



Human-elephant Conflicts and the Preservation of Elephant Corridors in Digboi Forest Division Area

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Abstract. *The study is based on the elephant corridors of the Digboi Forest Division area located under Tinsukia district of Assam. The town is enriched with natural resources like oil and coal and in the process of setting up any developmental projects, the elephant corridors are affected. The main objectives of the paper are to highlight the human-elephant conflict under the Digboi Forest Division area and the role played by the forest department and the common people. The data were collected from primary and secondary sources. The primary data includes field visits and the secondary data includes governmental reports. The paper suggests that, to preserve the environment and the elephant corridors, the groups of people working for environment and wildlife should play a proactive role. The elephant corridors should be protected legally and there should be less interference of people in those areas.*

Key Terms: Elephant Corridor, Human-Animal Conflicts, Forests, Environment

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Introduction. The increasing competition toward advancing economies with infrastructural developments is putting the natural environment to threat and danger. The construction of developmental projects and human societies nearby the forest areas and the process of deforestation have largely impacted the natural habitat and their existence. One of the most sensitive issues that have taken place in almost each and every region of the world is the conflict between humans and wildlife.

Human-elephant conflict is a major concern in every elephant range country (Shaffer 2019). According to the World Wide Fund for Nature (WWF), “elephant-human conflict is a result of habitat loss and fragmentation.” The WWF states that in countries like Asia and Africa crop raiding is the main reason behind the human-elephant conflict. Due to crop raiding there is interaction between humans and elephants which leads to their killings and death in millions per year (WWF). Hence, a number of factors contribute toward disturbances in the survival and the existence of the elephants. It has been found that the Asian elephants are threatened by a combination of activities like logging, large scale forest conversion and conflict with humans (Ganie 2010). In such cases, the survival of elephants cannot be guaranteed by just strictly protected national parks and sanctuaries. The habitats of elephants that are outside the reserves, especially if there are corridors between two habitats, then their protection becomes much more crucial and important (Rangarajan et al. 2010).

Therefore, the present paper is an attempt to make a study over the conflicts and concerns related to the elephant corridors that fall within Digboi Forest Division area. Digboi is one of the oldest oil refineries where Asia’s first oil industry was discovered during the 19th century. The total geographic area of Digboi division is situated between 27°15’ to 27° 30’ North latitude and 95°18’ to 96° East longitude and “covers

1310 sq. km, where Reserved Forests and Proposed Reserved Forests cover an area of 545.9716 sq. km and 84.8415 sq. km respectively” (Ram and Sule 2021:5). According to a report on the human-elephant interface titled “Living with the Elephants”, prepared by the Assam Forest department of Digboi division (2021), there are three different elephant corridors in the concerned forest division. They are:

1. Soraijung - Borjan - Bogapani - Nazirating to Kokajan corridor,
2. Golai - Powai- Kamonpathar - Khatangpani to Tarani corridor, and
3. Buri Dehing to Kotha Reserve Forest.

Moreover, the Digboi Forest division area has about 200 populations of wild elephants. However, since the time of the British era to the present context, due to several activities within and around the forest areas (such as extraction of coal, oil, timber etc.) there has been continuous encroachment and conflicts between elephants and humans in the concerned area. Thus the paper will try to discuss the ongoing human elephant conflicts of Digboi Forest division followed by the role of the forest department and local people in controlling this major issue.

Human-elephant conflicts: review from the available literature

In 2000, WWF launched a new African Elephant Programme on elephant conservation focusing on “improving wildlife policies and legislation; conserving elephant habitat; reducing illegal killing of elephants and the illegal trade in elephant products; reducing human-elephant conflict; improving the livelihoods of people living alongside elephants; and increasing public support for elephant conservation” (Mayberry 2017).

So far as India is concerned, the country has also overcome several conflicts between humans and elephants. The Asian elephants also known as “*Elephas maximus*” which were originally distributed to Tigris and Euphrates in West Asia to SouthEast Asia (Olivier, 1978) are now confined to various parts of Asian countries including India. The Asian elephants are estimated to be around 45,826-53,306 (IUCN AsESG 2016). In India, there are “about 27,312 elephants (MoEFCC 2017), which is 55% of the world population.” However, with time, various factors like developmental projects, encroachment within and around elephant habitats and many other factors have threatened to cause loss, shrinkage, degradation of habitat and the loss of the elephants’ traditional movement paths (Menon et al. 2017). All these lead to habitat transformation in elephants and thus there arises conflict between humans and elephants (Sharma et al. 2020).

In the north-eastern part of India, the habitat of Asian elephants is distributed in the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. In relation to human-elephant conflicts, between 1980 and 2003, more than 1,150 humans and 370 elephants have died in the region of northeast India (Choudhury 2004). As per the elephant population estimated by direct block count method during March- May, 2017, the northeastern region comprised 10,139 elephants in 36,089 sq. km distribution area. Out of which, the state of Assam has 5719 elephant populations in a 14,050 sq. km elephant distribution area with 0.38 per sq. km elephant density (MoEFCC 2017). The state of Assam, being the transition zone between the Indian, Indo-Malayan and Indo-Chinese bio geographical sub-regions, is largely divided into two valleys namely the Brahmaputra in the north and the Barak in the south. Within India, Assam is a key conservation region for Asian elephants (Nath 2013). The state is regarded as one of the strongholds of Asian elephant conservation and a major stakeholder of the state elephant project with almost five elephant reserves (Sharma et al. 2020). Within Assam, the Tinsukia district is one of the important hubs for elephant distribution. From Tinsukia, the elephants often enter through the Changlang district of Arunachal Pradesh to Myanmar. But slowly and gradually, the elephant corridors are disrupted by various developmental activities like construction of industries, human societies and railways.

However, before going to in-depth studies, it is necessary to understand the meaning of a wildlife corridor. A corridor is usually defined as a passageway or gallery through which the habitats are being connected (Venkataraman et al. 2017:24). According to Omondi (2018), “A wildlife corridor is an area of habitat that provides passage for wildlife across artificial obstacles such as dams, roads, and railways”. The wildlife corridors normally facilitate migration of the animals and their interbreeding. These corridors are also known as green corridors, eco-ducts and eco-passages encroaching through human populations leading to interactions and conflicts between humans and wildlife (Borneman 2021).

Although various studies were made on areas related to elephant protection and human-elephant conflicts, but none of the literatures were found that particularly focuses on the human-elephant interface of Digboi Forest Division area. Considering these facts, the proposed research work tried to explore the ongoing status of the human elephant conflict and the role played by the forest department of Digboi Division. Moreover, since various conflicts take place within and around the human societies, a study was also made on the concern of people regarding the steps taken by them in reducing the issue. The paper also includes certain recommendations related to the conflicts between wildlife and humans in order to attain a sustainable development of the environment for upcoming generations.

Objectives. The objective of the paper is mainly to highlight the human-elephant conflict under the Digboi Forest Division area. The paper attempts to find out the role played by the forest department in preserving and protecting the elephant corridors. The study also focuses on the concern of local people particularly those belonging to forest villages in reducing their ongoing conflicts with the elephants.

Material and method. The present paper was done with the help of data collected from primary and secondary sources. The paper is an exploratory research work, where data and facts were collected from field visits. The primary data were collected from the people living in the forest villages and also from the foresters of the Digboi Forest department. The secondary data was collected from various governmental reports, newspaper reports, books, journals, etc., available on preservation and protection of the wildlife and environment. The paper also included some of the facts collected from interviews and interactions with people and organisations associated with the concerned research area.

Data Analysis: As per interactions with the forest department and the local people, it has been found that there are a total of seven ranges under Digboi forest division. They are:

- **Digboi Range:** Two major elephant corridors fall under this range- the Bogapani and the Golai corridor.
- **Lakhipathar Range:** The Soraipung Bogapani corridor of Digboi Forest Division is connected with this range.
- **Soraipung Range:** This range is a part of Dehing Patkai National Park. There are high numbers of elephants in this range, but conflicts are rare.
- **Jagun Range:** The Kotha-Buriding corridor of Digboi forest Division falls under this range.
- **Lekhapani Range:** Elephant population is rare in this range.
- **Margherita West Range:** This range is also a part of Dehing Patkai National Park and is connected to the Golai elephant corridor of Digboi Forest Division.
- **Margherita East Range:** There is elephant existence near the Powai Tea Estate and villages that fall under this range.

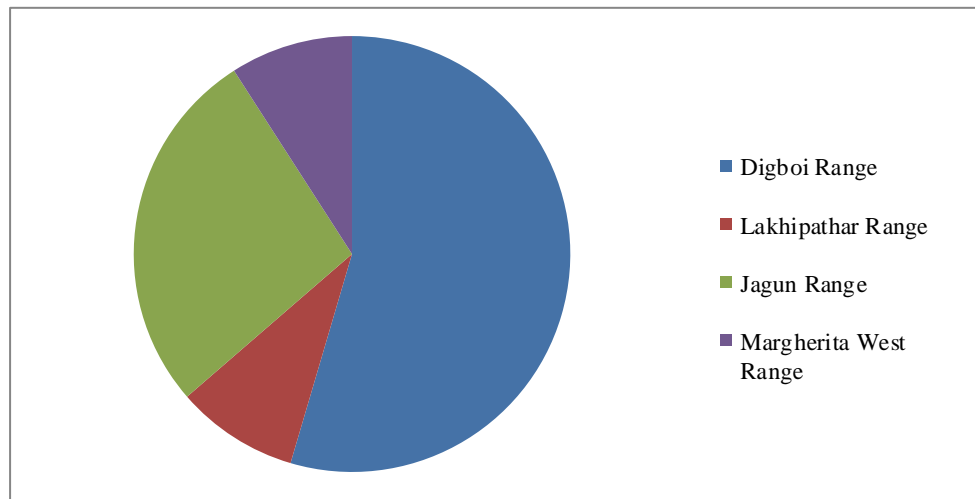


Figure 1: Elephant deaths in Digboi Forest Division, Assam, covering from 2016-2021.
Source: Data collected from Digboi Forest Division department.

From the above (figure 1), it can be analysed that from 2016-2021, Digboi range has witnessed the maximum number of elephant interfaces then the other ranges. Over the five years, there was death of almost six elephants in this range. The most probable reason is that a large area of Digboi range is surrounded by the oil fields of Indian Oil Corporation Limited (IOCL), the railway tracks and human settlements. Due to the blockage of the Golai corridor, the elephants recently entered into the Muliabari (a township area in Digboi) and IOCL Hospital areas. Moreover, the elephants also began to roam in the roads of Digboi town especially at night for which human elephant interface is recorded on a continuous basis.

The Lakhpathar range, which is connected to three villages- Lakhpathar village, Nagajan and Dhulijan, are less prone to elephant interface. Since the villagers are aware of the elephant tolerance, so, there is minimum death of elephants and humans. Although the range is a part of the Bogapani-Soraipung elephant corridor with large-scale elephant movement, over the four years death of only one elephant and human has been recorded in the range. Whereas, the Soraipung range which is a part of the Dihing Patkai National Park falls under a protected area for which elephant death is rare in this range. Although the forest villages like Gelapung, Kothalguri and Soraipung witness elephant movements, the conflicts are minimal in this area.

The Jagun range covers the Kotha-Buridihing corridor. There are a maximum number of elephant movements in this area. As per a report by Digboi Forest Division (2021), the reserve forests of Tinkopani and Kotha have a good number of elephant populations and the surrounding villages of Ahom pathar, Abor gaon and other villages see a regular elephant presence. From 2017-2021, the range has witnessed three elephant deaths and four human deaths around the Kotha Reserve Forest. Whereas, so far as the Lekhapani range is concerned, due to the presence of hills and rivers, there is less movement of elephants in this range. As a result of which none of the elephant deaths were recorded within this range.

The Margherita West range and East range have witnessed several issues of human-elephant conflict. The West range is a part of Dehing Patkai National Park for which it falls under a protected area. However, due to its connected villages such as Kurruka, Bhitwar-Powai and Makum killa, there is elephant interface in this area. Due to incidences of wildlife poaching and illicit felling in these villages, there are records of one elephant death and two human deaths within this range. The Margherita East range is connected to the Powai tea estate and Agbondha, Powai villages. From 2017-2021, although there is human elephant interface, none of the elephant deaths were recorded. However, three human deaths were caused by elephants during this time period.

Furthermore, the table 1 below is an illustration of human deaths caused by elephants in the three elephant corridors of Digboi Forest Division area of Assam Forest Department. The data covers from the year 2013-2021. It has been found that from 2013 to the present day a total of thirty seven human deaths were recorded within this forest division area. Out of this, the year 2018 has witnessed the maximum number (death of six people) of human deaths followed by the year 2017 and 2020 (death of five people in each year). In the present year of 2021 till June, the Digboi Forest Division has witnessed three human deaths- two from Jagun range (below 60 years) and one from Kothalguri village of Soraipung range.

The data (Table 1) also illustrates that most of the human deaths caused by elephants are below the age of sixty years, except for the year 2018 where four persons are above sixty years of age. It can be said that since most of the villages are located near the elephant corridors, so for various purposes like to get firewood, food (mushrooms, jackfruit, fiddlehead fern etc.) and for fishing purposes., the villagers enters to the forests and as such they interface with the elephants which results in human deaths.

Table 1: Human deaths in Digboi Forest Division, Assam, covering from 2013-2021.

SL. No.	Year	Number of human deaths	Age	
			Below 60 years	Above 60 years
1.	2013	2	1	1
2.	2014	5	3	2
3.	2015	4	3	1
4.	2016	3	3	0
5.	2017	5	3	2
6.	2018	6	2	4
7.	2019	4	3	1
8.	2020	5	3	2
9.	2021	3	2	1
Total		37	23	14

Source: Data collected from field surveys and Digboi Forest Division department.

Discussion

The study was undertaken to explore the new areas related to the conservation and preservation of the environment and the wildlife in Digboi division. The research work mainly focused on two factors- the ongoing human-elephant conflicts and the role played by the Digboi Forest Division and the local people. The Digboi Forest Division is the prime habitat for elephants and other species. There is movement of elephants in the area from a longer period of time. As such, due to various factors there is elephant fragmentation in the area. From various discussions and studies it has been recorded that there are numerous factors which contribute toward man-elephant conflicts in the region which are as follows -

Settlement and encroachment around the corridors: Digboi is an area which is famous for its abundant natural resources like oil and coal. Ever since the time of construction of the oil and coal industries, there has been a growing migration of people to this land for purposes like employment opportunities and others. As such there is an increasing population in the area for which the forest land is being encroached as a way of converting it into a human settlement area. Due to this, the habitat of elephants is being disturbed for which the conflict between human and elephant arises in the corridor areas. Moreover, the construction of roads and railways that passes through the elephant corridors also hindered the free movement of the elephants. As per a report on “Right of Passage”, by Tiwari et al. (2017), the National Highway 38 and the railway line passing through the elephant corridor of Golai-Powai pose a severe threat and have almost blocked the elephant movement in the area.



Figure 2: Map locating Assam within India.

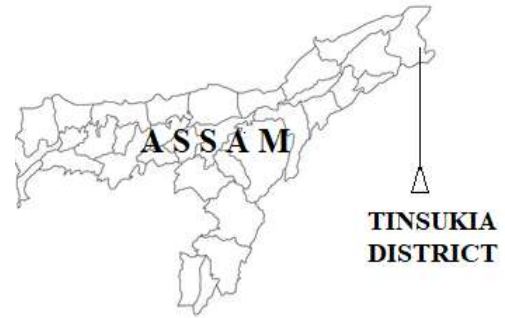


Figure 3: Map locating Tinsukia District



Figure 4: Map locating Digboi town. Source for Figure 2,3and 4: Google maps



Figure 5: Map representing the three elephant corridors of Digboi Forest Division area.
 Source: Digboi Forest Division, Assam Forest Department.

Developmental Projects & habitat destruction: The developmental projects such as construction of terminals and railway tracks alongside the elephant corridors are also another important cause for the destruction and fragmentation of elephants. In many cases, that the railway tracks are major reason for elephant deaths in the Digboi forest division. It also poses hindrances in the free movement of elephants. For example, from 2001 to 2015, due to railway tracks, there was death of almost eight elephants in the bogapani elephant corridor.

Tea garden and agricultural practices: There are numbers of tea gardens and agricultural practices that takes place within and around the elephant corridors and forest reserves of Digboi division. Most often the agricultural land and cropping are located near the elephant corridor areas. As per the reports by forest department of Digboi division there was large-scale crop loss on an annual basis in the area from forest villages of Panbari, Soraipung, Dhekiajan and others. During the season of cropping elephants move to the agricultural lands which leads to conflicts and deaths of humans and elephants. Moreover, lots of erstwhile forest areas were converted to tea gardens thereby reducing the area under elephant habitat. The tea gardens in the Bogapani corridor are another reason for frequent elephant deaths due to the high voltage terminal that is located inside it.

Therefore, the above mentioned are the major reasons which is largely responsible for the interface between human and elephants in the Digboi Forest Division area.

Digboi is a land where there is co-existence of both humans and elephants. It is recorded that the animals in the Digboi area often roam in and around the national highways and human settlement areas for which there is killing or injuries of both the wildlife and humans. The major reason for the occurrence of such a situation is occupying of forest land to meet the needs of modern day human civilisation, for which there is fragmentation of the wildlife habitat. In relation to the conflicts between humans and elephants in the three

corridors of Digboi Forest Division, it has been found that the forest villagers and the forest department have taken several steps to control elephant interface in their respective areas.

The elephants usually roam or move through the corridors during night times. For this, the people belonging to the forest villages are unaware of elephant interface and as such there is sudden conflicts between humans and elephants which results in death and severe injuries. However, the through field surveys it has been found that the people have begun to adopt certain indigenous methods. For example, the villagers of the Ahom pathar village of Jagun range near the Kotha Reserve Forest have invented an indigenous method of tying metal cans (such as the used soft drink cans) along the wired fences. The villagers said that when the elephants try to tamper with the fencing, the cans produces sound which serves as an early warning of elephant arrival in their locality.

Moreover, the formation of Anti-Depredation Squads by local people also helped in reducing the human elephant conflicts in the forest reserve of the Digboi division. The ADS are responsible for monitoring the elephant movement, giving early warning and controlling the mob and traffic in the corridor areas. They also perform the duty of guiding the elephants and in keeping them away from villages. The surveys suggested that ADS with the help of the forest department have been performing certain major roles during the time of elephant interface in the region such as mob control and facilitating the granting of compensation.

So far as the forest department is concerned, the Digboi Forest Division is vested with huge responsibility to maintain a peaceful co-existence between the humans and wildlife of the region. As per the directions of the state government the strategies that were undertaken by the Digboi Forest Division are –

1. Allotment of training to the forest staff on anti-depredation, rapid response in cases where elephants enter the fields or villages, guiding traffic on important road crossings, spreading awareness among the public.
2. Digging of elephant-proof trenches (figure 5) in the boundary of residential or paddy field areas. The trenches are dug in such a way that the elephants can enter and exit from only one way without getting any hurt or injury. For example earlier in the Lekhapani nursery (adjacent to Kotha Reserve Forest) elephants used to enter on a regular basis and cause huge damages, however since the digging of trenches none of the records of elephants entering into the nursery was found.

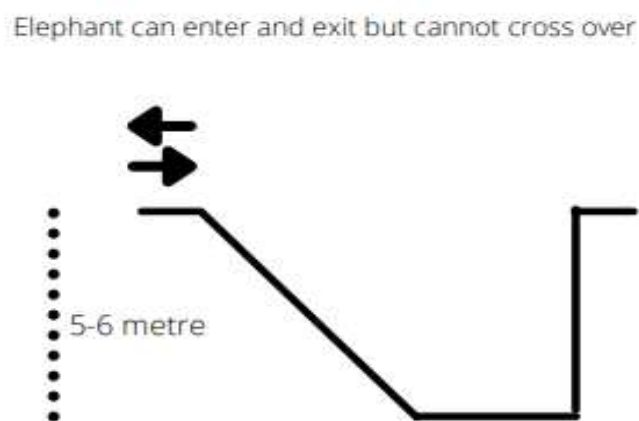


Figure 6: Elephant proof trenches. Source: Digboi Forest Division

3. Putting up sign boards indicating the elephant corridor areas. Since the passersby are unaware of the elephant corridors in such cases, the signboards (containing the speed limits) in all the three corridors act as an alert to them, especially in the national highways.

4. Cooperation with the Anti-Depredation Squad (ADS) by providing them with required logistic support such as first aid kits, torches, firecrackers, rewards, etc. Since it is not possible on the part of the foresters to be present immediately in all places, ADS formed by the local people of forest villages turned out to be successful so far in controlling the elephant interface.

Moreover, the awareness shared by the environmentalists, the reporters and the groups associated with wildlife and environment, are playing an influential role in the preservation of the wildlife and the environment as a whole. However, it will take a long time to create awareness about preservation of the elephant corridors in the region. It is because the ongoing projects and terminals in and around the corridor areas are giving rise to some new issues such as fragmentation in the elephant paths for which they migrate through the Digboi town areas and is posing a serious issue of elephant-human conflicts in the region.

Suggestions

One of the most necessary steps to be taken is the legal protection elephant corridors. The state forest department should enforce law for the protection of the corridors and deploy forest guards in the elephant corridors particularly during seasonal crop raiding. Secondly, to mitigate human-elephant interface there should be proper demarcation of corridor boundaries. Also, construction of industries and human settlement areas should be made far kilometers away from forest reserves and corridors. Moreover, the involvement of corporate from Indian Oil Corporation Limited, Coal India Limited, etc. in taking measures like hanging solar fences around the residential areas can help in preventing elephants from entering into the human settlement areas without hurting the wildlife. Besides this, raising awareness, plantation of vegetation inside the forest and use of modern techniques like watch towers, radio collaring, etc. if adopted can help in the prevention and protection of human-elephant conflicts.

Conclusion

Digboi Forest Division is covered with natural resources, reserve forests and most importantly the Dihing Patkai National Park is connected to this forest division. The region is rich in availability of various kinds of habitats and is one of the richest rainforests of Assam. With time, the region is exploring itself with different kinds of natural resources, plantations and habitats. Due to the availability of natural resources like coal and oil, the industrial demand for this region is increasing as it helps in contributing toward economic development of the state. As such it becomes a difficult task on the part of the state to maintain a balance between its industrial sector and the environment. However, despite the conflicts and issues, the division has tried their best to preserve its natural habitats. The various discussions with the forest department, the common people and the environmentalists are also playing a proactive role in exploring possible solutions for the sustainable development of the environment and wildlife.

Since, the Asiatic elephants are the pride of the Digboi Forest Division and for the Digboi town as well, therefore, if proper measures were followed then the region can serve as a bio-diverse ecosystem in the near future. For this proper monitoring and co-ordination among the forest department, industrial corporate and the common people are much necessary in maintaining the ecological balance of the region. In this way the wildlife, environment and the natural resources can be restored in a sustainable manner for the upcoming generations

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