Original Research Article

Human-Wildlife Interspecific Interaction in Barak Valley, Assam, India

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Abstract: The negative interface between the man and wildlife has been widening due to expanding human population and loss of natural habitats. Two important components of this aspect are human-wildlife conflicts (when wildlife causes direct or indirect loss to mankind) and rescue operations (when wildlife trespasses into human habitations and are rescued by competent authority). Forest villages (located inside protected forests) and fringe villages (located adjacent to protected areas) are highly vulnerable to this problem. To understand the intricacies of the problem, a close-ended questionnaire survey was conducted to document animals causing depredation in some randomly selected such villages of Barak Valley. Information on human-wildlife conflicts and wildlife rescue operations carried out in the valley were retrieved from the records of the forest department. Jackals, civets, monkeys and wild boars were mainly involved in conflicts in the forest- and fringe villages, apart from some other minor conflict animals. Human conflicts with elephants were mostly documented in official records of the forest department, and pythons were found to be the most frequently rescued wildlife from human habitations. An overall picture of human-wildlife interface using both primary and secondary data depicted in the Barak valley concludes that, there is a need for intensive study on the issues.

Key words: Barak valley, Forest villages, Fringe villages, Man-animal conflict, Rescue operations

Introduction

As human development penetrates into forests (both protected and unprotected), human interaction with wildlife is accelerated. In other words, human interface with wildlife increases. An important aspect of this interface is human–animal conflict, which takes place when wildlife requirement or behaviour has a negative consequence on human livelihoods or when the human activities intersect the needs of wild (Makindi *et al*., 2014). The problem threatens human lives and livelihoods as well as wildlife (Woodroffe *et al*., 2005), and is a big challenge to wildlife itself (Carney and Sydeman, 1999). When left unsolved, the issue affects local support for conservation efforts (Mulholland and Eagles, 2002).

Several communities reside in and around forests. The establishment of protected areas not only limits access of these communities to forest resources but also leads to losses from crop and livestock raiding by emerging wild animals (Sekhar, 2003). There is widespread prevalence of poverty in these areas (Banerjee and Chowdhury, 2013) and losses resulting from wildlife depredations have severe consequences upon the economy of these areas. It is thus an important problem in the forest villages which are located inside protected areas and fringe villages which are located adjacent to protected areas.

Territorial proximity is an important determinant of human conflicts with wildlife (Knight, 2000). In fact, one of the major instigators of human–wildlife conflict is competition for space (Choudhury, 2004). However, in addition to conflicts this factor also at times causes wildlife to stray into human habitations; thereby causing human inconveniences and (at

times) generating much public attention and panic. Under such circumstances, the forest department rescues the trespassing animals and releases them into appropriate habitats after requisite treatment. This in turn, makes rescue operations carried out by the forest department an important facet of human-wildlife interface.

Barak Valley, located in the southern part of Assam, India, has a number of forest villages and fringe villages, which share a widespread interface with wild animals and hence are highly vulnerable to conflicts. However, proper study in this regard has not yet been done in the Valley. Therefore, the present study was conducted to document the wild animals which cause depredation in these areas. To further supplement the outcome, cases from forest department records were examined. The other aspect of the interface i.e. rescue operations was also studied from data collected from forest department records. Thus, an attempt was made to depict the overall interface between human and wildlife in the Valley through the study of its two most important components; viz: human-wildlife conflict and rescue operations through the collection of primary and secondary information.

Materials and methods

Study area

Barak valley, located in the southern part of Assam in India is a part of the Indo-Burma biodiversity hotspot (Fig. 1). The region shares boundaries with four other states of India; viz: Manipur, Mizoram, Meghalaya, and Tripura as well as Bangladesh. The valley that covers a total area of 6962 km^2 and is constituted by three districts; namely: Cachar, Hailakandi and Karimganj (Mazumder, 2014). The main river of the region is Barak which acts as one of the most prominent geographic barriers. The physical geography of the region includes the Barak plains, tropical evergreen and semi-evergreen forests, tropical deciduous forests, tea planted areas, secondary forests, wetlands, monoculture orchards, and crop fields (Choudhury, 2013). The animals found in this valley are Asian elephant (*Elephas maximus*), wild boars (*Sus scrofa*), Phayer's leaf monkey (*Trachypithecus phayrei*), Indian flying fox (*Pteropus giganteus*) and so on. There are 12 reserve forests (Badshahtilla, Barak, Duhalia, Innerline, Katakhal, Longai, Lower Jiri, Patheria Hills, Singla, Sonai, Tilbhoom, Upper Jiri,) and a wildlife sanctuary (Barail) in the region which are located under the jurisdiction of three forest divisions; viz: Cachar, Hailakandi and Karimganj. There are 104 forest villages in Barak Valley (Source: Forest Division, Cachar, Karimganj and Hailakandi, 2013).

Fig.1 Location of Barak Valley in the map of India

The study was conducted during 2013 and 2014. The names of 104 forest villages were collected from divisional forest offices, Cachar, Karimganj and Hailakandi and out of these 52 (i.e. 50%) were taken into consideration for detailed study. The villages were selected randomly from the list of forest villages with the help of random numbers generated from a scientific calculator. On the other hand, two fringe villages located adjacent to each of the protected areas of Barak valley were surveyed. However, among the 12 reserve forests, one (Barak reserve forest) did not have any immediate fringe areas as it was surrounded by the river Barak and its tributaries. Hence, a total of 24 fringe villages located in the fringes of 11 reserve forests and the wildlife sanctuary were surveyed. A closed-ended questionnaire survey (Fanning, 2005; Anonymous, 2012) was undertaken in of all the selected 76 villages. Ten households selected randomly from every village were surveyed. The selection of households was done with the help of random numbers generated through a scientific calculator. The

Table 1. Individual conflict animal depredation in the forest and fringe villages surveyed during 2013 and 2014 in Barak Valley

Sl. No.	Conflict animal	Percentage of affected forest village (n=52)	Percentage of affected fringe villages (n=24)
1.	Golden Jackal	90.38	87.50
2.	Civets	88.46	87.50
3.	Rhesus Monkey	30.77	62.50
4.	Wild Boar	25	54.70

Golden Jackal (*Canis aureus*), Civets (*Viverricula indica*, *Paradoxus hamiltonis, Paguma larvata, Viverra zibetha)*, Rhesus Monkey (*Macaca mulatta*) and Wild Boar (*Sus scorfa*).

Table 2. Percentage of occurrence of different combinations of conflict animals in the forest and fringe villages surveyed during 2013 and 2014 in Barak Valley

Combination of conflict animals	Forest village n = 52	Fringe village n= 24
No conflict animal	3.85	0
Golden Jackal	1.92	0
Civets	1.92	0
Rhesus Monkey	3.85	8.33
Wild Boar	0	4.17
Golden Jackal and Civets	50	16.67
Golden Jackal and Wild Boar	1.92	0
Golden Jackal, Civets and Rhesus Monkey	13.46	20.83
Golden Jackal, Civets and Wild Boar	9.62	16.67
Golden Jackal, Civets, Rhesus Monkey and Wild Boar	13.46	33.33

Golden Jackal (*Canis aureus*), Civets (*Viverricula indica*,*Paradoxus hamiltonis, Paguma larvata, Viverra zibetha),* Rhesus Monkey (*Macaca mulatta*) and Wild Boar (*Sus scorfa*).

Table 3. Number of cases of man-animal conflict documented from Forest Department records (between 2007-2012)

Type of conflict	Cachar	Hailakandi	Karimganj
Man-leopard conflict	8	1	1
Man-jackal conflict	4	0	0
Man-monkey conflict	1	0	0
Man-elephant conflict	0	7	112
Man-wild boar conflict	0	0	2
Man-serow conflict	0	0	1

Source: Forest Divisions, Cachar, Karimganj and Hailakandi

household heads were interviewed but in their absence an adult family member of 18 or more years of age was questioned (Mutanga *et al*., 2015). The villagers were asked about the wild animals which caused depredation. The animals which were involved in conflicts were identified from the responses of the interviewed villagers. There are four species of civets in the Barak valley (Choudhury, 2003), and it was difficult to distinguish them from the descriptions by the villagers; so we categorized them as civets, which included all the four species as mentioned in the results section. We categorized the conflicts according to the nature of depredation by wild animals: on the basis of sole attack by a species alone, or by different species separately in the same village and so on. Thus, there were cases of conflicts by one conflict animal species, and/or by multiple conflict species (Table 2).

In addition, with due permission of the forest department, secondary data on human-wildlife conflicts in the region as well as rescue operations carried out were recorded (Nyhus and Tilson *et al*., 2004).

Results

Man-animal conflict

Questionnaire survey in forest- and fringe villages

Golden Jackals (*Canis aureus*), Civets (*Viverricula indica*, *Paradoxus hamiltonis, Paguma larvata, Viverra zibetha*), Rhesus Monkeys (*Macaca mulatta*) and Wild Boars (*Sus scorfa*) were mainly involved in conflicts with the inhabitants of both fringe villages and forest villages. Jackals and civets (livestock depredation) were documented to be involved in conflicts with humans inside all reserve forests as well as in their fringe areas. Monkey depredation (crop depredation) was absent from within Lower Jiri Reserve Forest as well as the fringe areas of Barail Wildlife Sanctuary and Inner line Reserve Forest. On the other hand, wild boars (crop depredation) were not found to be involved in conflicts in the forested areas of Singla and Longai Reserve Forests and in the fringe areas of Lower Jiri, Tilbhoom and Upper Jiri Reserve Forests. All the four main conflict animals were found to be present in the forested and fringe areas of Sonai Reserve Forest.

Jackal depredation which occurred in 97.38% of the surveyed forest villages predominated in this regard. On the other hand, individual jackal (87.50%) and civet (87.50%) depredations dominated in case of fringe villages. Monkey and wild boar depredations were found to take in a greater proportion of fringe villages than forest villages whereas the vice versa was found in case of jackal and civet depredations (Table 1).

There was no fringe village where human conflicts with wildlife did not occur; however, 3.85% of the forest villages

were completely free from the problem. Jackals solely caused depredation in 1.92% of the forest villages and civets were solely involved in conflicts with the inhabitants of the same percentage of forest villages. On the other hand, 4.17% of the surveyed fringe villages suffered from conflicts only with wild boar. Sole jackal and civet depredations were not documented from any fringe village whereas sole wild boar depredation was not prevalant in any forest village (Table 2).

Occurrence of multiple conflict animals was the most common phenomenon in both types of villages. Composite depredation by jackals and civets was mostly prevalent in forest villages (50%) whereas composite depredation by jackals, civets, monkeys and wild boars was mostly prevalent in fringe villages (33.33%). Jackals and wild boars occurred together in 1.92% of the forest villages but in none of the fringe villages. Jackals, civets and monkeys occurred together in 13.46% of forest villages and 20.83% of fringe villages. On the other hand, combined depredation by jackals, civets and wild boars took place in 9.62% of forest villages and 16.67% of fringe villages (Table 2).

Forest department records

Official records of Cachar, Karimganj and Hailakandi Divisions revealed cases of human conflicts with leopards (*Panthera pardus*), jackals, rhesus monkeys, elephants (*Elephas maximus*), wild boars and serows (*Capricornis sumatraensis*) (Table 3) from different parts of the Valley between 2007-2012. Elephant was the most documented animal in Forest Department records in this aspect (Table 3).

A total of 10 cases of human-wildlife conflicts (leopard: 8, jackal: 1 and rhesus monkey: 1) were recorded from Cachar Division during 2011-2012. Three cases involved human attacks whereas the rests were associated with livestock depredation. Apart from these, mention of the killing of cows and oxen by leopards was found from the records of Forest Department (Letter no. DH/51/Wildlife/534 dated 01/01/2012 written to the DFO, Cachar Division) (Document No. DH/51/Wildlife/690 dated 15/09/2011 and DH/51/Wildlife/590 dated 27/06/2011).

In Karimganj Division the prevalence of conflicts between human and elephants was an important aspect. A total of 13 such incidents were retrieved from the Wildlife File of Karimganj Division (from 2007 to 2011). It was also found that 30 human deaths had occurred between 1990 and 2003 due to elephants in Karimganj. In addition, records revealed that there had been altogether 90 cases of injury, property loss and crop damage due to elephants between 2007-2011 in Patherkandi Range under Karimganj Division (Document No. KRR 23/2010/ 195). Ten cases of crop damage were also documented (Document No. WL/FD/Ex-grantia/2012-13 dated 25/03/2013). Besides, there had been human attacks by wild boars (two cases in 2009), leopards (one case in 2012) and serows (one case in 2012). From Hailakandi Division, seven cases of man-elephant conflict were recorded (from 2008 to 2011) from the Wildlife file.

Rescue operations

Successful operations

A total of 15 cases of rescue operations were documented from Forest Department records between 2011 and 2013. The most commonly rescued animal was Burmese Rock Python (*Python bivittatus*) (six cases viz., two in 2011, four in 2012); others included Collared Scops Owl (*Otus lettia*) (two cases in 2012), Bengal Monitor Lizard (*Varanus bengalensis*) (two cases), Serows (*Capricornis sumatraensis*) (one case in 2011), Indian Porcupine (*Hystrix indica*) (one case in 2013), Rhesus Monkey (one case in 2013), juvenile Barking Deer (*Muntiacus muntjak*) (one case), Crested Serpent Eagle (*Spilornis cheela*) (one case in 2013) and unidentified deer (one case each in 2012 and 2013). All the rescued animals were handed over to the authorities of Udharbond Range, Cachar Division which was responsible for the appropriate release of the animals into the wild. All the animals were released at suitable sites of Barail Wildlife Sanctuary.

Unsuccessful rescue operations

A female Black Bear calf (*Ursus thibenatus*) was recovered from a paddy field in Gumrah Sarazpur area near Kalian Range in Karimganj Division on 11/12/2013 in injured condition. It was subjected to veterinary treatment but could not be saved. The

dead bear was later buried within the Kalain Range Headquarter campus (Document No. KL/52/BWL/366 dated 17/12/13).

An abandoned leopard cub was found in the Bhangarpar area near Kalain Range, Karimganj on 28 October 2014 (Document No. KL/52/BWL/283 dated 28/10/14). The cub already had been severely dehydrated when forest officials of the range came for rescue. However, the animal could not make it to the Range Headquarters and succumbed to death on its way.

Discussion

The study contributed to the development of an understanding about the human-wildlife interface in Barak Valley and depicted the various wild animals that interact with its residents. In terms of human-wildlife conflicts, jackals, civets, monkeys and wild boars were the most common animals in the forest villages and fringe villages of the region. Except for a few, combined depredations of multiple conflict animals were prevalent in these villages. This was indicative of the fact that human and wildlife requirements overlap in these areas.

Carnivores not only have large food requirements but also require large home ranges and thus are more likely to be involved in conflicts with humans (Linnell *et al.,* 2001; Macdonald and Sillero-Zubiri, 2002). In fact, human-carnivore conflict has become more frequent in many areas (Treves and Karanth, 2003). Jackals and civets were the main carnivores that were involved in conflicts with humans in forest villages and fringe villages of Barak Valley. There was a high availability of livestock in these villages and the predators often kill reared animals. In addition, mongooses were documented to cause damages to livestock. Thus, livestock loss due to wild predators was an important issue in and around the protected forests of Barak Valley.

Crop raiding by monkeys (*Rhesus macaques*) have been documented in the present study; similar study of crop raiding by primates are reported from Langtang National Park, Nepal (Regmi and Kandel, 2008). In fact in agricultural, horticultural and other plantation areas, monkeys are considered pests as they destroy crops and fruits and bring about economic losses (Roonwal and Mohnot, 1977). Monkeys also damage vegetable gardens and caused nuisance in human settlements in the surveyed villages. Wild boars were also found to cause severe crop loss in many such villages. In addition to these, squirrels raided home-gardens and porcupines damaged agricultural fields by burrowing. On the other hand, hares were found to raid vegetable gardens and jungle fowls were documented to damage paddy cultivations by feeding upon sown paddy seeds. Otters hunted fishes in local fishery ponds in some villages. Crop loss entails two other problems; viz: money and food (Priston, 2005). However, the socio-economic consequences of human-wildlife conflict can be more significant than direct agricultural loss (Anonymous, 1997). Human conflicts with jackals, civets and monkeys occured throughout the year while those with wild boars occured during winter months.

Interventions directed at reducing human-wildlife conflicts are any activities designed to reduce the severity or frequency of encounters between people and wild animals or any activity that increases peoples' tolerance of wildlife (Anonymous, 2013). The villagers applied a number of such interventions i.e. control measures but most of them were ineffective and depredations take place regularly. There was a need of economically feasible appropriate scientific measures to mitigate the problem.

Nyhus and Tilson (2004) obtained much valuable inputs from secondary information; our study also have revealed similar results. In fact such information obtained from Forest Department documents very well supplemented the primary data of the questionnaire survey to depict the overall scenario. It was in fact found that although jackals, civets, monkeys and wild boars most frequently resulted in economic losses, the secondary data were mainly confined to elephant depredations. This could be very well understood from the fact that human attention is mostly attracted to charismatic animals. Hence, although human-elephant-conflict was confined only to the fringes of one protected area (Patheria Hills Reserve Forest), it was highlighted with greater priority over the four main conflict animals that occur across all the protected areas of the valley.

The documentation of human-elephant conflicts was followed by human-leopard conflicts in the records of the forest department. However, it could be possible that number of conflict cases as well as rescue operations remained undocumented. In fact, throughout the duration of study, several incidences of animal rescues by locals and Forest Department were revealed through discussions. In this regard, rescue records of python dominated the forest department documents. Therefore, it was precisely understood that elephants, leopards and pythons were the three most documented wild animals in forest department documents that frequently share an interface with humans. However, one fact should be mentioned that our surveys were conducted during 2013-14, where as we collected information from the Forest Department since 1990's and more precisely between 2007-2012. This could be another cause of the differences in the findings. The conflicts occurred due to elephants (112 cases in Karimganj district alone) might be severe during recent past. The damages occurred due to depredation by smaller animals were not brought to the notice of the forest department, which are documented by our study. Given the poor condition of the people living in the forest- and fringe villages of Barak valley, the economic loss faced by them due the conflicts could not be ruled out.

Hence, it was concluded that frugivores, herbivores and carnivores were involved in interactions with the residents of forest and fringe villages of Barak Valley. Their interface with humans is mostly negative. This issue needs to be properly addressed through proper scientific research in these areas so that negative interactions could be avoided and mitigated for peaceful co-existence between man and wildlife.

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