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Perception and attitude of local people towards human-elephant conflicts around Mahananda wildlife sanctuary, West Bengal, India

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Abstract
An elaborate study was conducted on the local peoples' attitudes, expectations and perceptions towards human–elephant interaction in the fringing villages around Mahananda Wildlife sanctuary, Darjeeling, West Bengal, India. A set of questionnaire was formed and utilized for interviewing 253 individuals in 11 forest fringe villages around the sanctuary during 2015-2017. The perception and responses varied with age, sex, literacy of the respondents.

Keywords: human-elephant, interaction, Mahananda wildlife sanctuary, perception

1. Introduction
The Asian Elephant (*Elephas maximus*), the giant pachyderm is one of the top categorized mammalian species that falls in the list of scheduled I species. It has been an integral part of the culture, religion and economy of the Asian peoples for at least 4000 years. Globally, wild elephants are present in 50 countries, 13 of which are in Asia and 37 in Africa. India holds the largest population of wild Asian elephants (*Elephas maximus*) with nearly 27,000–29,000 animals [1].
The Asian elephant is inseparably integrated with the history and mythology of the country as it has been worshipped from ages. It has been compared to Lord Ganesha and has been thought of as a symbol of health, wealth and fertility. This pious link has saved the animal from the threat of extinction [2].
The relation between elephant and man has been the closest for the very reason that most elephant habitats are close to human settlement. However, with increasing degradation, decimation and fragmentation of forest habitats incidences of Human–elephant conflict (HEC) is on the rise. These growing occurrences of HECs not only are creating high economic losses but also life losses in a huge extent. These incidences are affecting the socio-economic status of the locale in such a manner that it is creating negative feelings and affecting people's tolerance, producing retaliatory effects eventually hindering conservation efforts [3].
Hence, it is extremely necessary to understand the perceptions of local people living around elephant habitats as they make significant contributions towards their survival [4].
And to implement any long term conservation strategy it is extremely important to assess people's attitude towards HEC and elephant conservation.
Here, the local peoples' attitudes, expectations and perceptions on HEC in the localities of Mahananda Wildlife Sanctuary (MWLS), West Bengal, India is discussed in details.

2. Materials and Methods
2.1 Study Area
Mahananda Wildlife Sanctuary is situated in the eastern Himalayan region (26°47'54"-26°55'33"N; 88°23'36"-88°33'31"E) covering an area of 158.04 km^2. It is situated partly in Darjeeling and Jalpaiguri districts of West Bengal and was declared as a full-fledged sanctuary in 1976. It is located on the western bank of the river Teesta and on the on southern part of Darjeeling district and is listed under 7B biogeographic zone. [5] National highway 31 passes through the southern part of the sanctuary.
There are 7 recognised forest villages around MWLS fringing within 2 kms from the forest boundary viz., Khairjhora, Punding, Khairani, Chamta, Khokling (also known as Golaghat), 10th mile and Jolly.[5] However, further human settlements are seen in the near vicinity (within 5 km) which includes Toribari, Gulma, Karaibari, Laltong etc.
Most of the dwellers of these villages are dependent on MWLS for livestock grazing, fodder, food, fuel wood etc. The inhabitants are of mixed community although majority of them belong to *Nepalese* tribe, while others are *Adivasi* community (Toppo, Oraon, Minj, Kerketta etc) and some *Rajbanshi* (Barman, Roy etc.).

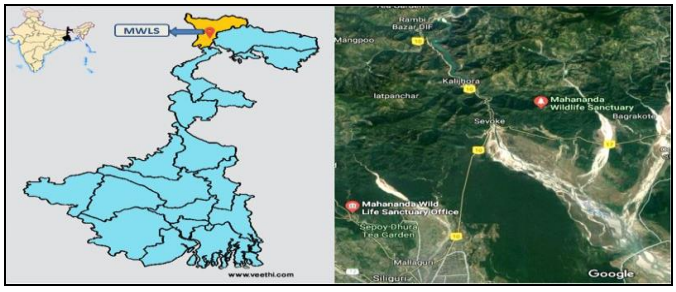

Fig 1: Map of surveyed area

2.2 Data Collection
A survey was conducted in 11 forest fringe villages (viz., Khairjhora, Punding, Khairani, Chamta, Khokling, 10th mile, Jolly, Toribari, Gulma, Karaibari and Laltong) around MWLS during the span of two years (2015-2017). Randomly selected individuals were interviewed separately, lasting 20-30 minutes.[6] The interview was done using a standard set of questionnaire which covered information on the local people's perception about elephant conflict, seasonality of conflict, trends in conflict, factors behind the increased incidences of conflict, attitude towards elephant conservation and willingness for cooperative management of conflict. [7]

3. Results and Discussion
3.1 Profile of the interviewees
During the 2 year long survey period, as many as 253 individuals were interviewed. Among them 137 (54%) were males and rest 116 were females. A conscious effort was made to maintain a balance between male and female respondents to have a more impartial representation. Individuals interviewed were between the ages of 18 –73 years (average 45 years).

3.2 Educational Status
Out of the total population interviewed 167 (66%) had some formal education. Rest of the individuals (34%) never went to school. Among 167 literate individuals, 107 (64.07%) were males. Education plays a major role in individual's perception about wild animals. Hence, the level of education reflects a lot about the nature of HEC in the area. [8, 9]

3.3 Community Type
The community type was heterogeneous. Most of the community in the above mentioned villages belonged to *Nepalese* hill tribe, others were *Adivasi* settlers (from Dooars belt), some *Rajbanshi* and a very few were *Bengalis*. Efforts were made to have a homogenous representation of respondents, without any biasness to a particular caste or creed. Due to traditional and ethno-cultural practices the tribes present are heavily dependent on forest, thus, bringing about frequent encounters with wildlife.

3.4 Culture Practices
The main type of crops harvested in the area, as stated by the respondents, are corn, mustard and rice. Most of the farmers are subsistence farmers and do not possess any other mode of livelihood. Due to infertility of the soil, many times of the year and also during periods of dry season, the locals have to rely upon forest products for subsistence, bringing the chances of HEC. This also had a direct connection with encroaching forest habitats. [10]
Lighting forests, resulting in forest fires, is also a common practice among the villagers, as accepted by some of them. This results in huge loss of biodiversity, forest depredation, and habitat loss.

3.5 Attitudes toward elephant
Majority of the respondents (81.8%, n= 207) had positive attitude towards presence of elephants, stating the need of elephant conservation in MWLS and mentioned they have a right to be in MWLS, 11.06% (n=28) were neutral, while rest 7.11 % (n=18) said elephants should not be conserved and they have no right to be in MWLS.
In reply to the question asking if the local people derive any benefit by the presence of elephants around, 87.35% (n= 221) replied no, while 1.18 % (n=3) said yes, and rest 11.4% (n=29) took no side. The positive reply was not that surprising because Elephant being worshipped as a God in Hinduism and most of the settlers being Hindu, this sentiment is quite understandable. Nature of view point towards elephant conservation was found to be significantly associated with gender, age and educational status of the interviewee. Females were more compassionate (especially older females above 40 years of age) about elephant conservation compared to males. It has been significantly found that there is a positive association of education with tendency of elephant conservation. This confirms importance of education among local people for developing and implementing conservation strategies. Heinen (1993) and Kumsa-Bekele (2014) found similar situations in Nepal and Ethiopia respectively. [11, 10]
When asked if they understood the importance of in-situ conservation strategy like MWLS, 92.09% (n= 233) replied in affirmative and supported the need of MWLS. They also understood the importance of MWLS for their sustenance, as they were dependent for most of their daily resources on it.
This positive approach towards conservation is an encouraging sign for the future of MWLS. This attitude can be harnessed in a greater extent to conserve Asian elephant in the area in future days. Contrarily, the level of negative attitude (merely 7.91%) can be eradicated with education, awareness camps, compensation schemes etc.

Table 1: Attitude of local people towards Asian Elephant

Demographic Variables		n	Positive	Negative	Neutral	χ^2	df	P-value
Gender	Male	137	103	11	23	10.79	02	P<0.025
	Female	116	104	07	05			
Age	Young	117	90	15	12	5.74	02	P<0.05
	Old	136	104	08	24			
Education	Illiterate	86	07	30	49	165.23	02	P<0.001
	Literate	167	151	03	13			

3.6 Attitudes Towards HEC
When the local villagers were asked about the level of HEC in the region, 81.02% (n=205) said it to be medium but it is rising, 12.65 % (n= 32) said it to be low, while 6.32% (n=16) said it was high. The perceptions and attitudes are influenced by their background experiences [12].
Going by their reactions, it seems there is a serious need to look to stop these HECs in this region and strategise plans to reduce the retaliatory effects. Some prospective measures can be like reconstruction of buffer zone, regular awareness

camps, creating other livelihood opportunities, encouraging locals to harvest alternative crops etc. According to the interaction it was found people who responded as HEC being high, had encountered some form of elephant attack directly in last 2-3 years. While those who said low did not have any such previous encounters. Thus connection with previous experience mattered in framing response.

3.7 Reasons of HEC according to local villagers

When asked about the possible causes of HEC around MWLS, destruction of forest and shortage of food, stood the most important point 37.9 % (n=96) among the responses. Others reasons include, human interference and picnic parties (24.11%, n= 61), increase in elephant population (17%, n=43), close proximity of the village to the park (8.3%, n=21), negligence of forest officials (6.3%, n= 16), preference of cultivated crop (2.37%, n= 6), others (3.95%, n=10). Among these aetiologies, closeness of the village to the forest [13, 14] and allurance of cultivated crop [15] seems most likely.

3.8 Mitigation techniques practised

When asked about the probable mitigation techniques followed by the villagers, the followings responses were recorded, bursting crackers 20%, using fire sticks, shouting, throwing stones or fire balls, combination of different techniques 40%. However, according to the locals bursting crackers was the most effective one. Throwing stones or fire balls is the most provocative method as it might bring about direct confrontation and increased risk of life. Hence, the villagers need to be made aware of the perils of processes used and more congenial, eco-friendly and effective techniques need to be applied in MWLS area to reduce HEC.

3.9 Compensation

The forest villagers when were asked about the different government compensation schemes. 82% said they were not very happy with the procedure, delay and the amount of compensation given, 7% said they don't know anything about it, 2% said they were more or less satisfied. The dissatisfaction regarding the compensation system is thus one of the important reasons for negative attitude towards elephant conservation.

Compensation schemes help people heal their wounds against elephants and create positive attitude, but non transparent and complex procedures have stifled the course [16].

4. Conclusion

The basic objective of the study was to assess the ability of the communities to cope with the elephant rampage in the local area in community based manner. It was assumed if complete eradication of these conflicts is not possible, still reducing it to an extent is possible in a community based manner. The study proved this assumption to be true, as the positive attitude of the villagers have made mitigating the conflicts in a sustained and coordinated manner.

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