Sociological Dimensions of Human-Elephant Conflict with Trans-boundary Herds in Northern Bangladesh

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Abstract. Bangladesh is a tenacious frontier of human-elephant conflict (HEC), with conflict in the country escalating over the last 20 years. HEC in the northern region involves trans-boundary herds and the sociological dimension of HEC there is under-studied. We, therefore, conducted a simple randomized household survey (n = 234) in 22 borderline villages of the Central North that is subject to intense HEC. The respondents showed a mixed response. Most of the respondents were tolerant towards elephants. Our results suggested that people tend to be retaliatory and want to kill elephants only if human life is threatened by direct elephant attack.

Introduction

Human-wildlife conflict is a global issue often resulting in human death, staggeringly high transaction and opportunity cost, loss of wildlife resources, and disruption of ecological balance (Dublin & Hoare 2004; Anthony *et al*. 2010). As people encroach into natural habitats, contact between people and wildlife is inevitable, subsequently leading to conflict (Woodroffe *et al*. 2005). This poses an increasing challenge to wildlife for space and resources (Pimm *et al*. 1995).

Being a large mammal, this challenge is particularly large for elephants. Though the Asian elephant (*Elephas maximus*) is spread across 13 countries, is revered as an integral part of certain cultures, and plays a significant ecological role, it is globally endangered owing to the rapid decline of populations and habitat loss (Sukumar 1992; Barua *et al*. 2010; Fernando & Pastorini 2011).

Like elsewhere, elephants in Bangladesh have become confined to small patches occupied by a single or a few small herds and are deemed Critically Endangered (Islam 2006; IUCN Bangladesh 2015). According to IUCN Bangladesh (2004), areas with high human-elephant conflict (HEC) strongly correspond to elephant corridors, as human settlement, agricultural practices and other developmental works have been carried out along these corridors. Protected by the Bangladesh Wildlife (Conservation and Security) Act (2012), the number of total elephants is thought to be 457 by IUCN Bangladesh (2016), of which resident herds comprise 268 individuals and captive elephants comprise 96 individuals. Migratory herds or trans-boundary herds, whose home ranges include areas in India, Bangladesh, or Myanmar, include 93 elephants.

Northern Bangladesh has a sizeable trans-boundary elephant population, found in Mymensingh Forest Division and in Sylhet Forest Division (Sunamganj and Moulvibazar). The number of migratory elephants found in Mymensingh Forest Division, Sunamganj, and Moulvibazar are estimated to be 51, 7 and 5, respectively (IUCN Bangladesh 2016).

These trans-boundary elephants in northern Bangladesh move between the wet deciduous forests and crop mosaics located in the districts of Kurigram, Mymensingh, Sherpur, Jamalpur and Netrokona of Bangladesh and the neighbouring state of Meghalaya, India (Islam 2006; IUCN Bangladesh 2011). Movement of these particular elephants between India and Bangladesh is

subject to the structure, nature and opening of the border fence, as well as to diversity of cultivated crop, availability of food sources, salt licks etc (Aziz *et al*. 2016). Owing to human-made barriers, HEC in these remote northern regions is multi-faceted, ranging from crop raiding and infrastructural damage to disruption of normal activities such as commuting to work and school and, in extreme cases, injury or death of people and elephants (Hoare 2000). The issue is more severe and unpredictable than expected because of restricted elephant routes and corridors. In addition, while HEC incidents were limited to a few localities in the past (Islam *et al*. 2011), it has now expanded to all the districts of the Central North (Aziz *et al*. 2016).

In this context, appropriate HEC mitigation is a dire necessity for Bangladesh. However, we have very little information on how human communities are reacting to elephants. Therefore, before attempting to involve the locals in any mitigation or conservation strategy, we wanted to understand their approach towards the 'conflict species'. Here, a sociological study is presented to understand the anthropogenic dimensions of HEC in northern Bangladesh.

The specific objectives of the study were to (a) understand people's perception towards elephants, (b) assess people's tolerance and (c) understand the factors that motivate people to kill elephants.

Methods

Study area

Of the five upazilas or sub-districts of Sherpur District, trans-boundary elephants are present in three. These are Jhenigati, Nalitabari and Sreebardi. The total area of the district is 1364.67 km^2 of which 78.80 km^2 (only 0.06% of the total area) is under forest cover (BBS 2015). The forest of the study area falls under the jurisdiction of Mymensingh Forest Division (IUCN Bangladesh 2016). The study took place in 22 border villages situated in these trans-boundary sub-districts (Fig. 1). These villages are characterized by an agricultural mosaic of primarily paddy and maize crops. The vegetation also includes acacia plantations and remnants of secondary sal forests (Shorea robusta), typical of the South Asian wet deciduous forests, managed by the Department of Forest, Bangladesh (Islam *et al*. 2011).

Questionnaire design

An initial pilot survey was carried out where 20 people were interviewed and an average time of two hours was spent per interview to design the questionnaire. Two focus group discussions (FGD) were carried out to provide additional context. Each FGD comprised eight respondents. A focus group discussion is a good way to gather together people from similar backgrounds or experiences to discuss a specific topic of interest. The group of participants is guided by a moderator who introduces topics for discussion and helps the group to participate in a lively and natural discussion amongst themselves (Krueger 2014). A further pilot with 17 respondents was conducted targeting more direct responses to the questions. Upon reviewing these initial survey results, the questionnaire was modified to alleviate the difficulties in understanding the questions.

The final questionnaire had four general sections. These were: Demographic information, perception towards elephants, level of tolerance, and assessment of factors that lead to retaliatory behaviour towards elephants. There was an additional section in which respondents were asked about their positive and negative meaningful experiences to support the information they provided.

Data collection

By following Morrison *et al*. (2008), simple ran-domized household survey technique was carried out during both the pilot (n = 20 respondents) and the final survey (n = 243 respondents). The data were collected from April 2016 to January 2017. People of different age groups were interviewed. Most of the respondents were from 20 to 40 years of age. A male or female adult from each household was approached and questioned depending on whether they were available and

willing to complete the survey. Interviews were arranged in a communal space; in the yard in front of the houses. The family members of the interviewees were present during the interview. Nine respondents were not able to complete answering the full questionnaire.

All the data were collected using a structured questionnaire. The interview followed the format of the questionnaire and each question was asked as was designed. The questionnaire was filled by the researcher. If the respondent chose to provide additional anecdotal information, they were encouraged until it was comfortable to return to the set survey structure. This was done to make them comfortable and understand their feeling, and also to get some additional information that could support the survey. The respondents' attitude to the survey was given maximum priority. In terms of accuracy of responses, particular actions displayed by villagers such as shouting or emotions towards elephants were often witnessed and noted in the field and anecdotally matched answers received during interviews.

Data analysis

All the data were qualitative data except those related to demography. The data analyses were carried out using IBM SPSS 23 (IBM Corp., Chicago, USA). The data were analyzed by means of simple descriptive statistics. The rigour and accuracy of our descriptions and interpretations were tested by going through the data and the information from different interviewees several times, and examining them to find common threads and patterns (Newing *et al*. 2011).

Results

Demographics

The respondents of the study site comprised 63.9% Muslims, and 19.7% and 16.3%, ethnic tribal Christians and ethnic tribal Hindus,
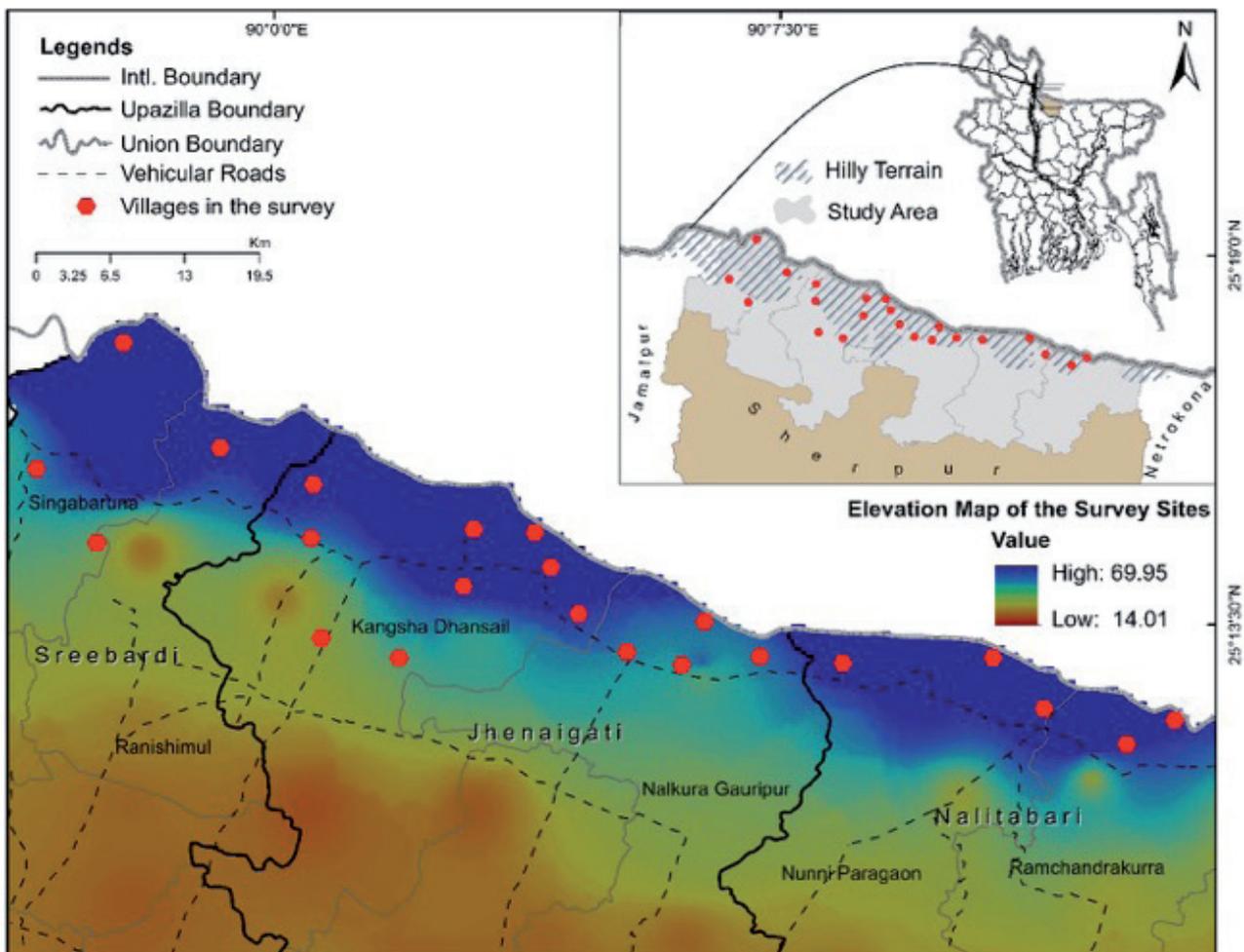

Figure 1. Study area, showing villages, unions and upazilas.

respectively. The ethnic groups living in the area are the Garo, the Koch and the Hajong. The average price of a property (households and agricultural lands) owned by a respondent was found to be BDT 239,201.13 (US$ 3,056). The average annual income of a respondent was BDT 156,000 (US$ 1,998). We considered people with an annual income less than BDT 180,000 as poor based on local context.

A total of 146 respondents owned agricultural land and 73 respondents had rented agricultural land, while we did not know the status for 15. A total of 168 respondents owned a house, 51 rented a house, and we did not know the status for 15 of them. In both cases, 15 female respondents were unable to clearly state ownership or lack thereof of agricultural land or their house. The average land size owned by a respondent was 1.51 acres.

From a religious perspective, Muslim women were initially found to be less inclined to consent to research teams interviewing them without a male household member present. One issue from interviewing female respondents was obtaining answers to questions on damage, mitigation measures etc. Female household members are less exposed to elephants and rarely engage in mitigation practices, except for tribal women. The latter actively participated in mitigation practices alongside the men. They were equally exposed to the elephants too.

Perception and attitude towards elephants

The respondents showed a combination of positive and negative attitude towards elephants depending on the context they were provided. Seventy one percent (71%) of the interviewees believed that elephants could understand what was being said to them. They also believed that elephants generally listened to them if the elephants were called "mama" ("uncle" in Bengali) or "babu" ("land lord" in Bengali).

The survey also revealed other important aspects of people's belief regarding elephants. The majority (67.5%) of the respondents liked elephants while 19.2% disliked them (Table 1). The survey revealed that a vast majority of people

Table 1. Perception and attitude towards the elephants.

Factors / Answers	Very negative	Negative	Neutral	Positive	Very positive
Liking elephants	9.8%	9.4%	13.2%	29.5%	38.0%
How elephants behave	2.1%	5.1%	6.4%	13.7%	72.7%
	Not at all beneficial	Somewhat beneficial	Moderately beneficial	Quite beneficial	Very beneficial
To respondents	84.2%	2.6%	6.4%	1.3%	5.6%
To the community	85.5%	2.6%	6.4%	5.6%	0%
To nature	71.4%	2.6%	6.0%	17.9%	2.1%
	Not at all dangerous	Somewhat dangerous	Moderately dangerous	Quite dangerous	Very dangerous
Elephants being dangerous	0%	0%	4.3%	6.4%	89.3%
	Not at all afraid	Somewhat afraid	Moderately afraid	Quite afraid	Very afraid
Respondents being frightened	15.4%	8.5%	8.1%	9.0%	59.0%
	Very rare	Quite rare	Medium	Quite common	Very common
Presence of elephants	0%	0%	0%	85%	15%
	Decrease a lot	Decrease a little	Stay same	Increase a little	Increase a lot
Elephant population	34.2%	32.9%	16.2%	16.9%	0%

Table 2. Tolerance of crop damage.

Crop damage	Very sad	A little sad	Would not mind
20%	23.5%	62.8%	13.7%
40%	85.0%	12.8%	2.2%
60%	100%	0%	0%

Table 3. Tolerance of the elephant presence.

Elephants in the area	Yes (%)	No (%)
Once in three months	60.7	39.3
Once in two months	34.6	65.4
Once in one month	26.1	73.9
Twice in one month	20.1	79.9
Two – four times/week	14.1	85.9

(86.4%) thought the behaviour of elephants to be attractive (Table 1). This indicates a positive emotion towards elephants, which is important to engage local people in conservation.

On the contrary, respondents (71.4–85.5%) thought that elephants were not beneficial to them in any form. People were asked how dangerous the elephants were and how afraid they were. Less people were afraid of elephants (84.6%) than they thought of elephants as being dangerous (100%). Two thirds (67.1%) of the respondents wanted the population of elephants to decrease (Table 1).

Tolerance

The survey found that almost half (50.4%) of the respondents' crop fields were not raided by the elephants in the last two harvesting seasons. These people were victims of crop raiding earlier (before 2016). They appeared to be more tolerant than others whose crop fields were raided once (23.9%) or twice (25.7%) in 2016.

To what extant people can tolerate the crop damage was surveyed. It was found that people can accept 5–10% of crop damage. When there is a damage of 20% of the crop, people get upset or they feel sad because it costs them more money to compensate their loss (Table 2).

The survey revealed that 60.7% of the respondents were okay with elephants visiting once in three months and only 11.1% of them are tolerant if elephants visit 5–7 times a week (Table 3). The real scenario is that sometimes elephants visit 10–20 times a month, sometimes not a single time for two to four months probably because of seasonal availability of food in the forest.

Motivation to kill elephants

To understand the factors that drive people to kill the elephants, people were provided with seven conditions or scenarios. The objective was to find out under what conditions people would want to kill elephants. None of the respondents wanted to kill elephants in the first six given scenarios. However, 70.1% of the respondents wanted to kill the elephants, if a child or adult person was killed by the elephants (Table 4).

Discussion

The existing belief of people on various aspects related to elephants, plays a very important role in further shaping their perceptions towards the elephants. The results of the survey and narratives of the interviewees gave insights into people's feeling regarding elephants. The results showed an overall positive reaction of people

Table 4. Motivation to kill the elephants.

Motivators to kill elephants	Yes (%)	No (%)
When elephants are seen in the forest far away from the village or houses	0	100
When elephants are seen in the vicinity of the agricultural land or houses	0	100
When elephants raid the houses or agricultural land	0	100
When elephants injured or killed the livestock animals	0	100
When elephants threatened a child or adult	0	100
When elephants injured a child or adult	0	100
When elephants killed a child or adult	70.1	29.9

towards elephants. Either due to fear or due to liking the elephants, people do not want to harm elephants. They think that they are not capable of causing any harm to the elephants because they do not have the tools and elephants are larger and stronger than them.

Though most of the respondents like the elephants, this does not guarantee the protection of the elephants. The positive attitude to the statement that they like the elephant and their behaviour might not always imply in case of the elephants as they are subjected to the economic well-being. Though most of the people think elephants are not beneficial, some of the interviewees think that elephants are beneficial because of the ecological role they play. These people can be useful asset for elephant conservation.

Some interesting narratives about people's belief regarding elephants were revealed. Some of these narratives are very hard to interpret. For instance, people believe that the elephants can hear them or understand them and can communicate accordingly. This belief was strengthened by various incidents they experienced during elephant raids and attacks, even through dreams. A place named "Amzadmara" (meaning Amzad got killed) was named after the incident when a guy named Amzad was killed by elephants. People believe that it was Amzad's fault to get himself killed and all of the respondents believed it surprisingly.

There are some people who think that the elephants are dangerous but they are not afraid of them. Other people also consider them to be brave and these people are always in the front line while chasing elephants. Though most of the people want the elephant population to decease, there are some people who have a strong feeling for the elephants and want elephant number to stay same or increase a little.

Many of the aspects of people's perception regarding the elephants can be understood by the level of tolerance they showed. The intensity of HEC depends on the people's ability to tolerate elephants. The level of tolerance also depends on other factors like whether the elephants entered their crop field; if they entered, how many times they entered and the percentage of crop damage.

As most of the people in the region are poor, they cannot afford great economic loss. These crops are the source of their foods. In a situation like this, people facing crop damage have to borrow money from other people, which in many cases they might not be able to repay soon. This ultimately results in hostility toward elephants. We think that if people were rich and did not have to depend on agriculture, they would not be so hostile.

Research done in the tropics suggests that wildlife-associated costs reduce tolerance and support for conservation and vice versa (Newmark *et al*. 1993; de Boer & Baquete 1998). Almost 85% of the respondents have an alternative means of income. In most cases, they work as day labourers. But, this job is not available all year round. We assume from the narrative of the people that they become more intolerant when there is no other way of income and the HEC situation is at its peak. This situation drives them to attack the elephants more or even kill them.

There is another reason for which people tolerate elephants. There is no electricity in most areas in that region. So, there is no television in most of the houses and they cannot afford a television being poor. There is a scarcity of games and sports too. People have no or a very limited access to entertainment. So, watching elephants is a form

Figure 2. A herd of elephants in the forest of the study area.

of entertainment to them. Anyone would love to watch them in the forest. These people are no exception though they are the sufferer of the HEC. Sometimes, while watching, people start throwing stones at the elephants or they make fun of them for their weird or interesting behaviour. At times, the elephants start chasing them and other times, they chase elephants back too. It seemed to be fun to the people and they enjoyed doing it. The information was obtained when people were asked about positive meaningful events with elephants.

Such incidents also occurred at night when the elephants roamed around the human settlements, but there was no possibility of an elephant attack on people and there was no crop in the field. People from the nearby settlements would come just to watch the elephants and not to help people of that particular residence. This entertainment value lets people tolerate elephants or like them.

The responses regarding people's behaviour of retaliation suggested that people are tolerant in most scenarios. People become intolerant enough to kill the elephants only when human life was threatened. They did not think that the other six scenarios would provoke them to kill elephants although all of the drivers mentioned in Table 4 have the potential to initiate incidents of HEC. The narratives of the respondents also suggest that sometime they feel like killing elephants but they would not kill the elephants if nobody gets killed by the elephants. One should keep in mind that killing of elephants is prohibited by law and people had been sentenced to jail for such action previously. This also motivated them not to kill elephants.

Though people are expected to show retaliatory behaviour, there were some exceptions. Eight respondents did not want to kill elephants despite losing a close family member or relatives. Their response was "I am not going to get my relative back. So, why should I kill the elephants?" Others said that it was the victim's fault for getting killed. Respondents who did not want to kill elephants believed that killing them would not solve the problem. It could evoke retaliatory behaviour from the elephants making the problem worse. They also believed that the elephants have to live too. People have sympathy for elephants when they see them starving or if there is a calf in the herd. In the article "Baby elephant rescued from well in Garo Hills" (Daily Star 2016) it was reported that the local people rescued a calf, which fell into a well. It was found that people are more compassionate to the elephants than they are thought to be.

The pattern of HEC is integrally connected with harvesting season and practices Aziz *et al.* (2016). We think the still persisting hospitable attitude of the local people should be utilized before they become completely hostile. As seen and proven in many human-wildlife conflicts scenario (Zimmermann *et al.* 2005; Inskip & Zimmermann 2009), the majority of the locals always have a friendly attitude toward the concerned 'conflict species'. To seal a secure future for the existing wild elephants, conservation strategies should monopolize the local perception and use the drivers of such reverence.

Acknowledgements

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