An Assessment of Human Wildlife Conflict in and around Kaimur Wildlife Sanctuary, Uttar Pradesh, India.

Azram Tahoor[1*], Azra Musavi[2] and Jamal Ahmad Khan[3]

[1] *Research Scholar, Department of Wildlife Sciences, Aligarh Muslim University, Aligarh-202002, Uttar Pradesh, India.*

[2] *Director, Advanced Centre of Women's Studies, Aligarh Muslim University, Aligarh-202002, Uttar Pradesh, India.*

[3] Chairman, Department of Wildlife Sciences, Aligarh Muslim University, Aligarh-202002, Uttar Pradesh, India.

ABSTRACT

The present study was done to assess the human wildlife conflict in and around Kaimoor Wildlife Sanctuary. The area of sanctuary 500km^2 and situated in Kaimoor hills of Mirzapur and Sonbhadra district of Uttar Pradesh. Villages were selected on the basis of highest human and livestock population. Twenty villages were selected with the help of secondary data. From each selected village, 10% household were sampled. Household survey was carried out by asking questions about demography, conflict and applied measures to reduce the spar. The results showed that crop-raiding is the most occurred conflict in the study area. The dominant crop raider is nilgai (29.14%) and the most damaged crop is wheat (26.66%). During the farm raiding, the phenology of crop is in sowing stage (31.28%). Usually, wild herbivore raids the cropfield in a group of more than 10 individuals. Human casualty is more in Halia range of sanctuary. Most of the attack is done by bear (89.58%) and the gender of victim is mostly male (71.67%). In majority of incidents, victim is injured compared to death due to attack by wild animals. From the above study it has been concluded that local people's participation in important in suggesting measures to reduce human wildlife conflict. More emphasis should be given to reduce crop raiding conflict in the study area.

Keywords: Kaimoor, human wildlife conflict, crop-raiding, attack on human

1. Introduction

Human wildlife conflict has ecological and social perspective [1, 2, 3]. Therefore, it occurs when there is an interference between the two opposite creatures of nature i.e. man and wildlife. Usually conflicts are frequent when interference is more in wildlife habitat. For example; changing land use pattern and forest resource extraction creates conflict by altering and fragmenting wildlife habitat [4]. The changing land use patterns are urbanisation, expansion of agricultural area at the periphery of Protected Areas and shifting cultivation. These land use patterns are the fastest mode of devastating forest degradation. This makes habitat loss, increased competition for food resources of wildlife, invasion of exotic species and overexploitation. Moreover, generally conflicts are more at the border of Protected areas because of large number of human settlements at their peripheries [5,6,7,8,9] (Linkie *et. al*, 2007; Oluput *et. al*, 2009; Monney *et. al*, 2010, Santiapillai, 2010 and Mwaktobe, 2013).

There are four types of conflicts *viz*; livestock depredation, crop-raiding, human and wildlife kill. Usually, livestock depredation and crop-raiding are a kind of economic loss [10, 11] to the poor villagers because livestock and crops are the form of cash values to them and are more common at the vicinity of protected areas [12,13].

Human wildlife conflict is a kind of economic and ecological loss to the villagers and protected areas. Since, there is unavailability of scientific documentation for Human wildlife conflict in Kaimur, therefore, initiatives were taken to study human wildlife conflict in the sanctuary.

2. Materials and Methods

2.1 Study area

Kaimur is situated in Kaimur hills of Mirzapur and Sonbhadra district of Uttar Pradesh in the semi-arid zone of northern India. The area of sanctuary is 500km^2 with geographical extent of 82°20$'$15E to 24^{O}52$'$00N and 83^{O}08$'$23E to 24^{O}27$'$51N (Fig 1). The sanctuary is divided into four ranges namely Halia, Ghorawal, Robertsganj and Gurma for administrative purpose. The most part of the sanctuary is hilly and undulating terrains. The soil is red clay which is stiff and ferruginous in nature. The dry deciduous type of forest is present in the sanctuary [14]. The forests are divided into four major groups (Sal forest, Bamboo, Scrub and Deciduous forest). There are more than hundred villages present at the periphery of the sanctuary. Twenty villages are present inside the sanctuary having human and cattle population 12,327 and 10265 respectively [15].
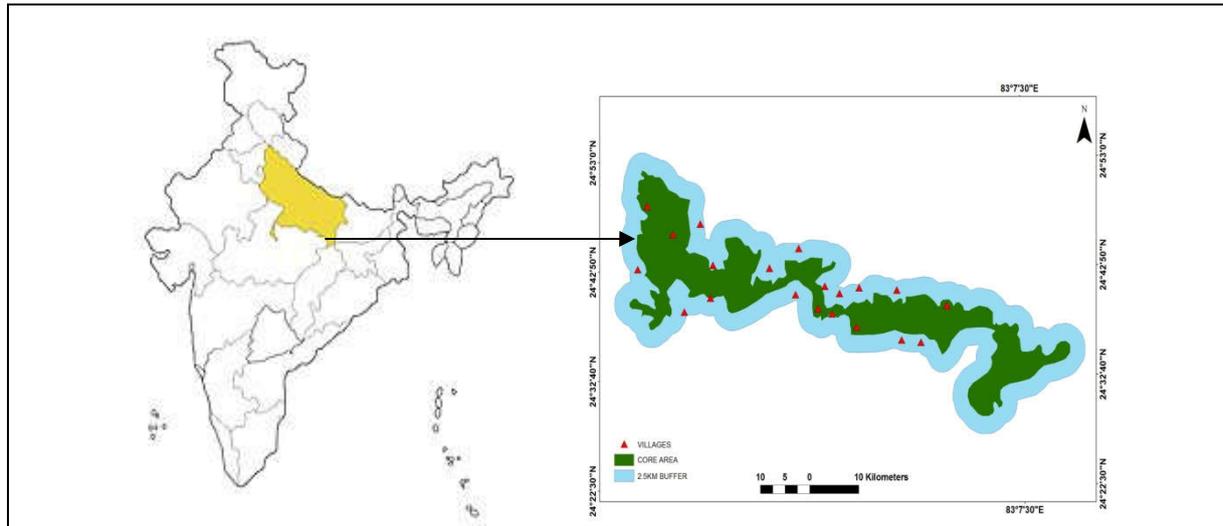
Figure 1. Map of India highlighting state of Uttar Pradesh. Inset: location of sampled village in Kaimur Wildlife Sanctuary (Source: Tahoor, 2017) [16]

2.2 Data collection

Both primary and secondary data was used for the present study. Villages were selected from the buffer and core side of the sanctuary. Therefore, a buffer of 2.5 km from the protected area boundary was created with the help of ArcGIS software showing presence of fifty villages. According to Kaimur's management plan (2000-2010), twenty villages are present inside the sanctuary. The village selection mode was done on the basis of presence of highest human and livestock population (data was collected from forest and revenue department). On that basis, a total number of twenty villages were selected from the buffer and as well as core area. With the help of random sampling, 10% households were sampled from each village. Household survey was done by using questionnaire survey, structured interviews, open and close ended questions. Questions were asked from the head of households, in the absence women were considered for discussions. If both are absent than whoever is present above the age of 18 was considered for survey. The questionnaire sheet contains details about demography, conflict, villager's perception about measures applied for crop-field protection and deterring wild animals.

2.3 Data analysis

The percentage for each variable was calculated. For visual presentation of data; tables, graph and pie-charts were used in the present study.

3. Result and Discussion

Table 1 present the demographic outline of the Kaimoor Wildlife Sanctuary. In the present study twenty villages were sampled. The total human and livestock population was found to be 2090 and 941 respectively out of sampled village in the study area. The result of the present study showed that three types of conflict occurred in the study area, i.e. crop-raiding, threat to human and livestock depredation. The most occurred conflict in the study area was crop raiding. Table 2 showed types of human wildlife conflict occurred in Kaimoor. The crop raiding was found to be the common and

most occurred conflict (20.55%). It is due to the fact that most of the villagers practise agriculture and owned crop-field (personal observation). The least occurred conflict was threat to human followed by livestock depredation in the study area (2.76% and 5.82% respectively).

Table1: Demographic detail of Kaimoor WLS

Demographic detail	Numbers
Village sampled	20
Household sampled	326
Human population sampled	2090
Livestock population sampled	941

Table 2: Type of human wildlife conflict in Kaimoor WLS

Type of human wildlife conflict	Percentage
Crop raiding	20.55
Threat to human	2.76
Livestock depredation	5.82
Poaching	0

3.1 Crop raiding

Crop raiding is the most occurred conflict in Kaimoor. Table 3 showed types of wild herbivores raiding the crop-field in the study area. According to respondents, four wild species are involved in crop raiding incidents. The most dominant crop raider is Nilgai (29.14%) followed by Primates (2.45%) and Blackbuck (2.14%). Sambar is the least crop raiding wild species in the study area (0.61%). Figure 2 showed graphical presentation of types of crops damaged by wild herbivores during crop-raiding. The secondary data reveals that six types of crops are damaged by wild herbivores. Most of the damage is done to rice followed by wheat (26.66% and 23.33 % respectively) in the study area. Barley is least damaged by wild herbivores in the study area (3.33%).

Table 3: Types of wild herbivores involved in crop-raiding in and around Kaimoor WLS

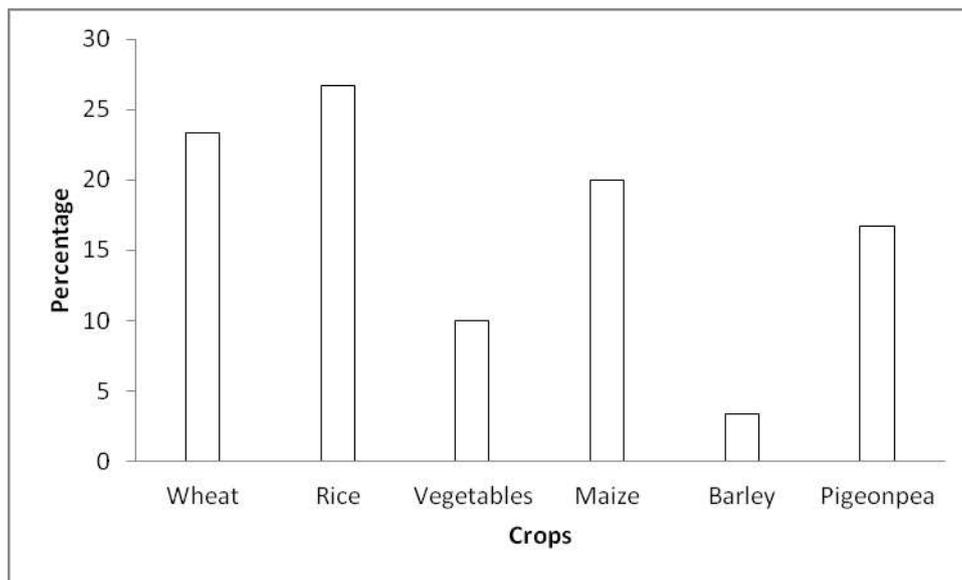| Wild herbivores	Percentage
Blackbuck	2.14
Sambar	0.61
Nilgai	29.14
Primates	2.45

Fig 2. Types of crop damaged by wild herbivores in the study area (secondary data)

Table 4 presents villager's attitude regarding crop raiding done by wild herbivores in the sanctuary. Few questions were asked to villagers about crop raiding incidents. The findings showed that wild herbivores frequently raid villager's crop-field (28.82%) followed by occasionally (28.82%). Usually, the number of wild herbivores raiding their crop-field is more than ten (33.43%). During the crop raiding incidents, the phenology of crop is majorly in sowing stage (31.28%) followed by mature and immature stand (19.32% and 14.41% respectively). Villagers applied various methods to protect their crop-field from wild herbivores. The most common method used by villagers is planting cactus at the border of their crop-field (13.8). Moreover, villagers used other measures to repel wild animals during crop-raiding. These are using of torchlight, drum beating, shouting in groups and fire crackers. The most common method is shouting in groups followed using of torchlight (14.415 and 3.37% respectively).

Table 4: Villager's perception regarding wild species involved in crop-raiding in Kaimoor

1. When wild species raids our crop	Percentage
Frequently	28.83
Occasionally	28.22
Rarely	3.68
2. Number of wild species raids your crop	
Single	3.07
Less than 10	14.72
More than 10	33.43
3. What is the phenology of your crop	
Sowing	31.28
Immature stand	14.41
Mature stand	19.32
4. What methods you used for crop-field protection	
Planting cactus	13.80
Planting dry shrubs	4.6
Planting scrub	3.06
Planting trees	0.61
Use of scare crows	2.76
5. What measures you apply to repel wild herbivores from crop-field	
Torchlight	3.37
Drum beating	0.61
Shouting	14.41
Fire crackers	0.306

3.1 Livestock depredation

According to respondents, the depredation on livestock by the wild species is the second occurred conflict (Table 1). However, villagers were not able to respond about detailed information about the depredation incidents. Moreover, there was lack of information from the forest department about the livestock depredation incidents. Therefore, in the present study the livestock depredation was not considered for further documentation.

3.2 Human casualty

The threat to human in the form of killing or injuring is the third occurred conflict in the study area. Table 5 showed details of human casualty occurred in and around Kaimoor Wildlife Sanctuary. On administrative purpose, the sanctuary is divided into four ranges (Halia, Ghorawal, Robertsganj and Gurma). In Halia, the attack on human is more as compared to other range (41.51%). Gurma range showed no incidents of attack on human by the wild species. There are three species involved in attacking humans i.e., wild boar, crocodile and bear. Usually, most of the incident is done by bear (89.58%). The secondary data showed in most of the incidents the gender of victim is male (71.67%) followed by female (28.3%). The reason for this is usually male goes inside the forest to collect forest resources and thus get attacked by the wild herbivores. Only 14.28% of the incidents caused killing of the humans due to attack by the wild herbivores. Figure 3 showed yearly details of attack on humans by wild species in the study area from 2005 to 2012. The secondary data showed that year 2006 and 2007 reported human casualty by wild the species. In 2006 most of the attack was done by bear. In 2007, only crocodile was involved in attacking humans in the study area.

Table 5: Details of human casualties by wild predators in and around Kaimoor

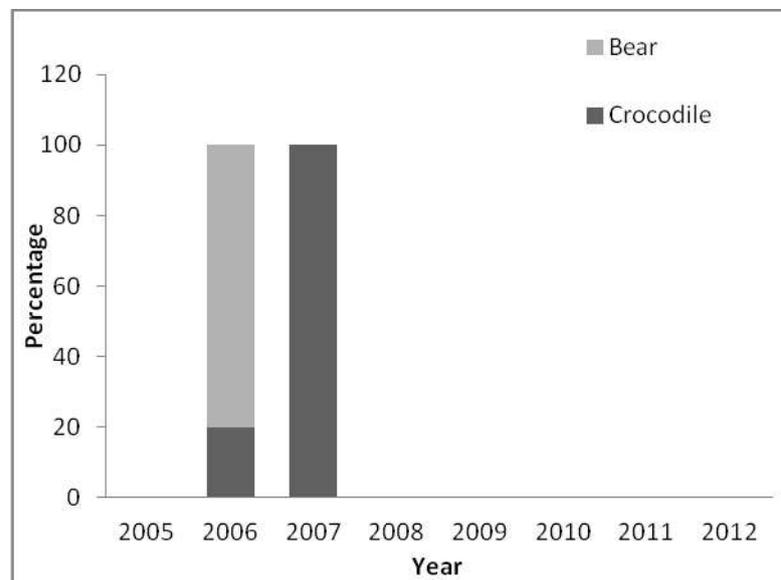| 1. Human casualties by wild predators in different range of Kaimoor	Percentage
Halia	41.51
Ghorawal	37.73
Robertsganj	20.75
Gurma	0
2. Type of wild species attacking humans	
Wild boar	4.16
Crocodile	6.25
Bear	89.58
3. Gender of human casualties	
Male	71.67
Female	28.30
4. Type of human casualties	
Injured	85.71
Killed	14.28

Fig 3. Human casualties done by wild species from 2005-2012 in and around Kaimoor (secondary data)

From the above finding, it has been concluded that crop-raiding is the most occurred conflict in the Kaimoor Wildlife Sanctuary. The crops are a like an economic asset to the villagers but are damaged by the wild herbivore in the present study. An economic loss may govern the villager's attitude towards biodiversity conservation and protected area management [17,18]. Therefore, initiatives

should be taken by involving local people in suggesting measures to reduce the crop-raiding incidents in and around the sanctuary.

Acknowledgements

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