INTERNATIONAL JOURNAL OF CONSERVATION SCIENCE

ISSN: 2067-533X Volume 8, Issue 2, April-June 2017: 295-302 www.ijcs.uaic.ro

LIVESTOCK DEPREDATION BY LEOPARD, AN ALARMING INTIMIDATION FOR ITS CONSERVATION IN PIR LASOORA NATIONAL PARK NAKIAL, AZAD JAMMU AND KASHMIR

Muhammad KABIR[1*], Muhammad WASEEM[2], Shakeel AHMAD[3], Umer Hafeez GOURSI[4], Muhammad Naeem AWAN[5]

[1] Department of Forestry & Wildlife Management, University of Haripur
[2] Nathiagali Field office, WWF, Pakistan[3] Hagler Bailly, Pakistan
[4] Department of Wildlife Management, PMAS-Arid Agriculture University Rawalpindi
[5] Himalayan Nature Conservation Foundation, Pakistan

Abstract

The threat posed by leopards to livestock and human lives makes their coexistence difficult. Mitigation measure should be based on an unequivocal understanding of the conflict patterns. Household surveys were conducted with an intention to quantify livestock losses and its effects on leopard conservation in the Pir Lasoora National Park. The questionnaire survey revealed a total of 72 livestock killed, equated to an annual loss of 4324.50 US$. Among the domestic animals, goats were killed significantly ($p<0.05$) in higher number. Young and female stocks were more vulnerable to leopard attacks. Forests were the preferred killing sites, and night time killing was more frequent than during other periods of the day. Seasonal killing and attacks were also observed, both attacks and killing in June showed significant ($p<0.05$) difference from other months of year. Results revealed the massive economic loss, which inevitably resulted in retaliation against 17 leopards since 2000 in the region. Habitat degradation and depletion of natural prey are more striking factors driving leopard populations to local extinction form the study area. Our results iterate the need of an awareness program, the implementation of collaborative insurance schemes, and the involvement of the local community in order to modify the negative perception towards the conservation of the leopard.

Keywords: Panthera pardus; Livestock depredation; Conservation; PLNP; AJ & K.

Introduction

Large carnivores that are in conflict with humans are more prone to extinction, and eventually disappearing from human dominated area [1]. Large carnivores are difficult to conserve because of small population sizes, extensive home ranges, resource competition, and conflict with human interest [2, 3]. Such conflicts happen most frequently because of competition for shared or limited resources [4, 5], and become particularly controversial when the resources concerned have economic value and the predators involved are legally protected [6]. Others influential factors include increasing human populations, loss of natural habitat and growing wildlife population resulting from successful conservation programs [7]. Conflict between humans and leopard (*Panthera pardus*) is a complex issue influenced by political and

* Corresponding author: Kabir_ajk@hotmail.com

social attitudes, the biology of the species, and management actions [8]. Human leopard conflict demands our thorough attention when the problem species is endangered, and the conflict poses a serious danger to human wellbeing [9]. As the problem grows, it is increasingly important to seek mitigation strategies that create a stronger and sustainable co-existence [10]. Livestock predation is preventable by applying efficient livestock management strategies [11].

Because of increases in predator populations or decreases in wild ungulates population, livestock becomes vulnerable to carnivores compared to wild ungulates [12]. Dependence on other animals for food brings leopards into direct conflict with humans, especially in area where natural habitat of leopard has been depleted and replaced by domesticated stock [13]. The sharing and competition on limited resources and livestock depredation are main drivers of human leopard conflict [6]. Conflict with stock holders unavoidably arises because leopard prefer prey between 10 and 40kg [14] which includes livestock and domestic stock is also easy to chase and capture. Retaliatory killing of predator due to livestock depredation is worldwide conservation concern [12]. Indigenous community always has negative attitudes when carnivores prey upon livestock and cause significant economic loss [15, 16]. The area where rural people live in close association with protected areas, conflict can be particularly serious [4, 17]. People retaliate to livestock depredation by poisoning, habitat destruction and direct killing of carnivores, which have led to extinction of many species and significant reductions in carnivore population.

In Pakistan, the leopard is listed as a critically endangered and heavily persecuted by humans, because of conflicts with rural communities. Consequently, the leopard has declined in population or has disappeared across vast areas of its former range [16-20]. Considering the already depleted population of large carnivores, it becomes increasingly important to seek mitigation strategies that create a sustainable co-existence [20]. To overcome challenges, new conservation strategies are urgently needed, especially near the protected areas. The present study was aimed to understand pattern of human leopard conflict, perceptions towards the existence of leopard and massive retaliatory killing in the study area. Understanding of patterns associated with such predation can be used to mitigate its effects and promote more stable coexistence of leopard and humans in the area. Our results might provide recommendations suggesting suitable measures to mitigate the intensity of conflict for the long term conservation of the leopard in Pir Lasoora National Park (PLNP).

Materials and Methods

Study area

The study was conducted in Pir Lasoora National Park (PLNP), covering an area of 1580 ha, lies at 33º25.92' N latitude and 74º05.64 E longitudes and located on Himalayan foot hills (Fig 1). The study area hosts several threatened species of mammals and birds. The climatic condition of the area is categorized as cold and humid. At high altitudes, snowfall occurs which accumulates to a depth and lies on the ground for a period depending on the amount of winter precipitation and temperature prevailing. Habitat of the area characterized by sub-tropical pine forest however, mountains tops have sub-tropical dry evergreen forest. The subtropical cheer pine forest provides diversity of the habitat for several ecologically important wildlife species. Baseline studies reported that area harbor 16 mammals, 119 birds, 24 reptiles, 6 amphibians and 15 butterfly species. Due to degradation of biodiversity and habitat loss, total area of the forests has been decreasing rapidly since last few years [21].

Methodology

Interview is a widely used method for surveying of mammals, especially carnivores, and for understanding people's perceptions towards the conservation of predators [5, 23, 20, 16]. A structured survey instruction was prepared in the form of an interview-based questionnaire and information was collected from randomly selected household in the study area representing all

villages of PLNP in 2010. Respondents were asked a series of questions about livestock rearing, depredation, number of livestock killed, location (inside village or outside village; in forest, meadow, or grazing near village), date, time and available habitat cover for leopard (open or closed). To quantify the economic cost of livestock depredation species, age, number and sex of livestock losses were also documented. Killing sites were visited to confirm the claims and killing of stocks. Predator signs (pugmarks, scrapes, claw marking and scats) were also observed within the study area. The kind and degree of human influence in the habitat was evaluated by evidence of disturbance such as human settlements, utilization of forest products, dependence upon natural resources and habitat degradation as well.

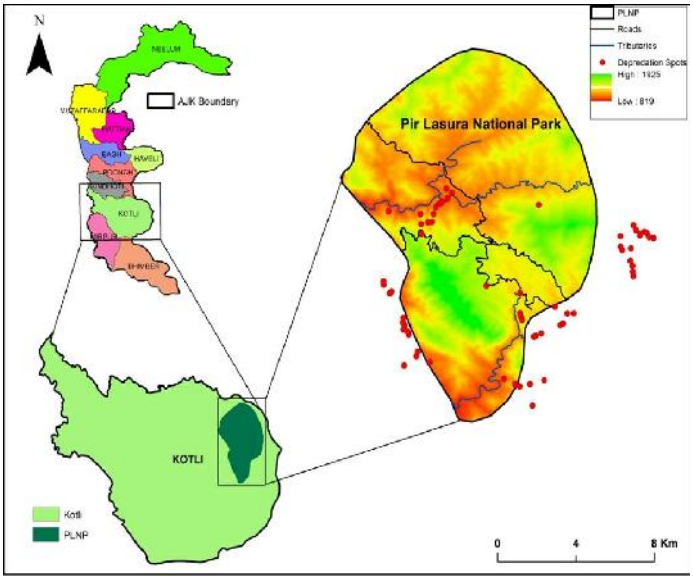

Fig 1. Study area and livestock killing locations in and around the PLNP.

Results and Discussion

Livestock depredation by carnivore is the main reason of conflict between human and wildlife across the world and is particularly common in and around the protected areas in developing world [24]. The most abundant livestock, have been reared by local community are goats and sheep. Grazing in the form of herds is widespread in or adjacent areas of PLNP. Questionnaire surveys revealed a total of 72 livestock were killed by leopard in a period of one year. In AJ&K the leopard populations are fragmented and relatively isolated with scattered patches of forest and protected areas and wild prey species have dramatically declined due to poaching, agricultural expansion, deforestation, and human settlement [20, 16]. As the natural prey is depleted at very high level losses attributed to leopard were most frequent throughout the study area.

Goats and sheep were most vulnerable to leopard attacks. The predation rate on goats was highest (46%), followed by dog (32%), sheep (17%), cattle (4%) and equine (1%). Grazing herds were composed of majority of young and female livestock. Being an opportunistic predator, leopard preferred to depredate on available young and female (65.27%; 63.88%) stocks as compared to adults and male (34.72%; 36.11) respectively. Free grazing goats and sheep were most valuable of livestock kept by local people, also appeared to be most vulnerable to leopard attack. Goats and sheep are proffered leopard prey because these medium sized animals (25-50kg) can be easily dragged to secure places after being killed [16]. In Sanjay

Gandhi National Park, India, dogs and goats form an important part of leopard's diet [27]. In Machiara National Park, AJ&K leopard was responsible for the killing of goats (57.3%) and sheep (27.8%) [16, 20]. In Sariska Tiger Reserve, India, goat, sheep and calves comprised 88% of livestock killed by leopard [28]. Livestock, due to lack of escaping ability are most vulnerable to leopard attack as compared to well adopted wild herbivores [17]. The total financial loss, caused by leopard depredation was estimated at 7899.59US$ comprised of 109.72US$ per house hold in the area. Livestock holdings and agricultural form an essential part of the local people income. The economic losses of livestock can increase human carnivore conflicts [25, 26].

The interval and intensity of attacks and depredation was also studied during different months of the year. The frequency of livestock depredation was higher during the month of June (19%) followed by may (15%), January and November (10%). Statistical analysis (Paired chi-square tests) showed that there is a significant variation ($P > 0.05$, $\chi^2 = 0.29\text{-}1.52$, $df = 1$) in different months of the year. Incidence of livestock attacks and depredation were occurred through the year but the intensity was higher in summer. Livestock predation often follows a seasonal pattern ([13, 29]. The majority (56%) of livestock killed by leopard occurred during the summer months of May and July [20].

The timing of most attacks was unspecified, but the rate of livestock (47.22%) depredated at night time was higher, followed by (27.77%) evening (15.27%) morning and daytime (9.72%). Because of the poorly adopted herding practices, leopard attacks at night time were frequent. During the day time people guard livestock and work in jungle for fuel wood and fodder collection, so freely grazing animals were more vulnerable to leopard attacks. It is the part of leopard's behaviour; tend to be solitary and nocturnal predators, relying on stealth and camouflage to stalk their prey [30]. It is therefore not surprising that livestock in villages were particularly vulnerable at night, as they were often left unattended and in poorly constructed pens [16]. Another study revealed that most leopard attacks on livestock took place at dawn and dusk when leopards are known to be more active, and this is the time when livestock are either herded back inside the corral at dusk or relieved from their tether at dawn [31]. The majority of leopard kills on livestock occurred during the night in similar studies [20, 32].

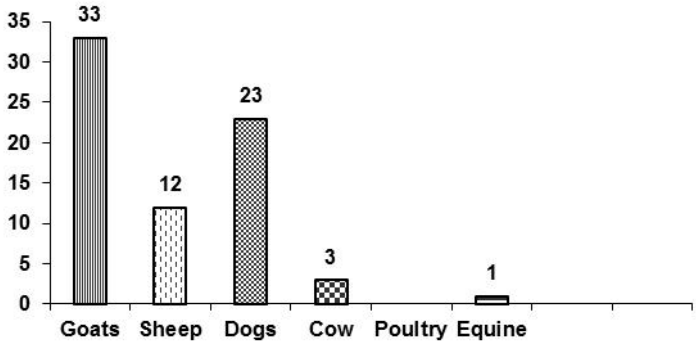

Fig. 2. Types of livestock killed by leopard in PLNP

The forests (46.47%) were preferred killing sites of livestock by leopard, followed by agriculture land (29.57%), grazing pasture (15.49%), and from unsecured corrals (8.45%). Proximity to protected area revealed that majority of the villagers made their settlements within the forest or close to the forest for the easiness of fodder, fuel wood collection and to use other resources. This close proximity to human often results in conflict and can be particularly controversial when the resources concerned have economic values such as livestock depredation and the predators involved have high conservation profile [6]. Leopards are known

to inhabit cropland in human dominated landscapes [31]. Freely and unattended livestock grazing in forest and pasture, explain the peak in predator attacks [16]. Livestock are more vulnerable to leopard attack that are grazed in or close to the forest area [9]. The maize cultivated crop lands provided hiding places for leopard and prove safe shelter and corridor to easily chase and capture the prey. The large home ranges of fields relative to the size of protected areas often draw them into conflict with humans [33].

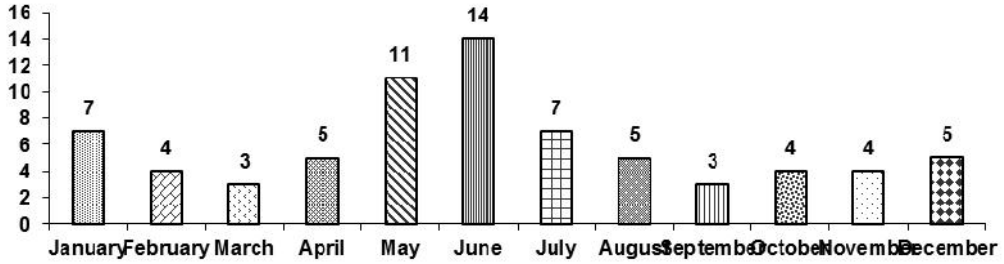

Fig. 3. Month wise livestock depredation by leopard in PLNP

Livestock rearing forms an integral part of the local pastoral and agricultural economy of the region, and grazing of substantial herds is widespread in AJ & K [16]. Unavailability of prey species has compelled leopard to attack on livestock which results in its retaliatory killing and putting its survival in danger. Since 2000 killing of seventeen (17) leopards were documented, in defense of their life and livestock in the study area that alarming the survival of leopard. Local community are heavily dependent on their livestock for subsistence and income, and therefore when livestock predation occurs, this however results in retaliatory action against the species, which can potentially eradicate them from vast areas [16]. In regions with widespread livestock predation, pastoralists retaliate by indiscriminately killing predators [34, 24]. Except a small group of peoples (30.55%) who still support the conservation of the leopards and have no objection to their existence in the forest if they don't come to the human settlements but majority (50%) wants complete elimination and few (19.44%) were impartial about the existence of leopard. Habitat degradation and depleted wild prey base may cause the species to shift their diet on the available domestic livestock available around the area which result in human leopard conflict [16]. Even in the absence of attacks on humans, livestock depredation by carnivores can hamper the livelihoods of people and affect their economic condition [11]. Thus predation of livestock is inevitable and creates a negative attitude to conservation that can lead to the retaliatory killing of carnivores [29].

Encroachment in buffer zone and installation of crush machine in core zone of PLNP are major threats and evidences of poor protection and conservation measure for the species. Another important but ignored aspect was lack of awareness among local community about the role of protected areas and wildlife in our ecosystem. These aspects need urgent action to make logic towards the conservation of wildlife in the area. Successful carnivore conservation depends on public attitudes and acceptance levels of predators, and these are likely to change as circumstances change. Our study suggests economic compensation, community education and proper husbandry practices. Research and monitoring related to human leopard conflict should be continue for better understanding of the conflict and its resolution to an acceptable limit. Designing and implementing an awareness program on the basis of research and more frequent interaction with the community could yield better results for the conservation of leopard in PLNP.

Conclusion

Livestock depredation by leopards (*Panthera pardus*) is one of the global key conservation issues in landscapes with limited wild prey resources. The present study revealed the pattern associated with human–leopard conflict. The extent of loss varied across the months, and small-bodied livestock, such as goat and sheep, were more vulnerable than large-bodied cattle. Domestic animals were killed more frequently after dark than during daylight hours. About 17 Leopards have been killed mostly in response to livestock depredation. Factors most closely associated with livestock depredation included decline of natural prey, lacking herding and guarding practices, especially during nighttime. Local people repeatedly use pastures where leopards are known to hunt. We suggest widespread local community education, proactive human–leopard conflict management, particularly through adopting carnivore-friendly livestock protection measures, and the restoration of natural prey species.

Abbreviations

AJ & K	Azad Jammu and Kashmir
PLNP	Pir Lasoora National Park

References

[1] R. Woodroffe, L.G. Frank, P.A. Lindsey, S.M.K. Oleranah, S. Roman, *Livestock husbandry as a tool for carnivore conservation in Africa's community rangelands: A case control study*, **Biodiversity and Conservation, 16,** 2007, pp.1245-1260.

[2] J.D.C. Linnell, J.E. Swenson, R. Andersen, *Predators and people: conservation of large carnivores is possible at high human densities if management policy is favorable*, **Animal Conservation, 4,** 2001, pp. 345-349.

[3] D.W. Macdonald, C. Sillero-Zubiri, *Large carnivores and conflict: Lion conservation in context*, **Lion Conservation Research,** Workshop 2: Modelling Conflict (Editors: A.J. Loveridge, T. Lynam and D.W. Macdonald), Wildlife Conservation Research Unit, Oxford University, 2002, pp. 1- 8. *www.peopleandwildlife.org.uk/crmanuals/CarnivoreConflictP&WManual*

[4] C. Mishra, *High altitude survival: conflicts between pastoralism and wildlife in the trans-Himalaya*, **Ph.D. Thesis**, Wageningen University, Netherlands, 2001.

[5] V.A. Conforti, C.C.D. Azevedo, *Local perceptions of jaguars (Panthera onca) and pumas (Puma concolor)in the Iguacu National Park area, south Brazil*, **Biological Conservation, 111,** 2003, pp. 215-221.

[6] K. Graham, A.P. Beckerman, S. Thirgood, *Human-predator-prey conflicts: Ecological correlates, prey loss and patterns of management*, **Biological Conservation**, **122,** 2005, pp. 159-171.

[7] V.K. Saberwal, J.P. Saberwal, R. Gibs, T. Chellam, J. Johnsingh, *Lion human conflict in the Gir forest India*, **Conservation Biology, 8,** 1994, pp**.** 501-507.

[8] V.R. Athreya, S.S. Thakur, S. Chaudhuri, A.V. Belsare, **A Study of the Man-Leopard Conflict in the Junnar Forest Division**, Pune District Maharashtra, 2004, pp. 25-29.

[9] S.W. Wang, D.W. Macdonald, *Livestock predation by carnivores in Jigma Singye Wangchuck National Park, Bhutan***, Biological Conservation**, **129,** 2006, pp. 558-565.

[10] C. Mishra, P. Allen, T. McCarthy, M.D. Madhusudhan, A. Bayarjagal, H.T.T. Prins, *The role of incentive programs in conserving the snow leopard*, **Conservation Biology, 17,** 2003, pp. 1512-1520.

[11] M.O. Ogada, R. Woodroffe, N.O. Oguge, L.G. Frank, *Limiting predation by African carnivores: The role of livestock husbandry*, **Conservation Biology, 17,** 2003, pp. 1521-1530.

[12] M.D. Madhusudan, C. Mishra, **Why Big, Fierce Animals Are Threatened: Conserving Large Mammals in Densely Populated Landscapes,** The Science and Politics of Conservation in India, New Delhi, 2003.

[13] B.D. Patterson, S.M. Kasiki, E. Selempo, R.W. Kays, *Livestock predation by lions and other carnivores on ranches neighboring Tsavo National Parks, Kenya*, **Biological Conservation**, **119,** 2004, pp. 507-516.

[14] M.W. Hayward, P. Henschel, J.O. Brien, M. Hofmeyr, G. Balme, G.I.H. Kerley, *Prey preferences of the leopard (Panthera pardus),* **Journal of Zoology, 270**, 2006, pp. 298-313.

[15] M.K. Oli, I.R. Taylor, M.E. Rogers, *Snow leopard predation of livestock: an assessment of local perceptions in the Annapurna conservation area,* Nepal, **Biological Conservation, 68**, pp. 63-68.

[16] M. Kabir, A. Ghoddousi, M.S. Awan, M.N. Awan, *Assessment of human-leopard conflict in Machiara National Park, Azad Jammu and Kashmir, Pakistan*, **European Journal of Wildlife Research, 60,** 2013, pp. 291-296.

[17] K. Nowell, P. Jackson, **Wild Cats: Status Survey and Conservation Action Plan**, IUCN, Gland, Switzerland, 1996.

[18] T.J. Roberts, **The Mammals of Pakistan**, Ernest Benn Publishers, London, 1997, pp. 217-221.

[19] K.M. Sheikh, S. Molur, **Status and Red List of Pakistan's Mammals, Based on Conservation Assessment and Management Plan for Mammals**, IUCN, Pakistan, 2005, p. 344.

[20] N.I. Dar, R.A. Minhas, Q. Zaman, M. Linkie, *Predicting the patterns, perceptions and causes of human–carnivore conflict in and around Machiara National Park, Pakistan*, **Biological Conservation**, **10,** 2009, pp. 2076-2082.

[21] M.M. Azam, R. Hussain, M. Ali, W. Ahmed, N. Abbas, **Pir Lasoora National Park, AJK,** Zoological Science Division 2006-07, p. 21.

[23] J. Marino, *Threatened Ethiopian wolves persist in small isolated Afroalpine enclaves*, **Oryx, 37,** 2003, pp. 62-71.

[24] E. Distefano, **Human-Wildlife Conflict Worldwide: A Collection of Case Studies, Analysis of Management Strategies And Good Practices**, Kruger National Park, South Africa, 2005, p. 34.

[25] A. Treves, K.U. Karanth, *Human-carnivore conflict and perspectives on carnivore management worldwide*, **Conservation Biology, 17,** 2003, pp. 1491-1499.

[26] R. Woodroffe, L.G. Frank, P.A. Lindsey, S.M.K. Oleranah, S. Roman, *Livestock husbandry as a tool for carnivore conservation in Africa's community rangelands,* **Biodiversity and Conservation, 16**, 2007, pp. 1245-1260.

[27] A. Edgaonkar, R. Chellam, *Food habit of the leopard (Panthera pardus) in the Sanjay Gandhi National Park, India*, **Mammalia, 66**(3), 2002, pp. 353-360.

[28] N.U. Sekhar, *Crop and livestock depredation caused by wild animals in protected areas: the case of Sariska Tiger reserve Rajasthan, India*, **Environmental Conservation**, 25, 1998, pp. 160-171.

[29] J.M. Kolowski, K.E. Holekamp, *Spatial, temporal and physical characteristics of livestock depredation by large carnivores along a Kenyan reserve border***, Biological Conservation, 128**, 2006, pp. 529-541

[30] A. Rabinowitz, *The density and behaviour of large cats in a dry tropical forest mosaic in Huai Kha Khaeng Wildlife Sanctuary, Thailand,* **Natural History Bulletin of the Siam Society, 37,** 1989, pp. 235-251.

[31] G. Balme, L. Hunter, R. Slotow, *Feeding habitat selection by hunting leopard (Panthera pardus) in a woodland savanna: Prey catch ability versus abundance*, **Animal Behavior, 74**, 2007, pp. 589-598.
[32] R.A. Ahmed, K. Prusty, J. Jena, C. Dave, S.K.R. Das, H.K. Sahu S.D. Rout, *Prevailing Human Carnivore Conflict in Kanha-Achanakmar Corridor, Central India.* **World Journal of Zoology, 7**(2), 2012, pp. 158-164.
[33] F.R. Michalski, L.P. Boulhosa, A. Faria, C.A. Peres, *Human-wildlife conflicts in a fragmented Amazonian forest landscape of large felid depredation on livestock*, **Animal Conservation, 9**, 2006, pp. 179-188.
[34] J. Polisar, I. Maxit, D. Scognamillo, L. Farrell, M.E. Sunquist, J.F. Eisenberg, *Jaguars, pumas, their prey base and cattle ranching: Ecological interpretations of a management problem*, **Biological Conservation, 109**, 2006, pp. 297-310.

Received: July 02, 2016
Accepted: May 30, 2017