, 2001). Due to the exponential growth of the human population, most of the world's forests have been converted to agricultural land or residential areas, in turn affecting the wildlife, including the leopard. Moreover, it is becoming a major cause of conflict between humans and leopards.

Large carnivores are more disposed to such conflicts due to two main factors: first, their large home ranges and food requirements overlap with humans (Linnell, et al. 2001; Macdonald and Sillero-Zubiri, 2001) and second, the killing of natural herbivore species by humans reduces the availability of natural prey resulting in attacks on livestock (Yalden, 1993; Mishra, 1997; Sillero-Zubiri and Laurenson, 2001; Treves and Karanth, 2003). Domestic livestock have no anti-predatory strategies, and carnivores can kill them with little effort (Vos, 2000).

Impacts of Human-Carnivore Conflicts:

Large carnivores are often considered keystone species because, as top predators, they play a role in regulating prey species, which in turn can potentially have significant impacts on habitats and other species via trophic cascades (Terborgh 2010; Ripple and Beschta 2012). Human-wildlife conflict is an emerging issue that has intensified with the passage of time. Many wildlife species have become threatened due to this conflict, especially large carnivores (Qamar et al. 2010).

The local people of Machiara National Park were severely affected by the human-leopard conflict in this area, as both share similar food resources. Many farmers and other villagers of the study area reported mean loss of livestock predation by leopard for goat 2.08 (50.50%), sheep 1.17 (28.53%), cow/ox 0.23 (5.63%), buffalo 0.10 (2.58%) horse/donkey 0.07 (1.75%), dog 0.19 (4.80%) and chicken 0.25 (6.18%). Furthermore, the studies showed that there is a highly significant difference between the conflict zone and the non-conflict zone. The Mann-Whitney U Test is significant at 0.240. Point estimate for ETA1-ETA2 is 10.0, 95.9% C. I for ETA1-ETA2 is (-53.0, 135.0), W = 58.5.

The total financial loss of villagers arising from livestock killing in MNP was estimated as US$23529.512. The financial loss due to the depredation of goats was US$823.52, buffalos US$470.58, cows US$470.58, donkeys US$117.64, poultry US$470.58. These financial losses were attributed to Leopard (40.0%), Jackal (30.0%) and Red Fox (30 %) (Bibi et al., 2013).

In Musk Deer National Park, villagers reported 817 livestock losses to depredation and disease during the last year. Carnivores were held responsible for 276 livestock losses, while disease accounted for 541. Snow leopard was blamed for 88 (31.9 %) livestock losses. Common leopard, grey wolf, brown bear, and Asiatic black bear predated on 18 (6.5 %), 51 (18.5 %), 72 (26.1 %), and 47 (17.0 %) heads of livestock, respectively. No lynx-related depredation was reported. The most favourable prey species for snow leopards were sheep (45 % of snow leopard hunts), followed by goat (32 %), others (17 %), and cattle (6.0 %). Common leopard's prey species consisted of goat (50.0 %), others (39 %), and cattle (11 %). Grey wolf prey species were sheep (75%), goat (24%), and cattle (1%). The most favourable prey species for the brown bear was sheep, which accounted for 63 % of its total killings. Other prey species were goat (25%), cattle (8%), and others (4%). The Asiatic black bear preyed on sheep and goat (40 % each), cattle (13 %), and others (7 %). The reported figure of 817 livestock losses constituted an economic loss of PKR 8,890,100 or USD 88,901 (PKR 59,665 or USD 597 per household) to 149 households. Of the total loss, carnivores were blamed for an annual economic loss of USD 28,145 (USD 189 per household per year) while disease contributed an annual loss of USD 60,756 (USD 408 per household per year). Respondents also reported crop damage by the two bear species in 2013. The annual economic loss incurred was PKR 1,633,000 or USD 16,330 (PKR 10,960 or USD 110 per household per year). Bears were the only carnivores responsible for crop damage, attacking crops in autumn when maize and potatoes are fully grown. Brown bear crop damage caused a loss of PKR 84,000 or USD 840 (PKR 564 or USD 6 per household per year). The corresponding figure for the Asiatic black bear was higher: PKR 1,549,000 or USD 15,490 (PKR 10,396 or USD 104 per household per year).

The majority (36%, n=78) of livestock killing by carnivore occurred during the winter season followed by the summer (31%, n=69), autumn (13%, n=29) and spring (18%, n=40) (Fig. 4). For the year 2009 and 2010 season the results were analyzed by Correlation Coefficient. The winter (36%) and autumn (29%) values have a significant difference (n=4, df=3, p=0.05, r=0.99). The spring (18%) and winter (36%) values have a significant difference (n=4, df=3, p=0.05, r=3.42). Positive correlation was found between summer and spring values (r=0.904). The study revealed that 36% (n=79) of livestock were killed during night, followed by morning (27%, n=60), evening

(17%, n=37) and daytime (18%, n=39). The night 36% and day time 18% values have significant difference (n=4, df=3, p=0.05, r=0.98) (Fig. 4). In 2009, about 14% of livestock killing was recorded in January followed by February (13%), December (12%), November (11%), July (11%), September (10%), May (8%), October (7%), April (4%), March (2%) and August (3%) while no incident was recorded during June. Similarly, 12% of livestock killing was recorded in January followed by February (12%), December (11%), November (11%), July (12%), September (10%), May (5%), October (6%), April (6%), March (1%), August (0%) and June (8%). For the years, 2009 and 2010, monthly results were analyzed by Correlation Coefficient. The January 14% and March 2.7% values have significant difference (n=6, df=5, p=0.05, r=6.82). The January 14% and August 3.2% values have significant difference (n=6, df=5, p=0.05, r=3.22). The January 14% and April 5.5% values have a significant difference (n=6, df=5, p=0.05, r=1.93). The January 14% and June 4.6% values have a significant difference (n=6, df=5, p=0.05, r=1.89). The November 11.1% and March 2.7% values have a significant difference (n=6, df=5, p=0.05, r=3.89). The July 11.5% and August 3.2% values have a significant difference (n=6, df=5, p=0.0, r=2.99). Positive correlation found between January, February, November, December and July values (0.704) (Bibi et al., 2013).

The majority of livestock killed by predation of leopard (reported by local peoples) in the Machiara National Park was recorded maximum during May (n=103), June (n=95) and Aug (n=75), however the least number of livestock was killed during Jan (n=21), Oct (n=23) and Dec (n=34).

Strategies to Control Human-Carnivore Conflicts:

Attempts to mitigate human–carnivore conflict and improve the conservation of the culprit species, and possibly other wildlife, should be based on an explicit understanding of the conflict patterns. The leopards, along with other carnivore species, are widely distributed across the Azad Jammu and Kashmir, and have been heavily persecuted, partly because of increasing levels of conflict with rural communities. This issue has attained the status of national priority because it is the major threat to the conservation of large carnivore species and the government is under intense pressure from rural communities who are vociferously and frequently complaining and demanding compensation for their livestock losses to leopards, as well as other carnivore species (Dar et al., 2009). Proper herding practices, removal of livestock from carnivores' habitats, presence of herders and improved animal husbandry measures can decrease livestock killing. Awareness programs should be organised for the herders to minimise the depredation incidents (Bibi et al., 2013). Educating local people, vaccinating their livestock, and compensating affected families can greatly reduce negative perceptions. Compensation and environmental education are required to promote the coexistence of carnivores and humans in MDNP (Mishra et al., 2003). Additional studies need to be carried out in different seasons to maximize carnivore study and their conflicts with humans (Ahmad et al., 2012).

By adoption of proper conservation and management strategies and implementation of rules related to livestock and carnivore species, the leopards reappeared and provided wide range cover, including forest settlement in the mountainous areas of the AJ and K.

CONCLUSION

Based on the results of these studies, it is suggested that using these studies as a baseline, there is a need for a detailed survey to assess the Human-leopard conflict and to investigate the status and distribution of the Common leopard. To reduce the human-carnivore conflict, the stewardship projects for the welfare of the local community should be launched. It is required to train the local community in livestock husbandry techniques and agricultural practices. A well-targeted conservation plan, promoting education and awareness toward the healthy ecosystem relevant to the carnivores, will develop nature nature-friendly attitude in the community.

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