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LIVESTOCK PREDATION BY ENDANGERED INDIAN WOLF (*CANIS LUPUS*) IN HADAGARH WILDLIFE SANCTUARY, EASTERN INDIA

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ABSTRACT

Indian wolf predations on domestic livestock were investigated by a questionnaire survey in four villages of the Hadagarh Wildlife Sanctuary, Eastern India. Most local inhabitants were subsistence daily wage laborers in addition to livestock rearing and agriculture as a secondary source of income, with an average livestock holding of 14 animals per household. Reported losses due to Indian wolves averaged 1.1 animals per household in one year of study, constituting 7.6 % of total stock-holding, representing in monetary US$ 3491.

Key words : Wolf, Farmer, Livestock, Goat, Hadagarh

Introduction

Conflicts between human and predators are the product of socio-economic and political landscapes and are particularly controversial because the resources concerned have economic value and the predators involved are high profile and often legally protected (Graham *et al.,* 2005). Livestock predation by large carnivores and their retaliatory persecution by peoples are worldwide conservation concerns. Poor understanding of the ecological and social underpinnings of this human wildlife conflict hampers effective conflict management programms (Bagchi and Mishra, 2006). Human carnivore conflict is manifested in the death of humans, livestock and carnivores; and also resulting negative local attitudes and retribution killings imperil the future of many endangered carnivores (Barlow *et al*., 2010). The Indian wolve (*Canis lupus*) is involved in conflict with humans since historical times as they are believed to lift children or attacks humans and predate livestock across India (Blanford, 1891; Jhala and Sharma, 1997; Rajpurohit, 1999; Jhala, 2003).

The Indian wolf is widely occurs, but at low density throughout its range in the Indian Subcontinent. The core habitat of this species is the western, central and peninsular India in open grassland, scrubland and rocky hills (Sahi, 1982). The Indian wolf is categorized as Endangered in the IUCN Red List, features on Schedule I of the Indian Wildlife (Protection) Act, 1972 and listed as Appendix -I under the Convention on International Trade in Endangered Species (CITES). The eastern population of Indian wolf found in Odisha, Jharkhand, Bihar and parts of West Bengal, is an exception and occurs in moister forested habitats (Sahi, 1982); prefer open forest on the periphery of protected forest areas where forest reduced to scrub forest due to heavy biotic pressure (Jhala, 2003).

The natural diet of Indian wolf seems to mainly medium-sized to small ungulate blackbuck (*Antilope cervicarpa*), chinkara (*Gazella bennettii*), and small sized livestock sheep and goat (Sahi, 1982). The majority of wolf populations in Indian inhabit outside protected areas and wolf have been reported to kill livestock in most parts of their range (Sahi, 1982; Kumar and Rahmani, 2000). Majority residents of Hadagarh Wildlife Sanctuary are daily wage labors and small farmers whose principal source of income is livestock. Livestock graze freely in sanctuary and providing conditions where conflict is likely.

In this study, authors describe extent of predation by wolves on livestock and its impact on the socio-economy of local inhabitant based on interviews with victims in and around Hadagarh Wildlife Sanctuary where we lack any knowledge on the status of wolf populations.

Material and Method

Study Area

Hadagarh Wildlife Sanctuary ($21^0$12' to $21^0$23' N and $86^0$12' to $86^0$21' E) was created in 1978, covering an area of 191 km^2 in Odisha. The sanctuary lies in the catchment of Salandi river, which is a major tributary of

Losses to Indian wolves averaged 1.1 animals per household in one year of study constituting 7.6% of total stock holding.

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the river Baitarani. There are three distinct seasons: winter (December- March), summer (April- June) and monsoon (July- October). The climate in the sanctuary is considerably influenced by south west monsoon in summer. The average annual rainfall is 1700 mm where as the temperature is highest (42^{0}C) in May-June before the arrival of monsoon, and lowest (5^{0}C) in the month of December. The tract is mainly hilly and undulating with altitudes ranging from 100 m to 600 m above msl. Hadagarh sanctuary is linked to some important elephant ranges including Similipal Tiger Reserve and Kuladiha Wildlife Sanctuary. The vegetation of this area has been broadly classified as northern tropical dry deciduous forest (Champion and Seth, 1968).

The main fauna of sanctuary includes *Elephas maximus, Panthera pardus, Felis chaus, Canis lupus, Canis aureus, Semnopithecus entellus, Macaca mullata, Hystrix indica, Axix axis, Muntiacus muntjac and Sus scrofa.* During the course of study, 155 species of birds were also identified (Sahu *et al*., 2012 and Palei *et al.,* 2012).

According to 2011 census, 15 villages are located along the boundary of the sanctuary, supporting a total human population 6538 of 1302 families. The main occupations of the inhabitants are agriculture and livestock rearing. Most agriculture-related activities are restricted to the short growing season (from July to December). The main crop cultivated is rice. Livestock includes goats, sheep and cattle and all these animals graze in the sanctuary.

Methodology

The study was based on questionnaire survey from October 2010 to March 2011 in four randomly selected villages (total household=89) of the sanctuary. The villages were chosen due to the known presence of wolf with relatively high level of livestock losses with the assistance of local authorities. The interviews were conducted only after the research team had been in the area for six months studying assessment of sanctuary biodiversity. Respondents (the head of household or their relative) were interviewed relating number of livestock owned, livestock management, number of livestock lost due to predation, time and location of attack and the response of attack by the livestock owners or herdsman. Also the extent of predation was evaluated by forming a network of informants among the villagers, who reported the depredation of livestock by wolf during study period. All estimates depredation reported here were related to recent event of a 12 month period, because survey respondents generally bias their memory towards recent event. A depredation claim was consider authentic if our investigation revealed some evidences or crosschecked by interview with third party.

To quantify the monetary loss of livestock due to depredation, the species, age, number and sex of livestock were recorded. Estimates of current average market values of different classes of livestock species by age and sex were obtained from people who frequently involved in trading of livestock species and through independent observations from local markets. Local economic values of livestock were translated in to US$ at the exchange rate at the time of study.

Results

Socio-economic status and livestock population

The economy of the surveyed households (n=89) primarily dependent upon daily wage labour (48%) within the local areas followed by livestock rearing (30%) and seasonal cultivation (22%). In addition to this livestock rearing (86%) constituted the secondary source of income followed by collection of minor forest products (14%). Others source of cash income among residents were the sale of livestock (67%) and agricultural products (20%) and forest products (13%) (n=89). Annual cash income per household was about 9,000 Indian Rupees (about 165 US$). In early 2011, 95% of households (n=84) reared a total of 1,253 head of livestock, with an average number of 14 livestock per household. Goat generally made up 82% of the total livestock population along with cattle, sheep, pig and buffalo. Farmers penned their livestock near their house in the shed.

Losses of livestock

Of the 89 households surveyed, 28 (31.4%) reported losses of livestock to wolf. Total 96 animals lost to predation, an annual loss of 7.6% of the livestock holdings. The average loss of animals per household over the whole village was 1.1 of total livestock holdings. Most of the losses were goats (96.8%) but sheep were also reported to be victims of predation.

Table 1 : Livestock population of four villages of Hadagarh Wildlife Sanctuary.

Village Name	Respodents	Buffalo	Cattle	Goat	Sheep	Total	Average livestock
Podasingada	36	04	78	372	10	464	12.88
Rangamatia	27	12	28	310	13	363	13.44
Phulajhar	18	06	54	234	0	294	16.33
Ketaki	08	0	18	112	02	132	16.5
Total	89	22	178	1028	25	1253	14.07

Temporal and spatial pattern of livestock predation

Out of the total 63 reported attacks majority (95.2%) were fatal. Of the 60 fatal attacks, 76.6% resulted in the death of only one animal where as death of 2 and more animals have also reported. Most (82.5%) of attacks were reported to have occurred near the grazing areas in close proximity to the sanctuary and the remaining (17.5%) in the vicinity of house or pen. Predator attacks (87%) were reported to have occurred during day.

Cost of livestock predation

Livestock predation in terms of monetary loss was estimated using average local prices in 2011. The values of each were calculated according to species, age and sex. The total loss of 96 head of livestock was valued to be US$ 3491. Overall each house hold (including those that did not reported losses) lost an estimated US$ 39.2 in average, about 23.7% of annual income. Mean losses only for households that reported livestock lost (n=28) was US$ 124.6.

Discussion

Our survey of human wolf conflicts revealed that loss in livestock due to predators represents an economic concern for livestock owners in Hadagarh Wildlife Sanctuary. Goats were the major victims of predation. They were killed proportionally more than their relative abundance. The predation of goats by wolf may be related to the vulnerability associated with the medium body size and careless husbandry.

Predation on livestock has also been linked to low densities of wild prey in wolves in southern Europe (Meriggi and Lovari, 1996) and North America (Mech *et al*., 1988). However, wolf predation on livestock may also be high where wild preys are abundant (Treves *et al*., 2004). In the study area, people have accessed the forest resources for their livestock and other requirements resulting overgrazing of the existing grasslands. Thus habitat quality was not sufficient to maintain a moderate wild prey population. The medium sized wild preys were found in very low densities in the study area. Almost all practice on traditional animal husbandry by people involves careless herding of livestock by day and in the shed at night. Such careless husbandry is probably vulnerable to wolf depredation of livestock. Herding practice on livestock may reduce the relative involvement of wolf in livestock predation. Earlier research in India has also identified the need of improving livestock husbandry to reduce conflict level (Mishra, 1997). It is therefore essential that further research should address the precise role of livestock husbandry practice in explaining depredation events.

One of the most important questions to be considered for wolf conservation is the payment of adequate compensation by the government. Currently in India, compensation payment is made only for the animal killed by tiger, leopard, lion, elephant and sloth bear. Only the state of Maharastra provides compensation for wolf attack. The state government does not provide compensation to farmers for wolf predation of livestock. As per our study, most of the livestock owners are very poor and a loss of single livestock is substantial. Many studies in India have recommended adequate compensation scheme for ensuring wolf conservation (Jhala, 2003; Kumar and Rahmani, 2000). Because livestock owners were not satisfied with the government's response to their problems, frequent wolf attacks on livestock offer negative attitudes towards wildlife and governments effort to conserve it. Compensation for livestock depredation by wolves might help those livestock owners that experience depredation offset some of the financial burden for conserving wolf. To provide some economic gain for the affected people to reduce the negative attitude to wolf, a parallel programme like ecotourism might have to be implemented. But it would not benefit the individuals who suffer most losses (Oli *et al.*, 1994). In case of the Hadagarh Wildlife Sanctuary, benefits from the outreach activities are currently inadequate. We suggest that wolf predation on livestock can be minimised through appropriate livestock husbandry and conservation of wild prey.

हादागढ़ वन्यजीव अभ्यारण, पूर्वी भारत में संकटापन्न भारतीय भेड़िये (*केनिस ल्यूपस*) द्वारा पालतू पशुओं का भक्षण

हिमांशु एस. पेलई, सुब्रत डिबाटा, प्रत्युश पी. मोहपात्र और हेमन्त के. साहू

सारांश

हादागढ़ वन्यजीव अभ्यारण, पूर्वी भारत के चार गाँवों में प्रश्नावली सर्वेक्षण द्वारा भारतीय भेड़िये द्वारा घरेलू जानवरों के भक्षण का अन्वेषण किया गया। पालतू पशुओं कौ चुगाने और द्वितीयक आय के रूप में कृषि को अपनाने वाले अधिकांश स्थानीय निवासी दैनिक मजदूरी से अपना जीविकोपार्जन करते है। घर–गृहस्थों के पास औसतन 14 पशु हैं। अध्ययन के एक वर्ष में भारतीय भेड़िये द्वारा प्रति घर–गृहस्थ से औसतन 1–1 पशु को अपना शिकार बनाया जो कुल पशुओं का 7.6 प्रतिशत है इस प्रकार यू.एस. डालर 3491 का नुकसान हुआ।

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