



Increasing Interference of Stray and Wild Animals in Farming: Reflections from Western Himalayan Foothills

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Abstract: The problem of animal menace is a burning issue and has direct bearing on the socio-economic conditions of the people in general and farming community in particular. Therefore, the present study was conducted to examine the various aspects of animal menace such as animal species responsible, frequency of crop raiding, extent and degree of menace and crop damages. The study is based on the primary data collected from 60 farm households selected through three stage random sampling technique in Kangra district of Himachal Pradesh. The results revealed that cattle, monkey, wild boar, *sambar* and *nilgai* were the major animal species associated with crop damages. Among these, the problem of cattle was reported to be of relatively recent origin (2-5 years) compared to wild animals' menace (5-10 years). During 2009-2015, there had been a significant increase in animal population from 1.68 to 8.53 in case of stray cattle and 5.66 to 29.48 for wild animals with monkey as dominant species. As far as degree of menace was concerned, the problem of wild animals was more serious compared to the stray cattle. Further, among the wild animals the degree of monkey menace was the major concern round the year.

Keywords: Animal menace, Crop damage, Crop raiding, Stray cattle, Wild animals

Agriculture is the major source of livelihood for the majority of rural population in mountainous regions of India where the farming community generally practices mixed farming to meet their multifarious demands. With the advancement of agricultural technology and extension services, the production and income generating potential of traditional farming systems have improved through the diversification and intensification. Despite of farmers' efforts and public safety nets, farming still remains a risky venture. Since the inhabited villages and farming lands are surrounded by forests, rivulets and gorges which are natural hideouts for wild animals (monkey, *sambar*, wild boar, *nilgai*, etc.) and the fragmentation of forest lands has led to the constant increase in the human-animal conflict (Saraswathi et al 2021). Due to changes in techno-socio-economic conditions in these regions, abandoning unproductive cattle (mainly bullocks) has become a common practice. The increasing population of these animals has assumed the form of menace for the farming.

Animal menace has become one of the major threats for growth and sustainability of agriculture and its extent varies from region to region depending upon the prevalence of animal species and their population status. Among these animals, the problems of menace associated with monkeys (Chauhan and Pirta 2010, Saraswat et al 2015, Reddy and Chander 2016, Rathi and Bhatt 2020) and stray cattle (Arya et al 2019, Lal et al 2019) are more

widespread and serious compared to others. In Himachal Pradesh there are 3243 panchayats out of which about 71 per cent are suffering from monkey menace and the population of stray cattle is around 32160. The conservative estimates of wildlife wing of Himachal Pradesh indicated an annual loss of worth Rs 300-450 crore in the horticulture and agriculture sectors on account of animal menace which may go upto Rs 1,500 crore if expenditure on watch and ward of crops is also accounted for. The crop loss, livestock loss and human injury or even deaths have also been reported (Karanth et al 2013). The farmers are abandoning cultivation due to stray and wild animal menace. Thus, the problem of animal menace is a burning issue and has direct bearing on the socio-economic conditions of the people in general and farming community in particular. Dev et al (2019) also reported that the problem of animal menace in Himachal Pradesh was limiting the farmers from effective use of advanced technologies. The problem needs to be tackled in a planned and systematic manner after examining and identifying the causes and key factors responsible for the ever increasing animal menace at local or regional levels. Thus, a diagnostic analysis on animal menace especially with respect to its origin, animals associated, degree of menace and extent of crop losses was conducted to provide insights for effective planning and management of animal menace at farmer and government level.

MATERIAL AND METHODS

The present investigation had been conducted in foothills of Western Himalayan region. The Kangra district of Himachal Pradesh was purposively selected for the study as it represents the average situation of the region with respect to agro-climatic conditions and has the highest number of holdings & stray cattle population among different districts of Himachal Pradesh. The study is based on the primary data collected from farming households selected through three stage random sampling design (blocks, villages and farmers). Finally, a sample of 60 farming households was drawn from the ten villages by adopting equal allocation method. Detailed information about the origin of the animals menace, major animals responsible for crop damages, trend of the wild/stray animal population, extent of crop damages, etc. were collected from the respondents. The data were collected through personal survey method on specifically designed and pre-tested survey schedules. The data were analysed by using simple tabular method, percentages, averages and total weighted score for the interpretation of results.

RESULTS AND DISCUSSION

Origin of animal menace: The responses indicated that the problem of stray cattle was of recent origin as compared to wild animals (Table 1). The majority of respondents (62 %) revealed that the problem of stray cattle had become more serious between last 2-5 years. It may be attributed to the fact that the farmers no longer wanted to rear bullocks (being replaced by tractors and power tillers) and cattles with low productivities and abandoned them. The problem of wild animals was not serious about over 10 years back. About 67 per cent of the respondents reported that these had become more prominent during last 5- 10 years. This could be attributed to the shrinkage of fodder and other food species in forests forcing the wild animals to raid the cultivated lands (Anonymous 2012).

Animals involved in menace: The prevalence of wild animals responsible for crop losses varied from area to area. The monkey, wild boar, *sambar* and *nilgai* were reported to be the major wild animals responsible for crop damages (Chhangani et al 2008). About 48, 37 and 28 per cent of the respondents reported problems due to monkey, wild boar and *sambar*, respectively, while 25 per cent of the respondents encountered the problem from other wild animals such as *nilgai* (Table 2). The problem of stray cattle was reported by about 42 per cent of the sample households. The figures given in the table are with respect to major animal species responsible for menace; however, in some areas more than one species might have also caused losses.

Population pattern of stray and wild animals: The crop damages and extent of losses depends on the population of animals (wild & stray cattle) prevalent in the locality. Their population might increase or decrease in a particular area. According to the sample respondents, over the period of 2009 to 2015, there had been an increase in population of wild and stray animal raiding the crops (Table 3). The total population of wild animals prevalent in the study area (2015) was estimated at 29.48 in which the proportion of monkeys was found to be highest (55.51%) followed by wild boar and *sambar*. The population of monkeys was comparatively more as compared to the other wild animals mainly because they are not hunted/killed by the locals on account of religious reasons. Saraswat et al (2015) also observed the Human-rhesus macaque monkey conflict as a major problem affecting northern India, particularly the states of Himachal Pradesh and Uttarakhand. Similarly the population of stray cattle increased from 1.68 during 2009 to 8.53 in 2015. The population of wild animals, especially monkeys and stray cattle, is increasing continuously and may have adverse impact on farming in the years to come.

Herd size of animals: Larger the size of herd, higher will be the extent of crop damages. It was reported by the majority of respondents that total population of herd prevalent in an area was not important for crop losses but the extent of damage is usually directly related with the number of animals actually raiding the crops (Table 4). It was found that among the

Table 1. Response of farmers regarding origin of animal menace

Particulars	Number	
	Wild animals	Stray animals
2yr back	-	-
2-5 yr back	16 (26.67)	37 (61.67)
5-10 yr back	40 (66.67)	23 (38.33)
>10 yrs	4 (6.67)	-
Total	60 (100.00)	60 (100.00)

Figures in parentheses indicate percentages to total in each category

Table 2. Distribution of respondents with respect to animals responsible for menace

Particulars	Number	Per cent
Wild animals		
Monkey	29	48.33
<i>Sambar</i>	17	28.33
Wild boar	22	36.67
Any other (<i>Nilgai</i>)	15	25.00
Stray animals		
Cattle	25	41.67

different animals, the herd size raiding the fields was found to be highest in case of monkeys (7.50) ranging from 5-12 in number followed by cattle (3.78) and wild boar (3.28) ranging from 3-6 and 2-6, respectively. However, the crop raiding by other animals like *Sambar* and *Nilgai* was comparatively lower. Though the animal population in the locality was more yet they attacked in smaller numbers. The smaller groups might allow them to easily escape from the fields after causing the damage to the crop fields.

Resting and entry points for wild/stray animals: Majority of respondents mentioned that animals enter the village and (or) farmers' fields through some common entry points. As the number of entry points leading to the crop fields increases the entry of crop raiding animals becomes easy and safe, while watch & ward of crop fields become difficult. It was also observed that the fragments nearer to the entry points were more prone to damage as compared to the fragments situated far away from the entry points. Monney et al (2010) recommended growing of plants that are undesirable to the animals close to the boundary to act as buffer. It was found that on an average there were about 3.6 and 2.4 entry points for wild and stray animals, respectively in the sample villages. It was reported by majority of respondents that these animals usually rest at some preferred places in the villages in case of stray cattle and nearby hideouts in case of wild animals. The total number of resting or hiding places was found to be about three in case of stray cattle whereas there was no common resting/hiding spot near fields/ villages in case of wild animals.

Frequency and time of visit of wild and stray animal: The study revealed that the animals visited the fields at different crop stages as per their preferences. Stray cattle, *sambar* and *nilgai* visited the fields in any of the crop growth stages as they feed on the vegetative growth but wild boar and

monkeys feed on tubers, maize cobs, etc. and usually raided and damaged the crops at reproductive stages. In case of wild animals, monkey damaged the fields during the day time while other wild animals such as wild boar, *sambar* and *nilgai* raided the fields during the night time, whereas both the day and night hours were preferred by the stray cattle for raiding the crop fields (Table 5). Wild/stray animals visited the crop

Table 4. Average size of herd raiding crop fields on sample farms

Particulars	Number	Range (Number)
Wild animal		
Monkey	7.50	5-12
Wild boar	3.28	2-6
<i>Sambar</i>	1.42	2-5
Other (<i>Nilgai</i>)	0.75	1-4
Stray animal		
Cattle	3.78	3-6

Table 5. Farmers' response regarding frequency of crop raiding by wild and stray animals

Crop raiding	Day		Night	
	No.	Percentage	No.	Percentage
Wild animals				
Once	32	53.33	37	61.67
Twice	24	40.00	20	33.33
>Twice	4	(6.67	3	5.00
Total	60	100.00	60	100.00
Stray animals				
Once	33	55.00	34	56.67
Twice	25	41.67	24	40.00
>Twice	2	3.33	2	3.33
Total	60	100.00	60	100.00

Table 3. Pattern of population of stray and wild animals in study area

Year	Monkey	Wild Boar	<i>Sambar</i>	Other	Sub-total	Stray animal	Total
2009	3.75 (51.09)	1.27 (17.30)	0.52 (7.08)	0.12 (1.63)	5.66 (77.11)	1.68 (22.89)	7.34 (100.00)
2010	6.50 (54.90)	1.47 (12.42)	0.77 (6.50)	0.32 (2.70)	9.06 (76.52)	2.78 (23.48)	11.84 (100.00)
2011	10.08 (59.12)	2.20 (12.90)	0.83 (4.87)	0.32 (1.88)	13.43 (78.77)	3.62 (21.23)	17.05 (100.00)
2012	15.83 (61.21)	2.83 (10.94)	1.08 (4.18)	0.67 (2.59)	20.41 (78.92)	5.45 (21.08)	25.86 (100.00)
2013	18.57 (60.87)	3.18 (10.42)	1.58 (5.18)	0.9 (2.95)	24.23 (79.42)	6.28 (20.58)	30.51 (100.00)
2014	19.08 (56.72)	4.50 (13.38)	1.78 (5.29)	1.08 (3.21)	26.44 (78.60)	7.20 (21.40)	33.64 (100.00)
2015	21.10 (55.51)	4.82 (12.68)	2.13 (5.60)	1.43 (3.76)	29.48 (77.56)	8.53 (22.44)	38.01 (100.00)

Figures in parentheses indicate percentages to total in each category

fields once in a week during the day and night time. About 40 and 33 per cent of the respondents reported that wild animals' raided the field twice a week during day and night time, respectively. It was observed that the stray cattle raided the fields once a week and preferably during the night hours. Only 3.33 per cent of the respondents informed that stray cattle raided the fields more than twice. Thus, it can be concluded that crop fields were raided usually once a week by stray and wild animals during the night hours, as it was easier to raid the crops during the night hours.

Degree of menace by different animals: The degree of animal menace in the study area was not uniform; it varied with type of animals prevalent in a particular area (Table 6). It was observed that 30 and 33 per cent of the sample respondents were facing the problem of stray cattle and wild animals, respectively, while about 37 per cent of the sample respondents were having the problem of stray and wild animals both. The problem of wild animals was rated as of high degree by about 50 per cent of the farmers. Majority of farmers having the problem of stray cattle and wild animal menace rated it as of moderate (50%) and high degree (38.89%). About 55 and 27 per cent of the sample farmers facing problems with both categories of animals reported the problem as of medium and high degree, respectively. The highest total weighted score *i.e.* 47 was observed in case of wild animals followed by both wild/stray animal problem (46). This indicated that the problem of wild animals was more serious in areas compared to stray animals.

Seasonal pattern and degree of crop damage by animals: The pattern of crop raiding by stray and wild animals was not uniform throughout the year. It was reported to be influenced by the availability of fodder in common land, forests as well as crop stand in the agricultural fields. The fodder availability in the forests/common lands in summer and winter months was usually less and there were more chances of wild and stray animals raiding the field crops. The

respondents were enquired about the degree of animal menace in different seasons of the years and the responses have been depicted in Table 7. Depending on the degree of problem, the crop raiding animals were ranked on the basis of total weighted score. The total weighted score was computed by assigning weight; 1, 2 and 3 for low, medium and high degree of problem, respectively. The analysis revealed that in summer and winter season the total weighted score was highest in case of monkey, thus the damage by monkey was more serious in these seasons followed by stray cattle, whereas the total weighted score was highest for wild boar during the rainy season, thus it caused maximum problem during this season. Rao et al (2015) have also reported enormous damage by wild boar in Southern India. In general the problem of animal menace in case of *sambar*, stray cattle, *nilgai* was found to be low in rainy season, mainly because ample fodder was available for these animals in areas other than crop fields. Similar analysis of seasonal crop raiding was also done by Prashanth et al (2013) and Warren et al (2007).

Degree of crop damage at different crop stages: The frequency of crop raids by a particular animal depends upon the preferred crops and preferred crop stages (vegetative, reproductive & maturity) of a particular crop. Among the different categories of crops *viz.* cereals, pulses, oilseeds, fodder and vegetable crops; cereals were more preferred crops by the wide range of wild and stray animals as compared to others because these crops provided fodder as well as grains of their preference. Thus, these were raided by *sambar*, *nilgai* and stray cattle throughout the entire growth period; while monkey preferred these crops especially maize at reproductive and maturity stages. Sahoo and Mohnot (2004) also specified that the major agricultural crops targeted by monkeys in Himachal Pradesh were maize, potato, wheat, vegetables and pulses and horticultural crops like apple, pear, cherries, plum, almond, walnut and apricot (Table 8, 9). Khatun et al (2013) also observed the extensive

Table 6. Degree of animal menace on sample farms

Particulars	L	M	H	Total	TWS	Rank
Wild animal	3 (15.00)	7 (35.00)	10 (50.00)	20 (33.33)	47 -	I -
Stray cattle	2 (11.11)	9 (50.00)	7 (38.89)	18 (30.00)	41 -	III -
Both	4 (18.18)	12 (54.55)	6 (27.27)	22 (36.67)	46 -	II -
Total	9 (15.00) (100.00)	28 (46.67) (100.00)	23 (38.33) (100.00)	60 (100.00) (100.00)	- - -	- - -

L= Low, M= Moderate, H= High, TWS= Total weighted score
Figures in parentheses indicate percentages to total in each category

Table 7. Degree of menace by important animals during different seasons on sample farms

Season/Animal	Low		Medium		High		Total		TWS	Rank
	No.	%	No.	%	No.	%	No.	%		
Summer										
Monkey	3	10.34	7	24.14	19	65.52	29	100.00	74	I
<i>Sambar</i>	5	29.41	4	23.53	8	47.06	17	100.00	37	IV
Wild boar	5	22.73	7	31.82	10	45.45	22	100.00	49	III
Cattle	2	8.00	5	20.00	18	72.00	25	100.00	66	II
Other	2	13.33	5	33.33	8	53.33	15	100.00	36	V
Winter										
Monkey	2	6.90	12	41.38	15	51.72	29	100.00	71	I
<i>Sambar</i>	2	11.76	5	29.41	10	58.82	17	100.00	42	IV
Wild boar	2	9.09	9	40.91	11	50.00	22	100.00	53	III
Cattle	1	4.00	10	40.00	14	56.00	25	100.00	63	II
Other	1	6.67	4	26.67	10	66.67	15	100.00	39	V
Rainy										
Monkey	20	68.97	7	24.14	2	6.90	29	100.00	40	I
<i>Sambar</i>	11	64.71	3	17.65	3	17.65	17	100.00	26	IV
Wild boar	11	50.00	5	22.73	6	27.27	22	100.00	39	II
Cattle	20	80.00	5	20.00	-	-	25	100.00	30	III
Other	9	60.00	6	40.00	-	-	15	100.00	21	V

TWS=Total Weighted Score

Table 8. Extent of crop damage by different animals at vegetative stage on sample farms

Particulars	Damage					Total	TWS	Rank
	N	L	M	H				
Cereals								
Monkey	55	5	-	-		60	5	V
	(91.67)	(8.33)	-	-		(100.00)		
Wild Boar	38	20	2	-		60	24	III
	(63.33)	(33.33)	(3.33)	-		(100.00)		
<i>Sambar</i>	43	5	12	-		60	29	II
	(71.67)	(8.33)	(20.00)	-		(100.00)		
Cattle	35	5	20	-		60	45	I
	(58.33)	(8.33)	(33.33)	-		(100.00)		
Other	45	9	6	-		60	21	IV
	(75.00)	(15.00)	(10.00)	-		(100.00)		
Vegetables								
Monkey	31	22	7	-		60	36	II
	(51.67)	(36.70)	(11.70)	-		(100.00)		
Wild Boar	38	16	6	-		60	28	III
	(63.30)	(26.70)	(10.00)	-		(100.00)		
<i>Sambar</i>	43	12	5	-		60	22	IV
	(71.70)	(20.00)	(8.33)	-		(100.00)		
Cattle	35	10	15	-		60	40	I
	(58.30)	(16.70)	(25.00)	-		(100.00)		
Other	45	10	5	-		60	20	V
	(75.00)	(16.70)	(8.33)	-		(100.00)		

N= Nil, L= Low, M= Moderate, H= High, TWS= Total weighted score
 Figures in parentheses indicate percentages to total in each category

Table 9. Extent of crop damage by different animals at reproductive and maturity stage

Particulars	Damage						Rank
	N	L	M	H	Total	TWS	
Cereals							
Monkey	31 (51.70)	-	2 (3.33)	27 (45.00)	60 (100.00)	85	I
Wild Boar	38 (63.30)	-	4 (6.67)	18 (30.00)	60 (100.00)	62	III
<i>Sambar</i>	43 (71.70)	-	3 (5.00)	14 (23.30)	60 (100.00)	48	IV
Cattle	35 (58.30)	-	3 (5.00)	22 (36.70)	60 (100.00)	72	II
Other	45 (75.00)	-	4 (6.67)	11 (18.30)	60 (100.00)	41	V
Vegetables							
Monkey	31 (51.70)	-	7 (11.70)	22 (36.70)	60 (100.00)	80	I
Wild Boar	38 (63.30)	-	6 (10.00)	16 (26.70)	60 (100.00)	60	III
<i>Sambar</i>	43 (71.70)	-	5 (8.33)	12 (20.00)	60 (100.00)	46	IV
Cattle	35 (58.30)	-	10 (16.70)	15 (25.00)	60 (100.00)	65	II
Other	45 (75.00)	-	3 (5.00)	12 (20.00)	60 (100.00)	42	V

N= Nil, L= Low, M= Moderate, H= High, TWS= Total weighted score
 Figures in parentheses indicate percentages to total in each category

damage of fruit crops by monkeys in Bangladesh.

Vegetative growth stages: The vegetative stage suffered damage on account of trampling by monkeys and eating of leaves by wild boar, *sambar*, *nilgai* and stray cattle. In this stage, low level of damage in cereals by monkeys was reported by about eight per cent of respondents while it was of medium level in case of wild boar, *sambar* and stray cattle as indicated by about 3, 20 and 33 per cent of the respondents, respectively. In case of vegetables, about 37, 27, 20, 17 and 17 per cent of the respondents reported low degree damage by monkey, wild boar, *sambar*, stray cattle and others, respectively. The magnitude of TWS for different animals indicated that during vegetative crop stage stray cattle was at rank-I as far as losses to the crops were concerned. On the other hand, monkey was the least damaging at this crop stage.

Reproductive and maturity stage: In case of cereals and vegetables, damage to crops was both by trampling and consumption of vegetative parts of cereals and vegetables by animals. Among all the stages of cereals, reproductive and

the maturity stages were the most vulnerable to damage by animals. About 45, 30, 23, 37 and 18 per cent of the respondents reported high damage during the maturity and reproductive stage in cereals by monkey, wild boar, *sambar*, cattle and others animals, respectively. In case of vegetables about 37, 27, 20, 25 and 20 per cent of the respondents reported high damage by monkey, wild boar, *sambar*, stray cattle and others animals, respectively. The crop damages by monkeys were reported to be highest for both the cereals and vegetables during the reproductive and maturity stages followed by cattle, wild boar, *sambar* and other animals.

CONCLUSION

In the recent years the animal menace has emerged as a major threat for the sustainability and progress of farming in hilly regions. The study revealed that monkey, wild boar, *sambar*, *nilgai* and stray cattle were major animals responsible for crop losses. The problem of stray cattle was relatively of recent origin compared to wild animals. Although the animal population was high yet the size of herd raiding

fields and damaging crops was relatively small. The frequency of crop raiding by wild and stray animals was once a week. As far as the degree of menace was concerned, half of the respondents felt that the menace of wild animals was of high degree while it was of medium category for stray cattle, which indicated that menace of wild animals was the major issue in the study area. The season wise analysis of the degree of menace indicated that among the major animals, monkey was reported to be the highly crop damaging animal in all the seasons (summer, winter and rainy). Next to monkey, stray cattle in summer and winter seasons and wild boar in rainy season were reported as major animals responsible for menace. Stray cattle, *sambar* and *nilgai* were damaging the crops during all stages while monkey and wild boars damaged the crops during reproductive/maturity crop stage. In vegetative growth stage of cereals and vegetables, cattle caused highest loss to crops while during reproductive and maturity stages of the cereals and vegetables, monkey were responsible for highest extent of losses. Thus, these findings can be used in tackling the growing problem of animal menace to keep alive the avocation of farming in hills.

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