The rapid growth rate of human population is exerting negative impact on the human wildlife relationship. A large part of forests has been converted into agriculture disturbing the ecological balance which resulted in the negative interaction between human with wildlife. The wild animals cause various types of damage to agriculture, property, livestock and human lives. Human-wildlife conflict (HWC) has become a very known problem in India in general and it is a major problem in the state like Uttarakhand, Himachal Pradesh, Jammu and Kashmir, Kerala, Uttar Pradesh, Andhra Pradesh and in Maharashtra particular. The hills of Uttarakhand and the connecting area of Uttar Pradesh with Uttarakhand is worst affected by this problem. Agricultural lands close to protected areas (PAs) often face crop raiding by wild herbivores, which is a serious problem for farmers.

In the present study, the status and nature of the human-wildlife conflict with special reference to leopard (Panthera pardus), Tiger (Panthera tigris), Elephant (Elephas maximus) and black bear (Ursus thibatanus) in the highly affected villages and agriculture fields lying in the vicinity of Najibabad forest division, Uttar Pradesh, were taken into consideration. Attempts have been made to suggest some measures for the policymakers and the conservation biologist for implementation regarding HWC.

MATERIAL AND METHODS

Study area: Najibabad Forest Division (29.6300° N, 78.3300° E) is located in the district Bijnor of Uttar Pradesh state of India. The forest division includes five ranges: Kauria, Sahuwala and Badhapur.

Badhapur, Sahuwala, Saharanpur, Rajgarh and three development blocks (Kotwali, Najibabad and some part of Afjalgarh) which are adjacent to the Najibabad Forest Division and covers an area of 390 km². The headquarter of the forest division is located at Najibabad. The northern side of the Najibabad Forest Division is attached to the Lansdowne forest division, while the eastern side is attached to the Jim Corbett National Park (famous for tiger conservation). Climatically, the area is divided into three seasons viz., rainy season (June to September), winter (October to February) and the summer (March to May).

The study was carried out in thirty-two villages and five places of Van gujjars (a tribe living inside the forest) with reports of conflict in various ranges of Najibabad forest division. These ranges lie in various development blocks namely Kotwali, Najibabad, Sahanpur, Kauria, Sahuwala, Badhapur and three development blocks (Kotwali, Najibabad and some part of Afjalgarh).

Fig.: 1. Map of Najibabad Forest division showing five different ranges (Rajgarh, Saharanpur Kauria, Badhapur, Sahuwala)
Najibabad and some part of Afzalgarh of Bijnor district of Uttar Pradesh. It also covered the agriculture land with both Rabi, wheat (*Triticum aestivum*), and Kharif season, sugarcane (*Saccharum officinarum*), rice (*Oryza sativa*).

The primary information on human wildlife conflict was collected from the forest department of Najibabad. We also visited the affected villages, places and questionnaires were distributed among the local people regarding negative interaction between human and wildlife in the study area. This study was carried out from 01 June 2015 to 27 January 2016 in thirty two villages and five settlements of Van gujjars in five ranges of Najibabad forest division and the information was collected on sighting records about attacks/killings/injuries, time, season, area, age and occupation of the affected people etc. and the problematic wild animal in the area. The informal public meetings and the face to face interactions were carried out with the affected peoples and the head of the village panchayat to get the information regarding conflict status and nature in the study area.

**RESULTS AND DISCUSSION**

**Nature and status of the conflict:** In the study area we found the negative interaction between the human and wildlife in the form of attacks, killings, damage to livestock and crops. Eighteen people were killed and ten incidences of attacks on humans with serious injuries by the wild animals were recorded within 12 years (2004 to 2016). Besides this, ten incidences of attacks occurred on livestock resulting in the death of nine livestock. In the duration of this study period, one tiger was killed by the villagers when the tiger attacked a farmer in Sahuwala range of Najibabad forest division.

Our study revealed that the incidences of HWC were more (24 out of total 38 cases) in the two ranges (Sahuwala and Badhapur) which are adjacent to the AmanGarh Tiger Reserve at socio forestry division of district Bijnor of Uttar Pradesh. In both ranges, tiger and leopard were found main problematic animal (Fig-2). The tiger and leopard contributing a lot to negative interaction with human in protected areas as well as another part of the country. The same has being reported in Maharashtra.

**Rajgarh:** In this area, Human population is settled in 29 villages were found and about two villagers killed and one injured by the elephant with 7.8% of total cases and no other animal was reported in conflict with humans. This area is enclosed with Laldhang range of Lansdowne forest division, Uttrakhand.

**Kauriya:** This range covers the twenty one villages. About three people were killed by the elephant and one person was injured by the bear and four cases of livestock damage were found in this area. In this area incidences were 21% of total cases.

**Sahanpur:** The nineteen villages were situated in this range. Three villagers were killed by the elephant with 7% of total cases and no other animal conflict cases was reported in this area.

![Fig-2. Different ranges of Najibabad forest division with number of conflict by different animals.](http://www.novapdf.com/)
Sahuwala: This range covers the twenty six villages. In this area, three villagers were killed and two injured by the leopard and three villagers were killed by tiger, one villager was killed by the elephant and two cases of livestock damage were reported by the leopard with 28.9% of total cases.

Badhapur: This range covers the thirty villages and two villagers were killed and two were injured by elephant. Leopard was involving in human-wildlife conflict with two killing of people and one injury. Tiger killed two villagers in this area. Besides this six cases of livestock damage were reported in this area. This area contributes the 39.4% of the total cases.

Maximum cases of human wildlife conflict occurred in the agriculture fields (Fig:-3) (when the villagers were working there) as compared to the forests (P=0.05508 paired t test). In the forest there were eleven cases (attacks/killings/injury) found (28.9%) while in the crop field 27 (71.05%) cases were found. In the forest area elephant and leopard were found most problematic animal while in the agriculture field elephant, leopard and tiger were found most problematic animal. During the study period the recorded high number of HWC in agriculture fields appears to be due to better cover/shelter to leopard and tiger and presence of the farmers working in their fields.\textsuperscript{11,12}

The leopard committed the highest number of attacks and killings (42.1%) as compared to elephant (36.8%) and tiger (18.4%). Maximum attacks of leopard were found in agriculture fields (28.9%) as compare to the forest (13.1%) when the people were working in their agriculture fields. In the case of elephant highest cases of human elephant conflict were recorded in agriculture fields 23.6% as compare to the forest 13.1% when the farmers were protecting their crop from elephant during night hours and 13% cases were reported in forest habitat when the people entered into the forest togather fuel, fodder and other household needs. If we talk about the tiger the maximum attacks were reported in the agriculture field with 18%. All the cases of tiger attacks were obserbed in the agriculture fields. No case of human-tiger conflict was found in forest habitat. Besides, a single case of attack by bear was also recorded in the forest only during the study period.\textsuperscript{Fig:-3}

Age group occupation and the gender of the victims: During the study period, we observed that person between 40-60 year age group was worst affected due to wild animal attacks with (57.1%) as compared to young about 20 to 40 years (28.5%), or teenage (14.2%). The people of the age group between 60-90 years were not found injured/killed during study period. Males were more affected (75%) compared to female (25%). The study revealed that mostly labour class employed in the agriculture and Vnagujjar were affected by HWC.

Time and season of the attacks: During the observation we found the most of attacks/killings by leopard and tiger took place in evening/early night ours there was no seasonality
found in the pattern of attacks by these carnivores. However, in the case of the elephant high percentage of attacks were found in winter when sugarcane crop was available in the agriculture fields which is the most preferable fodder for the elephants. Most of the farmers were attacked during this season by elephant when farmers were protecting their crop fields during night hours. Another reason behind human-elephant conflict is the increased human population around the boundary area of forest causing anthropogenic disturbances\textsuperscript{13-17}.

As per the record of Department of forest, Najibabad Forest Division, UP a sum of Rs 52,15000 were paid to the victims of negative interaction with wildlife.

**Conservation implications:** This study efforts were made to provide a responsible picture of negative interaction of wildlife with humans. Sighting of leopard and elephant are also reported by the local people in their villages and agriculture fields.

The better communication between local people and forest department on the issue of HWC and of wildlife are needed as a part of awairness campaign. Forest officials/forest guards need to be trained and equipped with wireless communication set, binoculers etc for petolling of the area to collect and generate data for better understanding of the problem. Some other deterrent methods like electric fencing, fire crackers, trenches, application of bioacoustics can also be used to mitigate the problem of human wildlife conflict.

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