

Monitoring the status of Human-wildlife conflict and its impact on community based conservation in Bandhavgarh tiger reserve, Madhya Pradesh, India

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Abstract

The Bandhavgarh Tiger Reserve is one of the famous tiger reserve in India. The human wildlife conflict is on rise for few years. A total of 194 human casualties and 1960 live-stock depredation were reported between 2001 to 2011. Out of 194 casualties, 6.7% were lethal which caused death and 93.3% were injuries. Out of these maximum 37.57% (68) were reported by Jackal (*Canis aureus*) followed by 27.64% (50) of Sloth bear (*Melursus ursinus*), 20.99% (38) by Wild boar (*Sus scrofa*), 8.84% (16) by Tiger (*Panthera tigris*), 3.31% (6) by Leopard (*Panthera Pardus*) and 1.65% (3) by other carnivores. Out of 194 casualties 71.13% were male and 28.87% were female. The livestock killings were reported to be 1960 out of which maximum 81.78% (1603) were by tiger followed by 17.60% (345) by leopard and rest 0.62% (12) by other carnivores. The mean livestock killing was 178.182±42.82 (SE) per year. Discussions and surveys were made with affected peoples to know the views about conflict and its alleviation by using Close ended questionnaire. Total 180 individuals were surveyed. Out of these 151 (83.89 %) respondent felt that wildlife should be conserved while 29 (16.11 %) felt there is no need for conservation. Adequate compensation, habitat management practices, livestock and crop insurance scheme and bio fencing around the affected villages and conservation awareness could be the way to mitigate existing conflict.

Keywords: Community perspective, Compensation, Crop damage, Habitat Management, Human casualties, Livestock depredation

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INTRODUCTION

The Human-Wildlife Conflict (HWC) is a common event from the past and has now become a significant problem all over the world. India is the fast developing economy and among most populous countries with around 17% of the world's human population, the protected area landscapes are not untouched by humans. The rapid growth of human population put the wildlife under threat. Due to deforestation, fragmentation of natural habitats, expansion of agricultural lands and human settlements wildlife areas become islands surrounded by human-dominated landscapes, the negative interaction between human and wildlife species, particularly large mammals, increases. Humans are competing with large mammals for space and other resources across the world (Madhusudan 2003). This competition for food, water and space

between humans and wildlife increases conflict (Sukumar 1991). Human-wildlife conflicts occur when they share a common limited resource such as land, game animals, livestock or fish (Schwerdtner and Gruber, 2007).

In north-east India, the incidences of conflict with the species have increased due to reduction of forest cover below 30-40% in the area (Chartier *et al.*, 2011). Wild animals tend to move out from such disturbed forests in human settlement in search of food and water, causing damage to life and property. The conflict is seen when an animal passes away in road and train accident, when an aircraft strikes birds, when diseases transmit through wildlife, and when wild animal bites (Messmer, 2000). Crop destruction, property damage, livestock depredation and human injuries are the most common forms of conflicts with wildlife (Ogra and Badola, 2008). Human casualties or

death and livestock depredation are the most severe conflict among all.

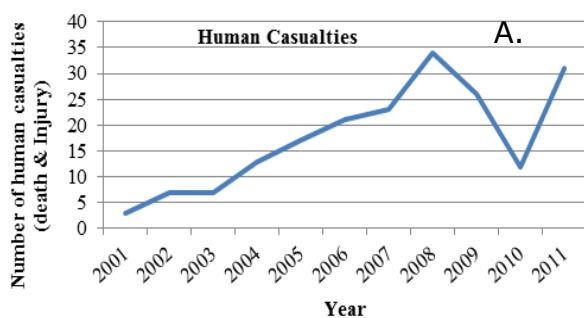
Herbivores such as the Asiatic elephant (*Elephas maximus*), Chital (*Axis axis*), and Wild boar (*Sus scrofa*) often come near to the human habitations which result conflict. Interface between large mammals such as tigers, elephants, lions and others with humans has caused serious conflicts countrywide over space and resources (Madhusudan and Mishra, 2003).

The large leopard population is living in human dominated landscape of rural and semi-urban India. Leopard density of nine animals per 100 sq. km. was recorded in human-dominated rural landscape of Maharashtra, in India (Chellam, 2010). Conflict can have multiple implications ranging from fear evoked by the presence of the carnivore to loss of life and livestock (Quammen, 2003). Crop and property damage and livestock depredation are common effect and cause financial loss worldwide. Large carnivores and herbivores require wide and large habitats and commonly come out of National Parks/reserves (Woodroffe, et al., 2005). Therefore, the carnivores which are predators of large ungulates may kill the livestock when opportunities arise.

When an animal kill or predate upon human or livestock, and damage the property, they are called as problematic animals, and humans often kill those animals. Sometimes wild animals are killed for fun, sport and trade. In India hunting of wild animals is a serious offence under the Wildlife (Protection) Act 1972, and is restricted in all the protected forest and nature reserve. Human poached wild animals for trade of their body parts, can also be counted for as human-wildlife conflict (Muhammed et al., 2007). In Central India the conflict is a serious problem in conservation of several wild species like Tiger and Leopard. Several cases of leopard attack were recorded in Maharashtra and Madhya Pradesh (Chellam, 2010)

The presented paper describes the level and factors associated with the conflict and people perceptions and their role in its mitigation at Bandhavgarh Tiger Reserve.

MATERIALS AND METHODS



Study area: The Bandhavgarh Tiger Reserve lies in Zone 6E – Deccan Peninsular Central Highlands. It supports a corresponding platitude of fauna. The reserve has earned reputation worldwide for its high density of tigers. Located between the Vindhyan and the Eastern flanks of Satpura hill ranges the reserve falls mostly in Umaria District of Madhya Pradesh and a chunk of 19.26 sq. km. in Katni Districts of Madhya Pradesh (Plate 1). The area of the Tiger Reserve is 1161.471 Sq. km. including both the units of Protected Area and Buffer Area. The reserve lies between 23°30' 08" to 23°57' 01" North latitude and 80 ° 47'05" to 81 °11'43" East longitude. The tiger reserve has 6 ranges namely Tala, Kalwah, Patour, Magdhi, Khitoli and Panpatha (Plate 2) (Prakasam, 2005).

Methodology: The study was conducted from July 2011 to June 2012. Data on Human casualties and livestock depredation were collected from the Forest Department archives. Direct observation and monitoring the wildlife sign and evidence was done by visiting the conflict site/villages. Time and date of conflict, activity of victims and livestock wildlife interface were recorded. The wildlife sign and evidence such as pugmark, scratch marks, human mauling, livestock depredation, etc. were observed.

Questionnaire surveys were performed in peripheral villages. 12 villages were randomly chosen for survey from the six forest ranges (viz. Tala, Kalwah, Patour, Magdhi, Khitoli and Panpatha) of BTR. Two villages from each range were chosen. The pre testing of questionnaire was also done. Total n=180 surveys were carried out. Discussions were also made with the village council and local residents to get the basic information about existing conflict. Mean, standard deviation, standard error and chi square test were carried out using MS excel and statistical tools.

RESULTS

Human casualties: Data on human casualty viz. death and injuries were collected from the archives of forest department during 2001 to 2011. Total 194 human casualties were recorded of which 6.7% (13) were lethal to human and caused

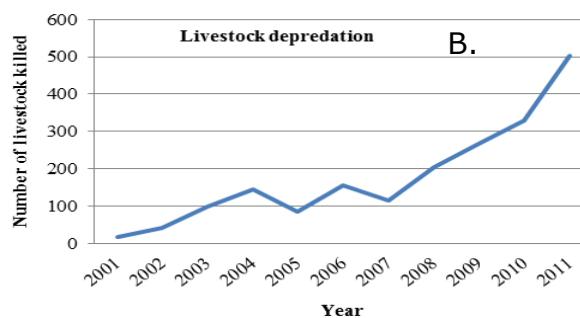


Fig.1(A,B). Showing rising trend in human casualties and livestock depredation during 2001 to 2011.

Table 1. Human wildlife conflict incidents in Bandhavgarh tiger reserve during 2001 to 2011.

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
Human casualties												
Death	0	1	0	0	0	2	1	2	3	1	3	13
Injury	3	6	7	13	17	19	22	32	23	11	28	181
Total	3	7	7	13	17	21	23	34	26	12	31	194
Livestock depredation												
Cattle	13	29	76	97	63	128	89	141	214	264	408	1522
Buffalo	3	13	23	46	20	23	20	58	47	57	71	381
Goat	1	0	0	3	1	4	5	5	7	8	23	57
Total	17	42	99	146	84	155	114	204	268	329	502	1960

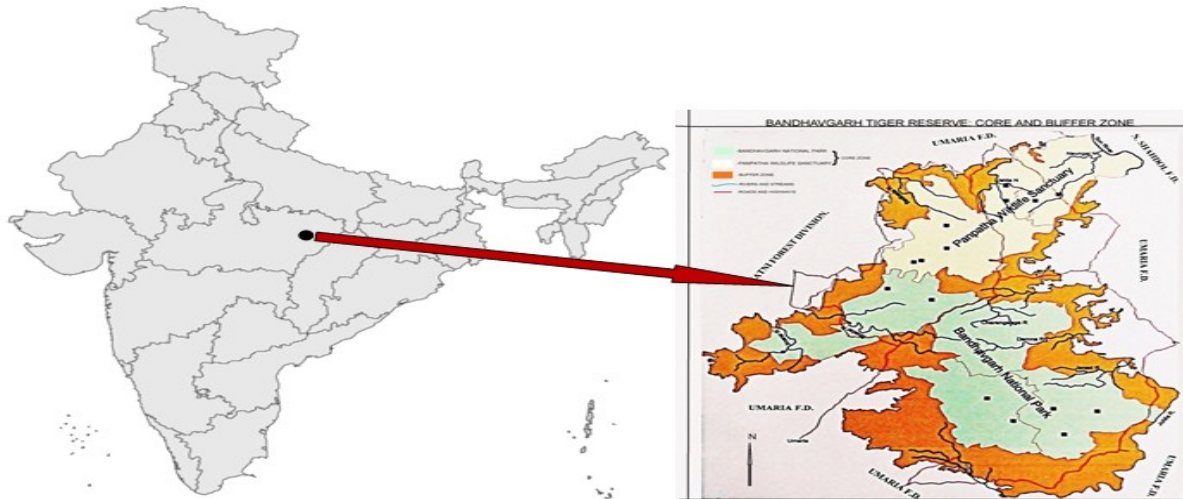


Plate 1. Map showing the location of Bandhavgarh tiger reserve in Umariya district of Madhya Pradesh, India

death while 93.3% (181) were injuries. Of 13 deaths maximum 11 were reported by tiger and 1 by sloth bear and wild boar each. Out of 181 injuries maximum 37.57% (68) were reported by Jackal followed by 27.64% (50) by Sloth bear, 20.99% (38) by Wild boar, 8.84% (16) by Tiger, 3.31% (6) by Leopard and 1.65% (3) by other carnivores. Out of 194 casualties 71.13% were male and 28.87% were female.

Livestock depredation: A total of 1960 livestock depredation were recorded from 2001 to 2011 in

BTR. Of which maximum 81.78% (1603) were by tiger followed by 17.60% (345) by leopard and rest 0.62% (12) by other carnivores. The mean livestock killing was 178.182 ± 42.82 (SE) per year. Maximum livestock killing were reported in Khitoli forest range by tiger and leopard then Kalwah, Patour, Panpatha, Magdhi and Tala ($\chi^2=58.1$, $df=5$, $P < 0.00001$). More cattle were killed by tiger and leopard then buffalo and goat ($\chi^2=134.29$, $df=2$, $P < 0.00001$).

Community perspectives toward existing conflict: Discussions and surveys were made with affected peoples to know the views about conflict and its alleviation. Out of 180 respondent 151 (83.89%) felt that wildlife should be conserved while 29 (16.11%) felt no need for conservation. Out of 29, 16 (55.18%) considered that Wild animal kill the livestock, 8 (27.58%) felt that wild animal are a threat to humans and 5 (17.24 %) considered that wild animal damages crops. Out of 151, 42 (27.81%) considered wildlife has ecological importance, 30(19.87%) considered importance for providing timber and MFPs and 22 (14.57%) felt it provide grazing lands to livestock, 32 (21.19 %) felt the aesthetic value and 25(16.56 %) wanted to conserve as it is under threat. Out of 180 respondents, 111 (61.66 %) opined that problematic animals should be relocated, 38 (21.11 %)

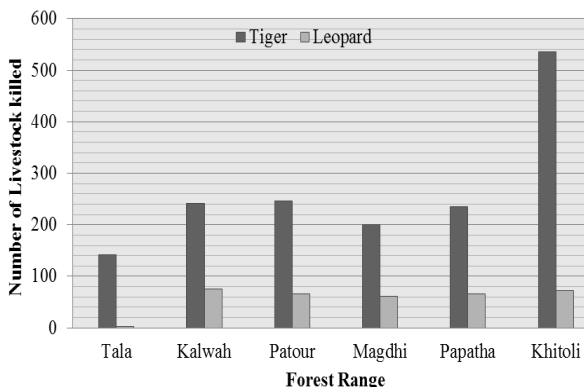


Fig. 2. Livestock killing by tiger and leopard from 2001 to 2011 in different Forest Range of Bandhavgarh Tiger Reserve.

felt that government should provide fencing and 19 (10.56%) felt that lethal methods should be used against problematic animals while 12 (6.67 %) believed that other methods should be used.

Crop damages: Data were collected through the crop field visit and evaluation. Crop damage by wild boar (*Sus scrofa*) was reported as a common problem in the peripheral villages of the TR. Nilgai (*Boselaphus tragocamelus*), spotted deer or chital (*Axis axis*) and langur (*Presbytis entellus*) were involved in crop damage. Out of 180, 65% respondents blamed wild boar followed by 17.22% nilgai, 8.89% spotted deer, 5% common langur and 3.89 % considered sambar deer responsible for crop damages.

DISCUSSION

Humans are disturbing and modifying the wildlife habitat for their benefits. Wild animal often come out to the forest in search of food and shelter, which causes conflict between human and wildlife. The study conducted by Bhattarai (2009) in Bardia National park concluded that high rate of human population growth and the successfully restored habitat in the community forests of Nepal have accelerated the conflicts due to the dispersal of tigers into these forests. The rising human population and livestock population around the BTR pose direct biotic pressure on natural resource of the park. Human–carnivore conflicts tend to be more frequent near forest edges at the interface of human and carnivore activity, and in areas of high human density (Nyhus and Tilson, 2004; Miquelle *et al.*, 2005; Gurung *et al.*, 2008; Nugraha and Sugardjito, 2009). Maximum cases were reported during the MFPs collection when people worked in the crop field, went for livestock grazing and toilet. People usually collect MFPs in the Buffer and Core area of the TR. Lethal or serious attacks on people often lead to retaliatory or defensive killings, which resulted in additional injuries to people and/or carnivores (Sillero-Zubiri *et al.*, 2006). Cattle lifting from the livestock shed by tiger and leopard during night hours was reported in the villages around the Bandhavgarh Tiger Reserve. The animal sheds were not fully protected and covered only from the top, made up of thorny bushes and bamboo shoots and branches. Similar observations were recorded by Rahalkar (2008) in agriculture land of Maharashtra, where leopards lifted the cattle of farmers from the poor livestock sheds. The study conducted in Dachigam National Park, Kashmir by Charoo *et al.* (2006) revealed that livestock were killed by bears in cattle sheds or night shelters.

Poaching is also a serious problem in and around the Protected Area. The incidences of poaching cases were 25 chital, 14 wild boar, 8 sambar deer, 8 nilgai, 4 tiger, 2 porcupine, 1 mongoose, 1 leopard and 11 other cases in BTR. Common methods

used for poaching were killing the animals by the use of tangi (Small Axe), gun, saw set, snare, electrocution, poisoning etc. Poaching of animals by human beings could create a negative psychological impact on the animals and they may start treating human beings like an enemy and start charging and attacking on them for safety.

Disease transmission through livestock to wild animals and vice versa is also a form of conflict. The villagers used to graze their livestock in the forest area particularly in the periphery of the Protected Areas. Wild animals and livestock share the common grazing area, so the chances of disease transmission between livestock and wild animals are more. Foot and Mouth Disease, Rinderpest and tuberculosis are some of the common livestock disease that often possessed threat to wild animals. Wildlife diseases can affect the health and immunity level of wild animals that could not hunt for the natural prey and start attacking livestock and sometime also on human beings.

In September 1973 "Rinderpest" outbreak was reported in the adjoining villages of Bandhavgarh National Park. Four Blue bulls (one male and three female) reportedly died of the disease. The villagers saw the decomposed carcasses first and the detail examination could be possible on one carcass only which confirmed Rinderpest. Singh *et al.* (2010) reported the death of a chital with history of chasing by stray dogs; on necropsy examination they reported tuberculous lesions in the animal.

Human wildlife conflict is now-a-days a common event in and around the Protected Areas. People living close to the forest areas face the conflict with wild animals. Fencing is used to reduce the intensity of human wildlife conflict but is expensive if done properly. Grassland management and improvement of wildlife habitat is also significant in mitigating the conflict. Wild animal often come out of the forest in search of food, water and shelter. Ahmed *et al.* (2012) conducted a survey in Kanha-Achanakmar corridor, where people suggested habitat improvement is one of the best ways to reduce conflict and animal movement from the forest.

Conservation education and awareness of local people may be a useful tool in conflict mitigation strategy. Matarasso (2004) concluded on the basis of his study that conservation education can change the attitude and behavior of people and increases the tolerance of losses. Many other studies have also suggested conservation education as a tool to reduce human-wildlife conflict, for example Oli, *et al.* 1994; Nyhus and Tilson 2004; Gurung, *et al.* 2008 stressed that conservation education focusing on behavior and ecology of wildlife, may reduce the human wildlife conflict.

Adequate Compensation for human death/injuries, livestock depredation and crop damage is best

strategy for the minimizing the dissatisfaction level. The process of compensation should be simple and flexible. Ogra and Badola, 2008 also concluded in their study that compensation of losses is a fundamental strategy to reduce the human-wildlife conflict through the increased tolerance level of the community towards wildlife.

State government of Madhya Pradesh provides compensation of Rs. 100,000 for human death by wildlife and Rs. 20,000 for injury by wild animals while Rs. 75,000 is given at the time of total disability. Compensation is also paid for the livestock losses viz. 10,000 for cow/ox, buffalos, horses and camels and Rs. 5,000 for death of their young ones while Rs. 1,000 for goat. The questionnaire survey showed that the villagers had positive attitude towards the wildlife conservation. Similar observations were recorded by Ahmad et al. (2012) in Kanha-Achanakmar corridor that showed strong belief of peoples toward conservation.

Conclusion

In present study the levels and factors associated with the conflict have been studied in Bandhavgarh Tiger Reserve along with people's perception and role in mitigation. In the findings, considerable number of human casualties and livestock killings from 2001 to 2011 were recorded which makes human wildlife conflict evident as a serious issue in the Tiger Reserve. Apart from casualties crop damage by wild animals was also observed in peripheral villages. The questionnaire survey revealed dependency of people on forest as it provides livelihood such as NTFP (Non Timber Forest Products) and grazing lands for their cattle. Most of the respondents were found positive for the concept of conserving wildlife and its ecological importance. Forest Department provide adequate compensation for the losses by wildlife but most of the respondents were unsatisfied with the current compensation scheme. The study shows human wildlife conflict is a serious issue in Bandhavgarh Tiger reserve that needs to be resolved with proper planning and implementation. Forest is of aesthetic importance for the people, which could form the basis of orientation and awareness of people. Provisions for adequate compensation, livestock and crop insurance scheme should be made considering long term effects. Habitat management practices and bio fencing around the affected villages could be the way to mitigate existing conflict.

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