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Crop and Livestock Depredation by Wild Animals: The Case of Ranthambore Tiger Reserve, India

Deepak Chand Meena[1]*, B.S. Meena[2], Sanchita Garai[3], H.R. Meena[4], Gopal Sankhala[5] and Akshita Chadda[6]

[1]Ph.D. Scholar, [2,4&5]Principal Scientist, [3]Senior Scientist, Dairy Extension Division, ICAR-National Dairy Research Institute, Karnal-132001, Haryana, India
[6]Ph.D. Scholar, Department of Veterinary Animal Husbandry Extension Education, GADVASU, Ludhiana-141004, Punjab, India
*Corresponding author email id: dcmndri@gmail.com

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ABSTRACT

People worry about crop and livestock destruction by wild animals in the nearby protected region, which might lead to opposition to the preservation of a protected area. We surveyed 360 households from 30 villages in the eco-sensitive region of Ranthambore Tiger Reserve in the period of December 2021 to May 2022 to assess the annually loss in the crops by the wild animals and livestock attacked by the wild animals. One-way variance followed by DMRT post hoc was used to analyse losses in crop. It was observed that farmers getting losses, in Rabi season farmers get much loss in the mustard crop, and in Kharif season farmers get loss in maize crop due to wild animals in the form of crop raiding foraging, and eating. 335 number of incidents happened with livestock in the last five years among them 155 got injured and 180 were killed by wild animals, majority of incidents happened with goat followed by calves and buffalo. Our comparative analysis helps to further ongoing conservation and compensation efforts by shedding light crops and livestock that influence conflict loss and tolerance.

INTRODUCTION

Human-wildlife conflicts are defined as Conflicts between humans and wildlife are those that arise when one of the two is harmed by a human action or a wildlife action (Redpath et al., 2013). In many locations, especially India, around protected areas (PAs), crop degradation and livestock predation by wildlife are important conservation challenges. The danger of human harm or death, along with crop and livestock losses, could make the local populace more hostile toward wildlife (Sillero-Zuberi et al., 2007).

For the very survival of humans, especially those who live nearby, this protected region and the forest area are among the most crucial natural and renewable resources. (Bhat, 2018), and tribes close to the forest receive the most of the benefits and have a significant source of income (Uchoi & Singh, 2021). The government's conservation efforts are severely hindered by a lack of funding, which also causes locals to lose employment possibilities and forest management programmes to help locals earn more money (Iqbal et al., 2021a; Iqbal et al., 2021b). Communities close to a protected region may lose out on economic opportunities, including being shut out of access to resources and having crops and cattle destroyed by wild animals. In some areas of India, tolerance for species has contributed to the survival of some huge mammals (Karanth et al., 2010). There are 52 Tiger Reserves in India, comprising a total area of 71027.10 km^2 and 140 protected areas located inside the tiger reserve (Wildlife Institute of India). Ranthambore Tiger Reserve is direst tiger reserve with 1700.24 km^2 of land of RTR designated as a Project Tiger Reserve in 1973, and on November 1st, 1980, it was designated as a national park. In the Ranthambore Tiger Reserve area, there are primarily three seasons throughout the year: summer, winter, and monsoons. The atmosphere is extremely hot and dry during the summer, with temperature variations between 40 and 45 degrees Celsius. And

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average annual rainfall (June-September) is 800 mm (DeFries et al., 2010; Karanth & DeFries, 2011).

The expansion of farmland restricts the range of many wild animals due to the loss of habitat and fragmentation which ultimately result in more contact between wild animals and humans begins. The majority of the time, these interactions result in the death of wild animals or the death of humans owing to wild animals destroying crops and livestock and farmers also obtain a good number of benefits from the reserve area. These conflicts need to be resolved immediately since the delay in conflict resolution can aggravate the people to the disadvantage of the conservation aims set for the protected areas. The assessment of the economic losses in crops and livestock depredation due to wild animal among the villages in the core and buffer zones of India's Ranthambore Tiger Reserve and analysis of a collection of forest products by the villagers on the premises of the reserve area has been attempted.

METHODOLOGY

Ranthambore Tiger Reserve is divided into two zone Tiger Habitat/Core Zone (Ranthambore National Park, Sawai Mansingh Wildlife Sanctuary, Sawai Madhopur Wildlife Sanctuary) and Buffer Zone (Keladevi Wildlife Sanctuary) spreading over four districts namely, Sawai Madhopur, Karauli, Bundi and Baran. Both zones were selected. Out of 304 villages in the vicinity of RTR 30 villages were selected randomly and 12 farmers who are engaged in agriculture activities and livestock activities from each village were selected randomly. Thus, a total of 360 farmers were interviewed either at their doorstep with the help of an open-ended interview schedule in the period of December 2021 to May 2022. Data collected from the farmers on several criteria (area, expected loss, yield) were subjected to One way Variance followed by the DMRT Post Hoc Test using all pairwise comparisons to identify the most important among them in case of livestock depredation farmers were asked about the incident happened with the livestock in last five year (2017-2021) on their memory based and documented it with the help of frequency, percentage.

RESULTS AND DISCUSSION

The annual loss in crops by wild as perceived by the farmers

Farmers in the vicinity of the Ranthambore Tiger Reserve were highly dependent on agriculture and livestock activities. The result presented in Table 1 shows that farmers were mostly growing four major crops in the Rabi season wheat, mustard, gram, and barley in the Rabi session. Farmers was grow mustard on the majority of their land that was average of 1.20 hectares land followed by 0.43, 0.21, 0.04 hectares of a land for gram, wheat, and barley grown by the farmers, respectively. In the case of the area, all the crops have a significant difference at $p<0.05$. the average yield of barley was 14.88 quintals in the area followed by 11.15 quintals per hectare in wheat and case of mustard and gram average yield was 5.27, and 4.65 quintals per hectare, respectively and there was no significant difference ($p<0.05$) in the yield of mustard and gram. Maximum percent loss observed by a wild animal in the wheat followed by gram and mustard at 9.16, 9.12, and 8.89 per cent in yield, respectively but at $p<0.005$, there was no discernible difference among these three crops but having a significant difference in barley crops with three crops in terms of losses by the wild animals. Species of wild animals like wild boar and nilgai are involved in crop losses in mainly two forms one is eating of the crops and crop raiding (Kranth & Nepal, 2011). Average crop loss in barley was 1.20 quintal per hectare by the wild animal followed by 1.00, 0.47, and 0.43 quintal per hectare in wheat, mustard, and gram, respectively. Loss in the rupee was calculated by using MSP 2021-2022 (Minimum Support Price) of the crops. The result was calculated that farmers bear a maximum loss was 2390.84 rupees in the crop of mustard followed by gram was 2332.05 rupee but when it came to rupee losses, there was a substantial difference ($p <0.05$) between these two crops. In the case of wheat average loss in rupee was 2020.14 rupee per hectare followed by a 1955.79 rupee in barley.

Farmers in the vicinity of Ranthambore Tiger Reserve mainly were grow four crops in the Kharif season namely sorghum, pearl millet, maize, and black gram. Results depicted in Table- 1 indicated that Farmers mostly use their land for the pearl millet average land used for the pearl millet was 0.78 hectares per household followed by 0.37, 0.27, 0.09 hectares land for black gram, maize, and sorghum, respectively. In the case of yield, average yield of the pearl millet was 10.15 quintals per hectare followed by 9.01, 2.71, and 2.16 quintals of maize, black gram, and sorghum, respectively. The favourite crop of wild animals was maize so farmers mostly

Table 1. Annual crop loss as perceived by the farmers in the Rabi crops and Kharif crops

Particular	Rabi Crops			
	Wheat	Mustard	Gram	Barley
Area	0.21 ± 0.01^{c}	1.20 ± 0.72^{a}	0.43 ± 0.21^{b}	0.04 ± 0.03^{d}
Yield (In qt.)	11.15 ± 8.71^{b}	5.27 ± 4.22^{c}	4.65 ± 2.95^{c}	14.88 ± 0.91^{a}
Percent Loss	9.16 ± 3.66^{a}	8.89 ± 2.91^{a}	9.12 ± 3.34^{a}	7.90 ± 2.91^{b}
Yield Loss (In qt.)	1.00 ± 0.90^{b}	0.47 ± 0.44^{c}	0.43 ± 0.33^{c}	1.20 ± 0.97^{a}
Loss in (Rupee)	2020.14 ± 1819.95^{b}	2390.84 ± 2247.05^{a}	2332.05 ± 1744.63^{a}	1955.79 ± 1589.18^{b}
Particular	Kharif Crops			
	Sorghum	Pearl Millet	Maize	Black Gram
Area	0.09 ± 0.05^{d}	0.78 ± 0.42^{a}	0.27 ± 0.15^{c}	0.37 ± 0.24^{b}
Yield (In qt.)	2.16 ± 1.31^{c}	10.15 ± 7.69^{a}	9.01 ± 4.89^{b}	2.71 ± 1.77^{c}
Percent Loss	7.04 ± 2.98^{c}	11.43 ± 6.44^{b}	17.59 ± 6.53^{a}	7.03 ± 3.88^{c}
Yield Loss (In qt.)	0.15 ± 0.12^{c}	1.16 ± 1.15^{b}	1.60 ± 1.15^{a}	0.19 ± 0.18^{c}
Loss in Rupee	421.13 ± 336.06^{d}	2613.46 ± 2603.41^{b}	2990.42 ± 2142.89^{a}	1219.17 ± 1161.77^{c}

(a, b, c, d means bearing different superscripts in a row under each criterion differ significantly ($p<0.05$). The multiple comparisons are based on the DMRT Post Hoc test)

Table 2. Annual Crop loss as perceived by the farmers in the horticulture crops

Crop Type	Area (hectare)	Yield (In qt.)	Percent Loss	Yield Loss (In qt.)	Loss in Rupee
Guava	0.54±0.34	76.39±48.03	14.10±6.41	10.90±9.18	26320.97±1167.54

Table 3. No. of Incidents with livestock by wild animals in the last five years

S.No.	Animal Type	No. of Incident	Injured of Livestock	Killed of Livestock	Death (%)
1	Buffalo	67	49	18	26.86
2	Cow	43	32	11	25.00
3	Calves	78	53	25	32.05
4	Goat	121	19	102	84.30
5	Sheep	26	2	24	92.31
	Total	335	155	180	53.73

perceived that the majority of loss happened in the maize crop that 17.59 per cent per hectare and then in pearl millet that is 11.43 per cent. According to Awasthi and Singh (2015), the Gaurishankar Conservation Area in Nepal is greatest crop damage, with maize crops suffering a 39 per cent and 30 per cent loss in potato yield due to wildlife attack on the crops. Over a decade, damage to grassland accounted for 50.10 per cent of damage cases and 57.80 per cent of the total financial compensation amount, followed by damage to maize (30.10%) and wheat (11.70%). Schley et al., (2008) found no significant difference ($p<0.05$) between sorghum and black gram in the loss percent by the wild animal. So average yield loss per hectare is more in maize followed by pearl millet crop and by using one-way variance followed by DMRT found that there was no significant difference ($p<0.05$) in case of yield loss per hectare in the sorghum and black gram crop. Around 2990.42 rupees per hectare loss happened in the maize crop followed by pearl millet, black gram, and sorghum. Farmers perceived that Maize is mostly preferred attacking crop by the wild animals followed by sorghum Malugu & Hoare (2007) & Mwakatob et al., (2014).

Farmers in the surrounding villages of RTR was growing horticulture crops like guava and earned a good amount of money. The result in Table 2 revealed that the average area for guava farming was 0.54 hectares and the average yield per hectare was 76.39 quintals. Farmers faced many problems in guava farming due to raided by the wild animal and the annual average loss in per cent was 14.10 or in case of yield loss that was 10.90 quintal per hectare or in case of the rupee that was 26320.97 rupee per hectare by the per household. Fruit crops are mostly targeted by the rehesus monkey due to various reasons like lack of fruits tree inside a forest, and increased monkey population (Baral et al., 2021) but wild boar uprooted the whole tree.

Human-wildlife conflict with the livestock

Farmers in the vicinity of the Ranthambore Tiger Reserve mostly rear four kinds of animal buffalo, cow, goat, and sheep. Data were collected from the memory of farmers based on incidents that happened in the last five years. Several incidents result presented in Table 3. The same table indicated that there were a total 335 number of incidents that happened with livestock in the last five years among them 155 got injured and 180 were killed by wild animals the maximum number of incidents that happened with a goats were 121 and among them, 19 were got injured and 102 were got killed by the wild animals like tiger and leopard so death rate of the goat was 84.30 per cent. 15.00 percent of households reported livestock loss by the two top-ranked wild animals such as tiger and leopard, and livestock incidents are positively associated with grazing time (Karanth et al., 2013). In the case of buffalo total of 67 number incidents reported among them 49 were got injured and 18 were killed by wild animals. In the case of cows the total number of incidents reported in the last five years were 43 among them 32 were got injured and 11 cows were killed by wild animals in the last five years. And in the case of sheep total number of incident with sheep was 26 among them 24 were killed and 2 were get injured and death rate of sheep is the highest compared to other animals which was 92.31 per cent. The total number of incidents were 78 with calves of cow and buffalo among them 53 were got injured and 25 were killed. Tigers and leopards collectively killed 209 and 1476 hoofed animals, respectively, between 2015 and 2019 among them at least 86 percent more sheep with hooves killed by leopards in each season than by tigers Bing et al., (2009).

CONCLUSION

People's lives are at danger close to protected area borders due to wildlife-caused damage to livestock and crops, and Ranthambore Tiger Reserve is being invaded by humans. Crop loss and livestock depredation by wild animals are major problems who are loving in the vicinity of the Reserve area. Its impact directly on their livelihood and income losses. It was found that farmers faced major loss in the mustard crop in Rabi season and Maize crop in Kharif season. Annually loss in guava farming was around 26000 by wild animals. Small ruminants like sheep and goats are highly vulnerable to kill by wild animals. Therefore, it is advised that relevant wildlife authorities educate farmers on how to manage these issues so that their fields suffer fewer financial losses.

REFERENCES

Awasthi, B., & Singh, N. B. (2015). Status of human-wildlife conflict and assessment of crop damage by wild animals in Gaurishankar conservation area, Nepal. *Journal of Institute of Science and Technology, 20*(1), 107-111.

Baral, K., Sharma, H. P., Kunwar, R., Morley, C., Aryal, A., Rimal, B., & Ji, W. (2021). Human-wildlife conflict and impact on

livelihood: A study in common forestry system in mid-hills of Nepal. *Sustainability, 13*, 1370.

Bhat, A. W. (2018). Forest conservation and livelihood generation through joint forest management in India. *International Journal of Academic Research and Development, 3*(2), 295-299.

Bing, L. I., Endi, Z. H. A. N. G., & Zhongbao, L. I. U. (2009). Livestock depredation by Amur tigers in Hunchun Nature Reserve, Jilin, China. *Acta Theriologica Sinica, 29*(3), 231.

DeFries, R., Karanth, K. K., & Pareeth, S. J. (2010). Interactions between protected areas and their surroundings in human-dominated tropical landscapes. *Biological Science, 143*(2), 2870–2880.

Iqbal, T., Slathia, P. S., Peshin, R., Sehgal, S., Sharma, M. K., Kour, K., & Kumar, R. (2021a). Perception Towards joint forest management programme in conservation of forest resources in Jammu Division. *Indian Journal of Extension Education, 57*(1), 67-72.

Iqbal, T., Slathia, P. S., Peshin, R., Sehgal, S., Sharma, M. K., Kour, K., & Kumar, R. (2021b). Constraint analysis of joint forest management programme in Jammu division of Jammu & Kashmir. *Indian Journal of Extension Education*, *57*(3), 102-105.

Karanth, K. K., & DeFries, R. (2010). Conservation and management in human- dominated landscapes: case studies from India. Introduction Spec Issue. *Biological Science, 143*, 2865–2869.

Karanth, K. K., Gopalaswamy, A. M., Prasad, P. K., & Dasguta, S. (2013). Patterns of human–wildlife conflicts and compensation: Insights from Western Ghats protected areas, *Biological Conservation, 166*, 175–185

Karanth, K. K., Nichols, J. D., Karanth, K. U., Hines, J. E., & Christensen, N. L. (2010). The shrinking ark: patterns of large mammal extinctions in India. Proc Royal Soc Ldn-B. *Biological Science, 277*(1690), 1971–1979.

Malugu L. T., & Hoare, R. E. (2007). Human-elephant conflict in the western Serengeti Mitigating Human-Elephant Conflict: Case Studies from Africa and Asia (Eds Walpole M, Linkie M.). Fauna and Flora International (FFI): Cambridge Press. pp 1-6.

Mwakatobe, A., Nyahongo, J., Ntalwila, J., & Roskaft, E. (2014). The impact of crop raiding by wild animals in communities surrounding the Serengeti National Park, *Tanzania*. *Academic Journal, 6*(9), 637-646.

Redpath, S. M., Young, J., Evely, A., Adams, W. M., Sutherland, W. J., Whitehouse, A., & Gutierrez, R. J. (2013). Understanding and managing conservation conflicts. *Trends in Ecology and Evolution, 28*(2), 100–109.

Schley, L., Dufrene, M., Krier, A., & Frantz, A. C. (2008). Patterns of crop damage by wild boar (Sus scrofa) in Luxembourg over a 10-year period. *European Journal of Wildlife Research, 54*(4), 589-599.

Sillero-Zuberi, C., Sukumar, R., & Treves, A. (2007). Living with wildlife: the roots of conflict and the solutions. In: MacDonald DW, Service K (eds) Key topics in conservation biology. Oxford University, Oxford, pp 266–272.

Uchi, O., & Singh, R. (2020). Self-reliance of tribal through corporate social responsibility (CSR): A case study in Tripura. *Indian Journal of Extension Education, 56*(1), 96-99.