



Case Study

Perception and attitude of tribal people towards human-elephant conflicts in Gorumara National Park: A Study of Purba Kantadighi Kumarpara Village, Jalpaiguri District, WB, India

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Available online at: www.isca.in, www.isca.me

Received 8th March 2021, revised 25th April 2021, accepted 5th July 2021

Abstract

Human-wildlife conflict arises due to direct and indirect negative interactions between them in and around forest areas. This could be potentially harmful to both sides and leads to negative human attitudes towards wildlife. This type of conflict causes economic losses particularly hampering of crop productions, agricultural activities and collection of non-timber forest products. Often human-wildlife conflicts become fatal due to their rivalries for food and niche. Human-elephant conflict in and around Gorumara National Park of West Bengal is a perfect example of this scenario. Gorumara is the natural habitat of approx 104 Asian Elephants (*Elephas maximus*) among them 85 is residential. Here elephant density is 1.06/km², one of the highest in the world. The study area, Purba Kantadighi Kumarpara (26°43'38.26"N, 88°45'52.02"E), is a small tribal village, situated at the western fringe Gorumara National Park, under Kumali Panchayat in Mal Bazar Police Station of Jalpaiguri district. It is inhabited by only 115 tribal people of 20 families; most of them are engaged in subsistence marginal farm activities. Due to proximity to forest, crop-raiding and damages of household properties by elephants is a recurring event here. This is a case study on human-elephant conflicts in Purba Kantadighi Kumarpara village, emphasising on people's perceptions and attitudes regarding this fact.

Keywords: Gorumara National Park, Human-Elephant Conflicts, Purba Kantadighi Kumarpara, Perceptions and Attitudes of Tribal People.

Introduction

Human-Elephant Conflict is a common incident in the northern part of West Bengal. This part of the country is ideal for the inhabitant of the Asian elephant (*Elephas maximus*). But due to several geographical factors, this conflict has been increased in north Bengal. The Asian elephant is listed as 'Endangered' by the IUCN in 2008¹. Habitat loss, fragmentation of elephant population, human-elephant conflict (HEC), and the illegal killing of elephants have adversely affected elephant conservation throughout its distribution in India². The elephants also harm local inhabitants. Damage of crops; loss of household properties, livelihood and human lives are common events. This ultimately creates a negative perception and attitude towards wild lives. There is approximately 27,000 elephant in 23 states of India, over 109,500km² forest lands³. Every year averagely 400 humans are killed by elephant attacks and about 100 elephants lost their lives⁴. At a regular interval, the central and state governments are spending funds for the damaged crops and properties of the local inhabitants⁵.

It has been noticed that there are spatial and temporal variations in this problem⁶. So, it is important to understand the nature of the Human-Elephant conflicts at local levels for better management. North Bengal, shares international borders with

Nepal, Bhutan, and Bangladesh, located in the north-eastern part of India. The elephant population is fairly well here. Initially, the elephant population hampered due to drastic changes over this region. In the 19th century, the British planters cleared forests for establishing commercial tea plantations. Subsequently, a large number of tribal people from Chotanagpur plateau and Central India were brought by the British planters in these gardens⁷. After independence and Bangladesh civilian war, a large number of refugees were also settled down in the vicinities of the forests. This resulted in the reduction of forest area and elephant population. But afterward, with the enhancing of public awareness and conservation policies elephant population has significantly increased⁸. Creation of reserve forest, wildlife sanctuary and national park in north Bengal has increased the forest covers. It creates favourable conditions for wild lives including Asian elephants. There were 300 elephants in the 1990s⁹. Now there are 500 elephants in north Bengal over 2000km² area³. In north Bengal, the large number of elephants present in fragmented forests surrounded by densely populated areas (> 500 people/km²). Moreover, rapid changes in land use and anthropogenic activities have increased the magnitude of Human-Elephant conflict. The Gorumara National Park (26°47'25.6" to 26°43'25.6" N and 88°52'4.2" to 88°47'7.3" E) is a prime example of this scenario. Since 1895 Gorumara was a

reserve forest with only 7km² area. It was declared as National Park in 1994. At present Gorumara has grown by incorporating neighbouring lands to about 79.45km²¹⁰. The study area Purba Kantadighi Kumarpara (26°43'38.26"N, 88°45'52.02"E), is a small tribal village, situated at the western fringe of Gorumara National Park. Regularly, this village is raided by the elephants. So, there is a conflict between villagers and elephants; the marginal tribal people face various problems. Taking this into account, the present study is an attempt to address the following objectives;

Objectives: The objectives of the present study are as follows: i. To study the nature, cause, and consequences of Human-Elephant conflict in Purba Kantadighi Kumarpara village and surroundings. ii. To study the tribal people's opinions, perceptions, and attitudes about this crisis. iii. To suggest possible mitigation of this problem.

Study Area: Purba Kantadighi Kumarpara (26°43'38.26"N, 88°45'52.02"E) is a small village under Kumlai Panchayat, Mal Block of Jalpaiguri district, West Bengal. This small village is located at the western fringe of Gorumara National Park. The Neora River follows from the west of Purba Kantadighi Kumarpara village, making its western boundary. The railway track, New Mal junction to Lataguri creates its northern boundary; the east side is surrounded by Gorumara National Park along National Highway 717 (formerly 31C), where Dakshin Kantadighi Kumarpara village is located at the south. The total area of the village is approximately 217.37 acres (0.88 km²).

The average elevation of the village is 109m. The direction of the slope is towards the south-west from north-eastern. The

highest point is 119 m at the extreme north-western boundary and the lowest point is 99 m at the south-western boundary on the bank of Neora River. The majority of the agricultural lands are situated on the western, north-western and south-western sides of the village along the eastern bank of the Neora River. A few agricultural lands are located in scatter at the eastern side with open forest (extended part of Gorumara National Park). The settlements have been developed at the central portion of the village, beside the village road which connects Lataguri. There is 118.6 acres (54.56%) of open forest, 59.03 acres (27.15%) of agricultural land, settlement area is spread over 19.64 acres (9.035%) and rest 20.10 (9.24%) acres are plantation area in this village. Soils of this village are sandy loam and clay loam in texture. The lands near the forest are mostly clay loam enriched with the organic matter with low pH level and the lands near the river bank are mostly sandy loam, composed of riverine gravels with a higher level of pH. Soil pH ranges from 4.55 to 7.58, the average is 5.88 (σ 0.86). The clay loam soil is ideal for paddy and sandy loam is perfect for sweet corn cultivation. However, paddy is the staple crops in this village followed by corn, a small amount of vegetables.

It is entirely a tribal village, inhabited by only 115 people of 20 families. Among them 63 are male and 52 are female. Villagers are mostly Oraon (87.83%) and the rest are Munda (12.17%) The literacy rate of the village is 74.74% where Male literacy stands at 90.38 % and female literacy rate is only 55.81%. Most of the villagers are engaged in subsistence marginal agriculture and tea garden activities in the nearest Appu Valley Tea Estate. Due to the proximity of the forest, the village is very close to the elephant corridor and elephant raiding is a regular event here.

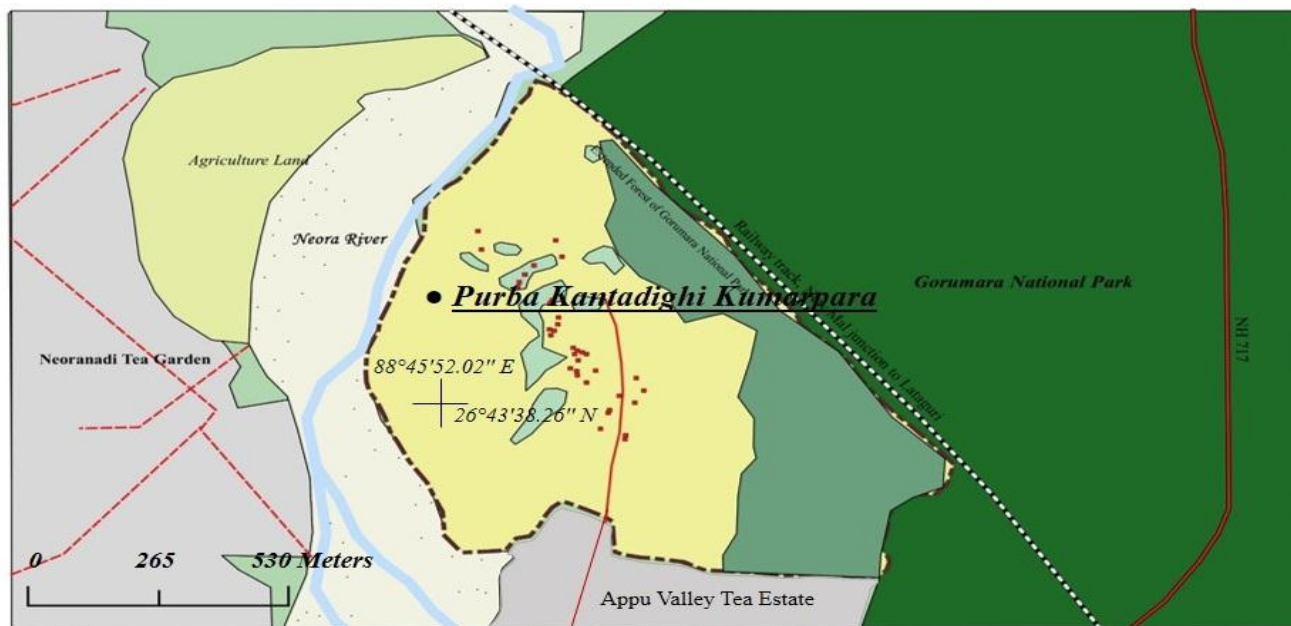


Figure-1: Shows Study Area, Purba Kantadighi Kumarpara Village and Surroundings.

Methodology

This is an intensive case study based on both primary and secondary data. The field investigation was conducted in two phases; from 21st August to 22nd August, 2018 and 26th December to 28th December, 2018. The first field visit was made just after the implantation of green paddy, during the vegetative phase of the plant. This time elephant raids become higher. The second field visit was conducted during the paddy harvesting period.

During the field visit, the physical observation was made on agricultural practice, land use pattern and community activities. Altitudes were measured by GPS survey. Soil samples were collected for the examination of pH and texture. Soil pH was measured with universal indicator pH paper and texture was measured by feeling methods. Land use pattern has been measured by Google Earth Pro and co-related with collected data from Kumlai Panchayat. 60 persons from 20 families were surveyed through stratified random sampling. A standard set of questionnaire was used, covering information on the local people's perception about seasonality and factors of the conflict; their attitude towards the elephants.

Local people and forest personnel, who had witnessed the elephant raids, were interviewed in and around Lataguri area. Secondary data were collected from Divisional Forest Office, Gorumara Wildlife, Jalpaiguri Forest Division; Kumlai Panchayat. Collected data were compiled and analyzed by specific statistical methods. For preparing map QGIS version 2.8 was used.

Results and discussion

Nature of Elephant Menace: The villagers experienced total 75 elephant raids during 2012-18; averagely 12.50/year ($\sigma = 2.565$). Among the total villagers (N=115) 20% (n=23) were injured and 01 people died in this period. Averagely 3.83 ($\sigma = 2.228$) persons/year were attacked by the elephant. 17.275 ($\sigma = 2.752$) acres of agricultural products damaged annually which includes green paddy (32.81%), ripe paddy (61.98%), cornfield (2.99%) and winter vegetables (2.23%). Averagely 9.833 ($\sigma = 2.483$) families out of total (N=20) hampered by elephant attack every year during 2012-18.

Seasonal and Temporal Variation of Elephant Attacks: On the base of secondary data, received from Divisional Forest Office, Gorumara Wildlife and Kumlai Panchayat Office, it is found that out of total (N=75) elephant attack or raid 36% occurred between November–January (paddy harvesting period), followed by 30.67% during August-October, 15% during February-April and 13.33% during May-July ($\chi^2 = 23.764$, $df=15$, $P=0.0692$). 42.67% of elephant attack was recorded between 4pm to 10 pm, followed by 22.66% between 10pm to 4am, 18.67% during 10am to 4pm and 16% between 4 am to 10am ($\chi^2=22.247$, $df=15$, $P=0.1015$).

Profile of the Interviewees: During the survey conscious effort was made to maintain a balance between male and female respondents from various age groups to have a more impartial representation. Among the total respondents (N=60) 58.33% (n=35) were male and 41.67% (n=25) were female. The age of the respondents ranges between 8 years to 75 years and the average age was 39.2 years ($\sigma=17.667$). 68.33% of respondents were literate and rest 31.67% were illiterate, the average level of education was 5th standard ($\sigma=4.002$). There are averagely 5.75 persons/family ($\sigma=1.802$) and the average income of the families is only Rs.362.75/ day ($\sigma=109.978$).

Attitudes and Opinion towards Elephant and Elephant Attacks: Out of total respondents (N=60) 55% have positive attitude towards the presence of elephant, 28.33% gave negative response and rest 16.67% unable to give feedback which considered as neutral.

Among the surveyed population (N=60), 43.33% informed that elephant attack is a serious problem, 30% referred it as a common problem and the rest 26.67% mentioned it as life threatening. The respondents were categorised into two segments 'Survivors in Elephant Attack' and 'Common Sufferers'. The majority (47.83%, n=11) of the survivors mentioned it as life-threatening where the majority (51.35%, n=26) of the sufferers mentioned it as a serious problem.

Reasons of Human-Elephant Conflict According to Local Villagers: When the villagers were asked about the possible causes of Human-Elephant conflicts, several opinions arrived. Out of the total respondent (N=60), 36.67% blamed on increasing population of elephant followed by the negligence of forest officials (33.33%), non-functioning of electric fences (23.33%) and only 6.67% mentioned the proximity of the village to the forest.

Opinion about Compensation and Further Agricultural Practices: The villagers were asked about government compensation, the majority (63.33%, n=38) of them were not satisfied due to the low amount, complex process and delay. 20% (n=20) of them informed that they need improvement but surprisingly 16.67% (n=10) informed that they unaware about it. The dissatisfaction regarding the compensation system is thus one of the important reasons for the negative attitude towards elephant conservation. Due to frequent elephant attack majority (48.33%, n=29) disagreed to continue farm activities, 33.33% (n=20) agreed to continue and rest 8.34% (n=11) were unable to answer. There were differences of opinion in male-female and literate-illiterate categories. Out of the total female population 56%, were ready to continue farm activities, 24% disagreed and rest 20% were non-responsive. Where among the total male population, the majority (65.71%) disagreed, 17.14% agreed and another 17.14% did not replay. Among the total literate persons, only 26.82 % (n=11) expressed interest in further farm activities.

Table-1: Nature of Elephant Menace in Purba Kantadighi Kumarpara village during 2012-18¹⁰.

Year	No. of Elephant Raid	Significant Damages	No of Family Hampered
2012-13	11	Green paddy of 10.5 acres land are destroyed	09
		9.3 acres ripe paddy field were ruined	
		4 houses were damaged,	
		6 persons were injured.	
2013-14	08	12.63 acres ripe paddy field were ruined	06
		3.10 acres corn filed were destroyed	
		5 houses were damaged	
		4 persons were injured	
2014-15	14	10.32 acres ripe paddy were ruined	12
		Winter vegetables were destroyed in 2.3 acres land	
		7 household properties were destroyed.	
		4 persons were injured	
2015-16	12	Green paddy of 8.63 acre lands were destroyed	10
		9.24 acres ripe paddy were ruined	
		Grain-shed of 2 household were destroyed	
2016-17	16	Green paddy of 5.38 acres land were destroyed	13
		14.52 acres ripe paddy were ruined	
		9 household properties were destroyed	
		6 persons were injured and 1 person was killed	
2017-18	14	Green paddy of 9.5 acres land were destroyed	09
		8.23 acres ripe paddy was ruined	
		3 household properties were destroyed	
		3 persons were injured	
Mean (\bar{x})	12.50 ($\sigma = 2.565$)		9.833 ($\sigma = 2.483$)

Table-2: Attitude of local people towards presence of elephant.

Demographic Variable		n	Attitude			χ^2	df	P-value
			Positive	Negative	Neutral			
Sex	Male	35	25	5	5	10.258	2	0.0059
	Female	25	8	12	5			
	Total	60	33	17	10			
Age	>30 Years	40	27	8	5	9.269	2	0.0097
	<30 Years	20	5	10	5			
	Total	60	32	18	10			
Education	Literate	41	28	8	5	9.766	2	0.0076
	Illiterate	19	5	9	5			
	Total	60	33	17	10			
		Percentage						
		(100%)	(55%)	(28.33%)	(16.67%)			

Table-3: Opinion of local people about elephant raids event.

Variable Respondent		n	Opinion			χ^2	df	P-value
			Life threatening	Serious Problem	Common Problem			
Sex	Sufferer	37	5	19	13	8.542	2	0.0140
	Survivor	23	11	7	5			
	Total	60	16	26	18			
Education	Male	35	5	18	12	6.613	2	0.0366
	Female	25	11	8	6			
	Total	60	16	26	18			
		Percentage						
		100%	26.67%	43.33%	18 30%			

Table-4: Opinion about further farm activities.

Demographic Variable		n	Opinion			χ^2	df	P-value
			Agree	Disagree	No Response			
Sex	Male	35	6	23	6	11.921	2	0.002
	Female	25	14	6	5			
	Total	60	20	29	11			
Education	Literate	41	11	24	6	6.832,	2	0.032
	Illiterate	19	9	5	5			
	Total	60	20	29	11			
Percentage		100	33.33	48.33	18.34			

Discussions: Elephant raid is a regular event in Purba Kantadighi Kumarpara village as it is situated on the elephant corridor. When the resident elephants of the Gorumara National Park move towards the Apalchand forest or Baikunthapur Forest, west side of the Neora River, they move through this village. Similarly when the non-resident elephants come towards the national park, creates menace to the villagers. Elephant raids become frequent during the harvesting seasons of paddy and corn (November-December). They not only raid the fields but also destroy the grain sheds. After the implantation of green paddy (last week of August to the first week of October), the vegetative phase of the plant, elephant raids also increases because elephants prefer the tender plants. Tender green paddy fields are frequently ruined due to group movement of the elephants. Winter vegetables cauliflower, cabbage, carrot, radish, spinach etc. are also destroyed by the elephants. So, crop production is severely hampered and the majority of this tribal people lost their interest in farming (Table-4). Even tea production in Appu Valley Tea Estate, a good number of villagers engaged, is hampered by frequent elephant raid. Houses, cowsheds and other structures of the villagers are often damaged by the elephants in searching for food. While the villagers try to resist the elephant, they become violent. Various time, elephant raids become life-threatening and vulnerable (Table-1).

To overcome this problem this tribal people adopted several techniques. Watchtowers have been installed by both villagers and forest department towards the eastern, north-eastern and northern periphery of the village at the elephant infiltration points. Some houses are constructed on wooden or concrete pillars to avoid casualties. Male persons of the village are active members of *Hullah Party*; they use crackers, drums, tin jar canes and fire torches to drive out the elephants. *Hullah Party* becomes active during plantation and harvesting time of paddy and corn. The forest department encircled the village with the

electric fencing. But it was noticed that major portions of the fencing had been destroyed by the elephants.

In spite of these prevented measures, the elephant raids and Human-Elephant conflicts are continued in this tribal village. Actually, due to human proximity, the big mammals have adopted themselves with human tactics. The villagers and forest personnel informed that the elephants have learnt the technique to break the electric fencing. They usually break the fences with dry wooden blocks. Now they are raiding during day time when power is disconnected to the fencing. So, villagers have no confidence in electric fencing. They are using fire torches, crackers and elephants becoming violent. In this way, the attitude of these tribal people towards wild lives is changing.

Still, the majority of the villagers have a positive attitude to the elephant (Table-2), in spite of their damages and sufferings. It is due to their religious traditions, long time co-existences with this big mammal. More interestingly, with the promotion of eco-tourism, the perception towards the elephant and other wild lives is being improved. During the interviews, various persons of this tribal village and Lataguri area conveyed that in recent times the tourist flows has increased due to the influx of elephant raids. Now the literate members of this tribal village are not interested in agricultural practice (Table-4), rather they want to switch over towards the tourism industry and allied professions. As the local people are well aware of the positive correlation between elephant raids and tourist flow, few resorts have developed at the south of this village, near the elephant corridor.

Conclusion

Where deforestation, habitat loss, human infiltration and encroachment of settlements and agricultural land are responsible for the Human-Elephant conflict in various part of India, this scenario is different in north Bengal and Gorumara. Since 1895 *Gorumara* was a reserve forest with only 7km² area.

At present Gorumara has grown by incorporating neighbouring lands to about 79.45km²¹⁰. Surrounded tea gardens and associated tribal villages have been encroached by the expended forest. Due to intensive conservation practice, the population of elephant and other large mammals such as bison, rhino, chital deer, hog etc. have rapidly increased. The Union ministry of environment and forests declared Gorumara National Park as the best among the 235 national parks and wildlife sanctuaries for conservation effort in 2009¹¹. Now Gorumara is the natural habitat of approx 104 Asian Elephants (*Elephas maximus*) among them 85 are residential (as per received data from Divisional Forest Office, Gorumara Wildlife). Here elephant density is 1.06/km², highest in the subcontinent where the national average is only 0.305/km²³. Elephants eat up to 450 kg of food per day¹². So, the area within the national forest is not sufficient for the elephants. They are facing the food crisis and their food habit is changing due to the proximity of agricultural fields. Elephants are known for long-distance migration. During their movement, the villages near the elephant corridors are becoming common targets. So, there are regular Human-Elephant conflicts at Purba Kantadighi Kumarpara and surrounding villages.

Recommendations: As electric fencings are not effective, the villages could be encircled by jute fences made of strong vegetable fibre and smeared them with automobile grease and *Bhut Jolokia* chilli (Scoville heat unit 1,041,427), the world's hottest¹³. The forest department of Assam has successfully used this tactic to drive out elephants from forest villages. The elephants always avoid strong chilli plants. So, the villagers could be encouraged to plant strong chilli trees such as *Bhut Jolokia* and *Naga Morich*, *Naga Viper* in and around their houses and agricultural fields. Honey bees are attracted to the water around elephants' eyes and elephants always afraid of them. So, when the swarm of bees approaches, elephants become restless and escape. This tactic is successfully used in several East African countries over the last two decades as Elephant and Bees Programme¹⁴. So, villagers could be encouraged in beekeeping. Moreover, the sound boxes releasing the sound of bees could be installed in surrounding areas of the village. Crops like paddy, corn and mahua (*Madhuca longifolia*) attract elephants, whereas cultivation of turmeric and tobacco could be helpful to drive out elephants as they don't prefer the strong smell of turmeric and tobacco.

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