Status of Elephant Corridors in Garbhanga-Rani Reserve Forest in an around Deepor beel

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ABSTRACT

The need to protect wildlife corridor is increasingly gaining traction globally. Corridors in larger space of ecological conservation, occupy a niche. Their role and vitality in species conservation is well documented, but their definition is source of constant confusion. They have been generally understood to be linear landscape elements, meant to establish or facilitate connectivity across habitat and increase survivorship by increasing the diversity of specific gene pool. In more technical parlance, ecological literature defines corridors as a fundamental landscape element, being narrow strip of land which differ from the matrices on the either side.

Kamrup (M) district is an administrative district of the Indian state of Assam. The area of Kamrup (M) is about 1528 sq. kms. Guwahati is the largest city in the indian state of Assam and also the largest urban area in the Northeast india. the latitude and longitude of the Guwahati are 26º14'45ºN and 91º73'62º E. Deepor beel is a lake located to the south west of Guwahati city, in Kamrup district of Assam, India. To the south of Deepor beel there is Rani Garbhanga forest. there are five notified Elephant corridors across the forest to the Deepor beel.

These five corridors are situated along the PWD Highway through Deepor beel 274 railway gate as the name of the corridor is given by the forest department. This corridor starts from the Rani forest in Meghalaya and Assam border and passes through the deep forest down to the Deepor Beel in search of water. The railway track cut the corridor in the tail end along with a VIP road that connect national highway-37 to the LGB airport Guwahati. The forest habitat contains many wild trees. The Elephant came down the corridor in search of water and food. Some of names of the plant they consume are Foxnut, Sal, Country Fig, Bamboo, Water hyacinth etc. The human population nearby the corridor in the beginning of the study was lesser in the month of August 2018 which increases over time and in the end of study period by the month of March 2019. The Elephant population is seen maximum in the month of August 2018 in number and minimum in the month of March'2019.

Keywords: Corridor, Kamrup, Deepor beel, Elephants,

INTRODUCTION

The Elephant has always been considered as an embodiment of strength, size and intelligence. It has been looked upon with the mixed feeling of love, worship and fear. Elephants were also a part of human society and were maintained in the captivity for use in war, festivals, timber logging and religious processions.

The habitat of the Asian Elephant (*Elephus maximus*) in India specially in North East Assam is being fragmented into smaller areas as a fragmented into smaller areas as a result of developmental activities, human settlement, industrial instillation etc. As the equilibrium theory of island biogeography (Mc Arthur & Wilson, 1967) predicts that the size of the habitat island a species occupies plays an important role in the survival of the species. Larger areas may contain more individual of a particular species than smaller areas and therefore offers the species a greater chance of persistence over time. In order to ameliorate the effect of habitat fragmentation, the ideas using habitat corridor was introduced first in 1959 in Srilanka , later Diamond (1975) proposed the creation of corridors, by protecting strips of forest connecting two larger habitat island. Corridor aids dispersal and movement of individual between Habitat Island thus enlarging effective populations sizes and in turn decreasing extinction probabilities. Elephant need to fulfil their need for food water, salt & nutrient which remain distributed in different areas of their habitat. Hence, they need to migrate to wars resource location on daily or seasonal basis.

As for Elephants are concerned, the disadvantage of corridor is that they may increase interference between Elephants and humans, thus leading to human Elephants conflict. Careful planning and serious efforts are needed to mitigate such conflicts around corridor areas. As a result of increased awareness of the advantage of the corridors and need to ensure the survival of large bodied mammals such as Elephants, a network of protected areas connected by corridors was proposed as a conservation strategy in India (Rodgers & panwar; 1988, Sukumar 1991) this resulted in identifying and declaring several Elephant corridors. In India, 88 Elephant corridors identified and well documented and among these 12 are in north western India, 20 in central India,14 in northern West Bengal, 22 in North Eastern India and 20 in South India. In this paper, Elephant corridor present nearby Deepor beel area is presented and discussed.

AIMS AND OBJECTIVES

AIM: To study present status of Elephant corridors of Rani-Garbhanga forest in Deepor beel area.
OBJECTIVES:
1. to observe Elephant movement in the corridors.
2. to find out the conflict between Elephant and humans.
3. to observe the damages done by the Elephant.
4. to identify the vegetation which are utilised by Elephant.
5. to observe Elephant ride frequency through corridors.

REVIEW AND LITERATURE

WTI & ANCF identified 88 Elephant corridors in India (Menon et al, 20015).

In 2019, the Assam State Goverment notified that Deopahar as a reserve forest. It was on august 18,1999 notified and proposed as a reserve forest and this area is highlighted as a regular migratory route for Elephant.

K. Ramkumar, K. Monimozhi and S. Paulraj, 2000, status of the Elephant corridor in and around Mudumalai wildlife sanctuary, Tamilnadu, Southern India. They conducted the study on Masinagudi Moyar corridor: here there are two routes between Mudumalai wildlife sanctuary and Sigur reserve forest. These areas lies entirely within the Mudumalai wildlife sanctuary. And Masinagudi Singara corridor: it is most crucial and one life between Masinagudi and Singara villages. Bokkapuram corridor: the Bokkapuram corridor lies in the south eastern part of the Mudumalai wildlife sanctuary.

They recorded 41 trees species from these corridor among them 24 species were the Elephants food. In these corridor highest grass cover was calculated in the Masinagudi Singara (57%) and to west in Mavanhalla Chemmanatham (25%).

In North India Elephant corridor was affected by heavy intensity of lopping on Elephant food species. This is studied by John Sing et al (1990), sunderraj et al (1995). Silori and Mishra, (1995) have also brought out the impact of anthropogenic pressure such as wood cutting and grazing on habitat viability of Elephant corridor in India. Thannoli (1997) has reported that looping intensity of Elephant food species would reduce the corridor viability rapidly.
Rodgers and Panwar, (1988) and Sukumar (1991) they propose that the increase awareness of the advantages of corridors and the need to ensure the survival of large bodied mammal such as Elephant, a network of protected areas connected by corridors.
Corridor in 1998. Out of which the first one is The Rajaji- Corbett corridor in Uttar Pradesh : this corridor connecting the Rajaji National Park with Corbett National park. The Kallar- juccanari corridor in Tamil Nadu is situated in the Nilgiri biosphere reserve in Sourthern India, which contains the single largest population of Asian Elephant(4500). It serve as a link between the Elephant population of the northern India and Southern India.

The Sirj- Rewak Corridor in Meghalaya : this corridor in state of Meghalaya in North East India connects a population of 600 Elephant in and around Balphkaram national park .
Arun Venkataraman, Sandeep Krfiwari & K Ramkumar (Asian Elephant Corridor) they published 1. Thirunelli- Kudrakote Elephant corridor, kerala, 2) Edayarhalli-Doddasampige Elephant corridor, Karnataka
Johnsing et al (1992) and (2001) Joshi et al (2010) conducted four Elephant corridor in Yamuna - Ganga comprises shivalik forest division , Dehradun forest division and a large part of Rajaji nationa park.
Sandeep K R Tiwari, Sunil Kyaron, Anwara Uddin Chauodhury, Achristy Williams , K Ramkumar And Dilip Deory (Elephant Corridor Of North Eastern India , They studied the following corridor:
Pakke - Doimara at TipPi, Pakke- Doimara at Dadzu-Lumia, Pakke - Papum at Longka Nullah, Pakke- Papum at Seijosa nullah, Durpong – Doimukh at Khundakuwa, Dulung - Subansiri, D'Ering – Mebo at Sigar Nullah, D'Ering – Dibru Saikhowa, Kotha - Burihiding, Upper Dihing East - Upper Dihing West Block At Bogapani, Upper Dihing East - Upper Dihing West Block between Golai-Pawai, Kalapahar - Daigrung, Kaziranga – Karbi Anglong at Panbari, Kaziranga – Karbi Anglong at Kanchanjuri, Kaziranga – Karbi Anglong at Haldibari, Kaziranga – East Karbi Anglong at Deosur, Kukurakata – Bagser at Amguri, Bornadi - Khalingduar and others.

METHODOLOGY

1. PRIMARY DATA: Primary data collected like visiting the study area 8 times in a month studying along the corridors in the day time. Using questionnaire to interview the local people inhabitating nearby and identifying corridor and its vegetation nearby with the help of forest guard and Taking photographs of corridors along with vegetation and Elephants using DSR camera cannon

2. SECONDARY DATA : Data collected from the college departments officials. People inhibited nearby, internet international journals, internet, etc.
Map: GPS Coordinates points of five corridors. Study area map of Assam- Kamrup dist. Garbhanga, Rani Reserved Forest.
Finally analysing Data y using MS word and MS excel with graphical representation.

STUDY AREA

India is a vast South Asian country with diverse terrain. The latitude and longitude of India are 20.59°37' N and 78.9629° E. Assam is one of the seven Northeastern states of India with an area of about 78,438 sq. km. Assam shares international borders with Bhutan and Bangladesh and the international borders of China and Myanmar are within 80 to 100 km. The latitude and longitude of Assam are 26.20°06' N and 92.9376° E.

Kamrup (M) district is an administrative district of the Indian state of Assam. The area of Kamrup (M) is about 1528 sq. kms. Guwahati is the largest city in the indian state of Assam and also the largest urban area in the Northeast india. the latitude and longitude of the Guwahati are 26º1445ºN and 91º7362º E. Deepor beel is a lake located to the south west of Guwahati city, in Kamrup district of Assam, India. To the south of Deepor beel there is Rani Garbhanga forest. there are five notified Elephant corridors across the forest to the Deepor beel.

Fig:1 Map of study area

Table: 1 The latitude and longitude of the study areas is given below

Sl . no	Name of corridor	GPS POINT	TEMPERATURE
01	Watch Tower point	N 26º06.752" & E 091º39.412"	24ºC
02	Banbandha	N 26º06.531" & E 091º38.524"	28ºC
03	Mikirpara	N 26º06.375" & E 091º37.761"	29ºC
04	Beltol	N 26º06.328" & E 091º37.975"	25ºC
05	274 railway gate	N 26º06.728" & E 091º39.564"	25ºC

*Temperature was recorded in the month of November,2018 which may vary according to the seasons.

RESULTS AND FINDINGS

Table-2: Corridor- Watch Tower point (2018-19)

Year of survey (2018-19)	August	September	October	November	December	January	February	March
Human population	0	0	0	0	0	0	0	0
Elephant population	47	36	46	13	27	26	33	18
Elephant ride frequency	28	30	30	30	28	24	32	32
Human injuries	0	0	0	0	0	0	0	0
Human death	0	0	0	0	0	0	0	0
Elephant death/ injuries	0	0	0	1	0	0	0	2
New settlement	0	0	0	0	0	0	0	0

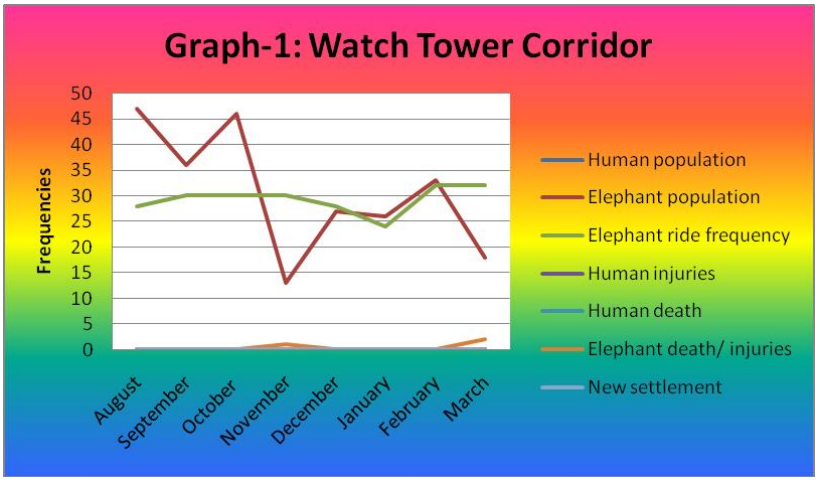


Table-3: Corridor- Banbandha (2018-19)

Year of survey (2018-19)	August	September	October	November	December	January	February	March
Human population	135	135	138	142	142	145	145	145
Elephant population	5	4	4	0	2	3	3	3
Elephant ride frequency	4	4	5	0	12	24	4	4
Human injuries	1	1	0	0	1	1	1	0
Human death	0	0	0	0	0	1	1	0
Elephant death/ injuries	0	0	0	0	1	0	0	0
New settlement	0	2	1	0	0	1	0	0

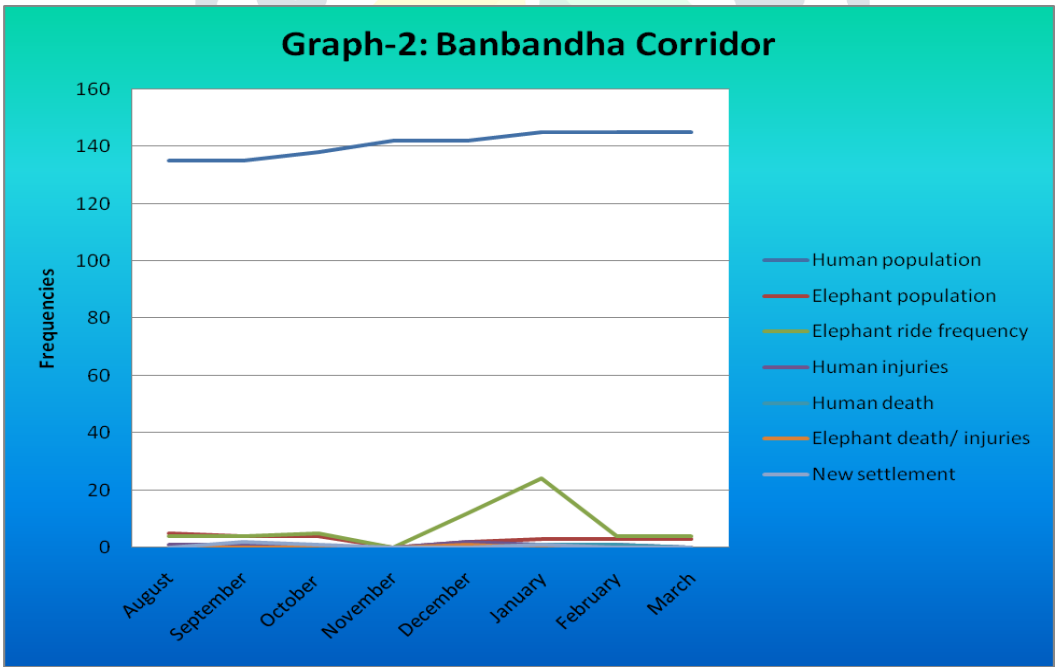


Table-4: Beltol Corridor (2018-19)

Year of survey (2018-19)	August	September	October	November	December	January	February	March
Human population	71	71	71	71	71	71	71	71
Elephant population	13	3	3	7	9	4	7	0
Elephant ride frequency	16	4	4	16	4	4	8	0
Human injuries	1	0	0	0	0	0	0	0
Human death	0	0	0	0	0	0	0	0
Elephant death/ injuries	0	0	0	2	0	0	0	0
New settlement	0	0	0	0	0	0	0	0

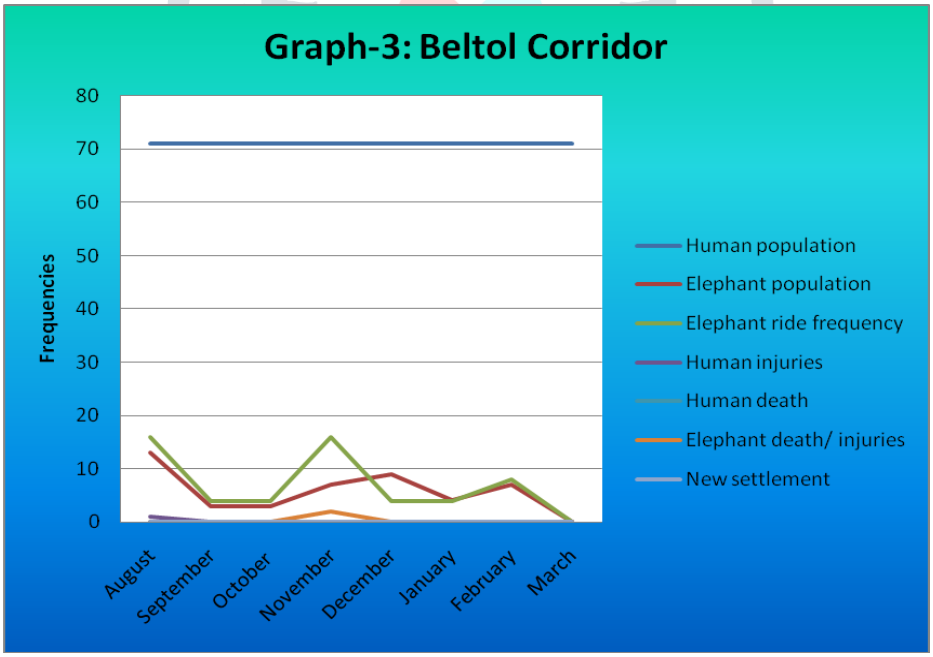


Table-5 Corridor- Mikirpara Corridor (2018-19)

Year of survey (2018-19)	August	September	October	November	December	January	February	March
Human population	35	35	35	35	37	37	37	37
Elephant population	13	30	0	0	3	3	5	5
Elephant ride frequency	15	4	0	0	4	4	16	6
Human injuries	0	1	0	0	1	0	0	0
Human death	0	0	0	0	0	0	0	0
Elephant death/ injuries	0	0	0	0	0	0	1	0
New settlement	0	0	0	0	1	0	0	0

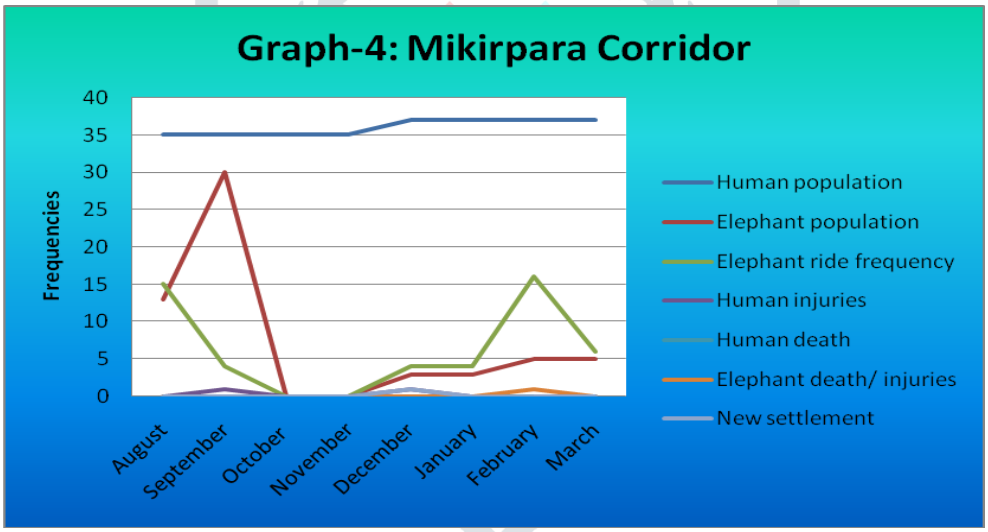
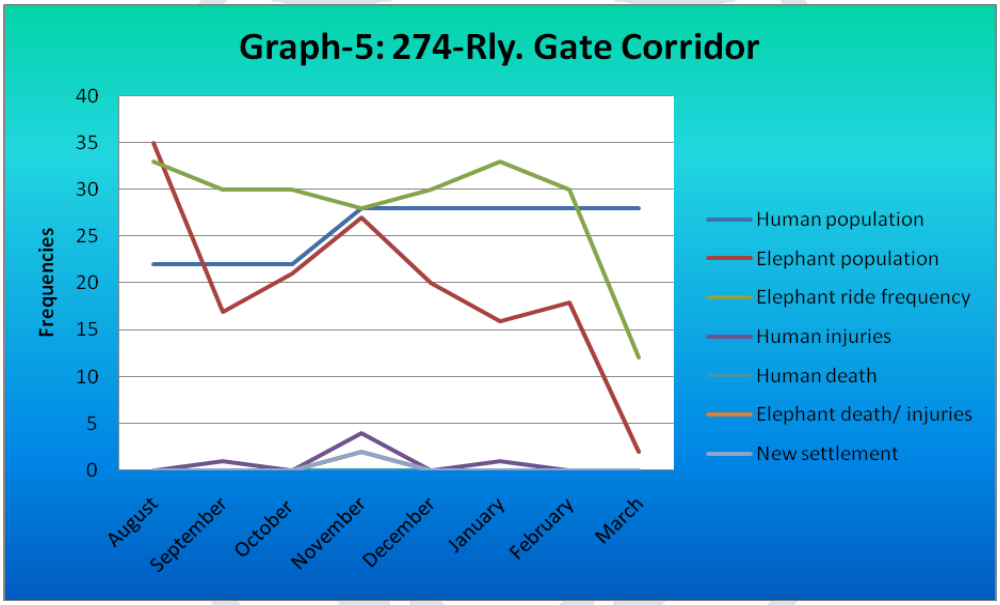


Table-6: Corridor- 274-Rly. Gate Corridor (2018-19)

Year of survey (2018-19)	August	September	October	November	December	January	February	March
Human population	22	22	22	28	28	28	28	28
Elephant population	35	17	21	27	20	16	18	2
Elephant ride frequency	33	30	30	28	30	33	30	12
Human injuries	0	1	0	4	0	1	0	0
Human death	0	0	0	0	0	0	0	0
Elephant death/ injuries	0	0	0	2	0	0	0	0
New settlement	0	0	0	2	0	0	0	0



DISCUSSION

Watch Tower point corridor

This corridor is situated near Deepor beel watch Tower point as the name of the corridor is given by the forest department. This corridor starts from the Rani forest in Meghalaya and Assam border and passes through the deep forest down to the Deepor beel in search of water. The railway track cut the corridor in the tail end along with a VIP road that connect national highway-37 to the LGB airport Guwahati. The forest habitat contains many wild trees. The Elephant came down the corridor in search of water and food. Some of names of the plant they consumes are foxnut, sal, country Fig, bamboo, water hyacinth etc. There is no human dwellings near by the corridor. The Elephant population is seen maximum in the month of August,2018 i.e 47 in number and minimum in the month of November,2018 i.e 13 in number. however the frequency of ride is seen maximum in the month of February and March,2019 (32 rides/month) and minimum in the the month of January,2019 (24 rides) . The forest department alloted the duty of the forest guard since 2013. Since then there is no major accident happened in terms of injury or death of the Elephants. However there are mild injury of 1 Elephants case reported in month of August 2018 and 2 Elephant injury in the month March 2019 by the vehicle (truck) passes by the road. And there is no new human settlements till date.

Banbandha corridor

This corridor is situated 1km from the watch Tower point of Deepor beel through the banbandha Village. This corridor starts from the Rani forest in Meghalaya and Assam border and passes through the deep forest down in search of food and water. The VIP road cut the corridor in the tail end. The forest habitat contains many wild trees. The Elephant came down the corridor in search

of water and food. Some of names of the plant they consumes are Consumes Paddy crops, sahysdrithron,mango, jackfruit, Elephant apple etc. The human population nearby the corridor is 135 in the month of August i.e in the beginning of the study which gradually increase over the time and in the month of March the population recorded 145. As compared to others this corridor has less number of Elephant population. The Elephant population is maximum in the month of August,2018 i.e 5 however there is no Elephant seen in the month of November,2018. However the frequency of ride is seen maximum in the month of January (24 rides/month) and no Elephant rides in the month of November. The forest department alloted the duty of the forest guard since 2013. Since then there is no major accident happened in terms of injury or death of the Elephants. However there are mild injury of 1 Elephants case reported in month of December 2018 due to human Elephant conflict. And there is new settlements seen in the month of September (2), October (1), January (1).

Beltol corridor

This corridor is situated 1.5 km from the watch Tower point of Deepor beel. This corridor starts from the Rani forest in Meghalaya and Assam border and passes through the deep forest down in search of food and water. The VIP road cut the corridor in the tail end. The forest habitat contains many wild trees. The Elephant came down the corridor in search of water and food. Some of names of the plant they consumes are Consumes Paddy crops, sahysdrithron,mango, jackfruit, Elephant apple , banana crops , bamboo etc. The human population nearby the corridor is 71 in the month of August i.e in the beginning of the study time and remains static through out the study period the Elephant population is maximum in the month of August,2018 i.e13 however there is no Elephant seen in the month ofdecember ,2018. However the frequency of ride is seen maximum in the month of August and November,2018 (16 rides/month) and no Elephant rides in the month of December. The forest department alloted the duty of the forest guard since 2013. Since then there is no major accident happened in terms of injury or death of the Elephants. However there are mild injury of 2 Elephants case reported in month of November 2018 by the vehicles.

Mikirpara Elephant corridor

This corridor is situated 500 m away from the watch Tower point of Deepor beel through the mikirpara Village. This corridor starts from the Rani forest in Meghalaya and Assam border and passes through the deep forest down in search of food and water. The VIP road cut the corridor in the tail end. The forest habitat contains many wild trees. The Elephant came down the corridor in search of water and food. Some of names of the plant they consumes are Consumes banana crops, bamboo, Paddy crops, sahysdrithron,mango, jackfruit, Elephant apple etc. The human population nearby the corridor is 35 in the month of August i.e in the beginning of the study which gradually increase over the time and in the month of March the population recorded37. The Elephant population is maximum in the month of September,2018 i.e30 however there is no Elephant seen in the month of October and November,2018. However the frequency of ride is seen maximum in the month of February (16 rides/month) and no Elephant rides in the month of October and November. The forest department alloted the duty of the forest guard since 2013. Since then there is no major accident happened in terms of injury or death of the Elephants. However there are mild injury of 1 Elephants case reported in month of February 2019by vehicles. And there is new settlements seen in the month of December (1).

274 railway gate corridor

This corridor is situated near Deepor beel 274 railway gate as the name of the corridor is given by the forest department. This corridor starts from the Rani forest in Meghalaya and Assam border and passes through the deep forest down to the Deepor beel in search of water. The railway track cut the corridor in the tail end along with a VIP road that connect national highway-37 to the LGB airport Guwahati. The forest habitat contains many wild trees. The Elephant came down the corridor in search of water and food. Some of names of the plant they consumes are foxnut, sal, country Fig, bamboo, water hyacinth etc. The human population nearby the corridor in the beginning of the study was 22 in the month of August 2018 which increases over time and in the end of study period it is recorded 28 in the month of March 2019. The Elephant population is seen maximum in the month of August2018 i.e35 in number and minimum in the month of March,2019 i.e 2 in number. however the frequency of ride is seen maximum in the month of August2018 andJanuary,2019 (33 rides/month) and minimum in the the month of March ,2019 (12 rides) . The forest department alloted the duty of the forest guard since 2013. Since then there is no major accident happened in terms of injury or death of the Elephants. However there are mild injury of 2 Elephant injury in the month November 2018 by the vehicle (truck) passes by the road. And there also 2 new human settlement in the month of November,2018.

Conclusion

The Elephant is a perpetual nomad. Being a very large and herbivorous animal it needs vast areas to roam: constantly browsing, foraging, moving from place to place in search of food and water with the changing seasons. Elephants in India are primarily threatened because of habitat loss, shrinkage and degradation. The growing infrastructural and agricultural needs of India's expanding human population have led to increasing encroachment within and around Elephant habitats, resulting in the fragmentation of wild habitats and a loss of the traditional movement paths of Elephants. This has forced Elephants to move through human-use areas, contributing to increased human-Elephant conflict, which often leads to loss of human and Elephant lives.

Conservation plan

1. The corridor is to be notified and legally protected by the state forest department under appropriate law.
2. Action should be taken to prevent encroachment and developmental activities affecting Elephant movement
3. The national green tribunal also requested the railway authorities to slowdown the speed of the train in the corridor area.
4. Vehicle speed should be regulated mainly between 6pm to 6am

5. The National Green Tribunal has directed the Railway authorities as well as the Ministry of Forest and Environment (MoEF & Climate Change) to construct a tunnel to lay the railway line on the stretch through the forest land falling under Deepor beel Bird Sanctuary, to facilitate free movement of wild Elephants in the area.

Elephant corridor is important because:

- It reduces man and animal conflict.
- It would ensure not restricted mobility of Elephants.
- It ensures safe mobility in times of emergencies like Forest Fires etc.
- They help in enhancing the gene pool diversity.
- It would be helpful in monitoring of Elephants, if they are sick or under any kind of stress.
- It would help in effective migration and then leading to increase of population through interbreeding.

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ANNEXURE-I

Questionnaire

1. Do Elephant come here often?
2. If yes how often do they come?
3. Do they come in group or solitary?
4. If in a group what is the number of Elephants?
5. Do they have specific route?
6. Why do they come?
7. What they do eat?
8. Do they harm human or any household?
9. Is there any conflict?
10. Is there any injury to the human or Elephant?
11. What do you think to minimize the conflict?
12. Is there new human settlement near by?
13. Where the Elephant coming from?