Man-Elephant Conflict Limits the Livelihood Opportunities in Forest Fringe Villages of Chandra Forest Range of Midnapore Forest Division

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ABSTRACT

Forests play a vital role in sustaining all living beings on the earth surface. Quality and quantity of forest has been deteriorated day by day due to land use land cover change, forest fragmentation, species conversion etc. Natural habitat destruction may cause human-elephant conflict at the forest fringe areas. The present study focuses on the livelihood opportunities and constraints faced by the elephant attacked villagers of Dumurkata village which is located on the track of elephant movement at Chandra Forest Range of Medinipur Forest Division. Primary data have been collected from different sample households using semi-structured interview schedule. Livelihood pattern of the households have been examined by livelihood asset pentagon analysis. Elephant movement records have been collected from Medinipur Divisional Forest Office and Chandra Forest Range Office. Psychological state of the villagers has been accessed by 5-point Likert scale. Due to the nearness of forest, people of this region are mostly dependent on forest resources especially non-timber forest products (NTFPs) and in doing so they must face the elephants resulting in human death, human injury, crop damage, hut damage etc. The psychological condition of the villagers shows that they are frightened at the time of elephant attack because the effects of man-elephant conflict is the known fact to them and the problem is rising day by day. There is no particular season when the elephant movement is more. Problem is now randomly distributed throughout the year. Reports from different official sources shows that elephant movement is the year long issue. Easy availability of food and water source in the locality changes the food habit of the elephants and most of the time of year they become the residential elephant for this forest division. Due to rural poverty and accessibility of forest resources force villagers to enter into the nearby forest and the risk of elephant attack increases. So, living at the forest fringe region has become a life-threatening concern to the villagers and it will be the high risk for sustaining forest-based livelihood.

Introduction:

Forests have great ecological as well as economic importance including fresh air, medicinal plants, food, non-timber forest products such as honey, fuel wood, mushrooms, eggs of kurkut, mahua fruit etc. and other materials for industries also. Forests are also important for the prevention of soil erosion, provides habitat for animals and mitigate climate change. Human beings are dependent largely on forest as it provides livelihoods to the forest fringe people. Recently these people face the problem of man-elephant conflict at the forest fringe areas resulting in different problems i.e. hut damage, crop damage, human injury and human death due to elephant attack.

The Asian elephant (Elephas maximus) is now in a vulnerable condition due to great extent of habitat fragmentation, habitat loss, land use land cover conversion in different regions of India. Nearly 60% of Asian elephants reside in India and two-third of the them live at the close proximity to forest area where the human settlements continue to exist (Sugumar and Jayaparvathy, 2014). India is a developing country and increase of population is the major issue that force to convert natural forest land into different commercial land uses such as agriculture, industry etc. Due to the expansion of human settlements and encroachment into natural forest land and their conversion compel wild elephants and other animals to come out from the forest and these problems make them move towards human settlements for easy access to food and water source and thus,the severe man-elephant conflict arises. (Sugumar and Jayaparvathy, 2013). The south-western part of West Bengal (part of Jungle Mahal) has been affected by the intrusion of wild elephants.

Around 1995 the undivided Midnapore district and Bankura district of West Bengal suffered by the problem related to elephant migration. Before 1980s the migration and intrusion of wild elephant herds in the said districts was unspecified. Some of the cases was reported at Kankrajhore Forest region in Bengal-Jharkhand border but the elephants never crossed the Kangsabati River. In the month of September, 1987, a small wild elephant herd coming from Dalma, Jharkhand travelled into South West Bengal through Kankrajhore forest region to Jhargram Forest Division and crossed Kangsabati river near Lalgarh Forest Range and entered into East Midnapore Forest Division and in December,1987 they went back. It was very interesting that next year in September, 1988 several elephant herds consisting of around 40 elephants followed the same path and entered East Midnapore Forest Division and travelled upto Hoomgarh and Garbeta forest ranges to the other side of the Kangsabati river and after that they got divided into several smaller groups and took shelter in the forest patches of Goaltore,

Hoomgarh, Garbeta forest ranges of East Midnapore Forest Division. November month is the maturing season of paddy in the agricultural fields and the wild elephant herds raid this crop field in night time causing huge damage. These elephant herds reside in the nearby forest and took rest in day time. After the end of paddy season, in December they left this forest division and went back to Dalma. It is seen in the observation that every year wild elephant herds visit West Bengal and stayed up to February for easy access of food like potatoes. This new habit of the elephant enhanced man-elephant conflict in the forest fringe areas. (Raha, 2021).

Presently Midnapore Forest Division has nine forest ranges and Chandra Forest Range is one of them. This forest range is situated at the route of elephant movement and the villages which are located along this elephant movement route face the effects of man-elephant conflict. The life and livelihood of the forest fringe dwellers are dependent on the collection of non-timber forest products and agricultural practices. Elephant attack on the villagers is increasing day by day. To assess this problem, a village level study has been made based on following objectives:

1. To study the livelihood strategy followed by the villagers in elephant attack prone region.

2. To understand the impact of elephant attack on the villagers.

Materials and Methods:

1.1. Study Area:

Medinipur forest division includes nine forest ranges. Chandra Forest Range is one of them where the elephant movement through out the year is high. It has three forest beats i.e. Gurguripal Beat, Chandra Beat and Dherua Beat. Dumurkata Village (87°10'43.404" to 87°11'22.516" E and 22°29'4.845" N to 22°28'14.897" N) is located in Chandra Beat which locates on the track of elephant movement (Fig No.1). Chandra Forest Range is dominated by sal forest species. Kurmi and Santhal tribes live here and the life of these communities are very difficult due to economic backwardness and less opportunity to access forest resources due to elephant attack.
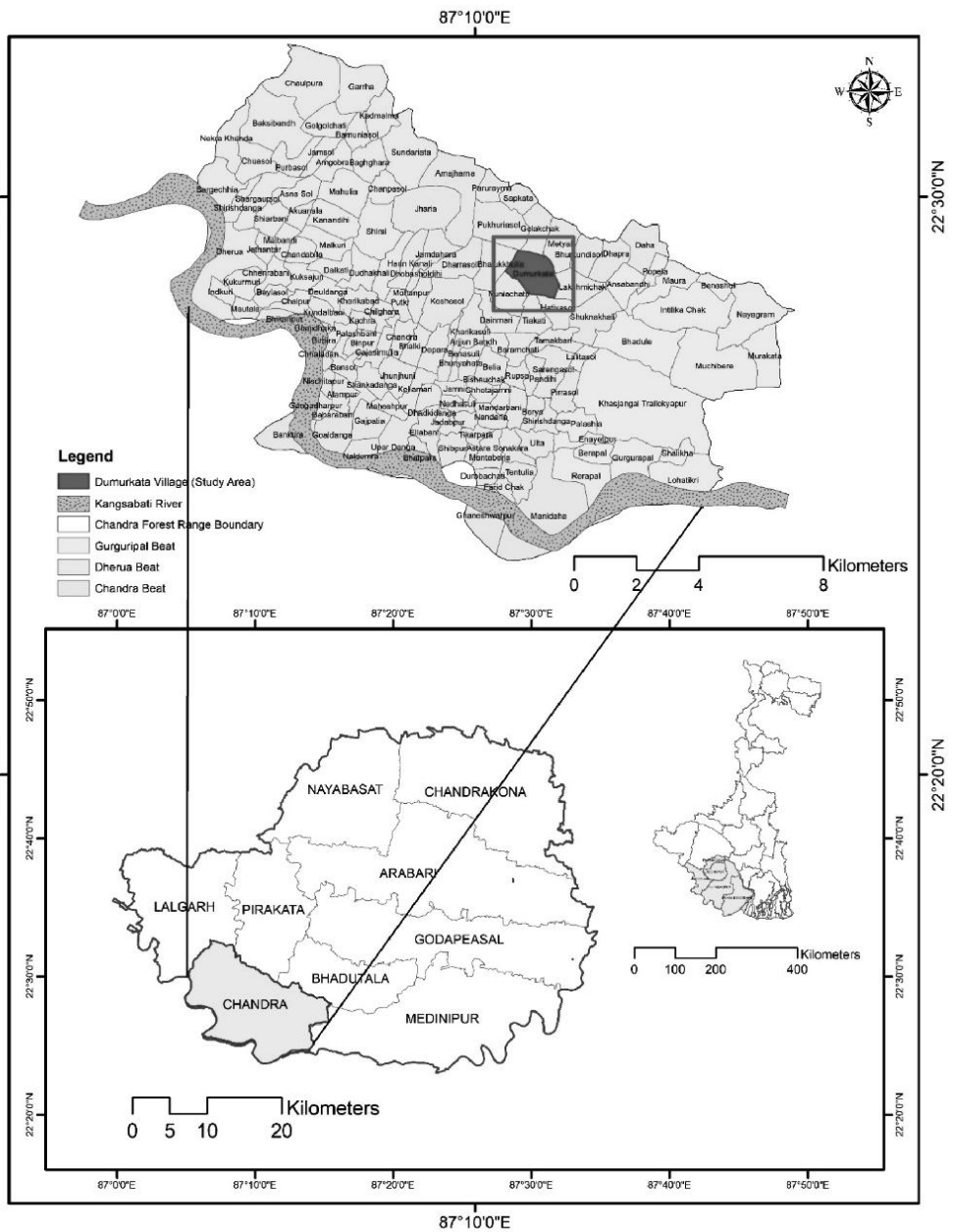
Fig No. 1 : Location of the Study Area

1.2. Data Source:

Door to door household survey has been conducted in the study area to know the livelihood pattern of Dumurkata village. About 42 households have been surveyed. The region is dominated by Kurmi

Community and Santhal tribe. The livelihood analysis of the villagers was based on the verbal interaction with semi-structured interview schedule. Analysis of rural livelihood indicates the degree to which the structure or pattern of rural life is distinguishable from one socio-cultural class to another socio-cultural class. It may be analyzed through the description and understanding of size of the family, rural house type, technology adoption pattern by the villagers, size of land holdings, use of land holdings, monthly and annual income, sources of income, expenditure pattern, food habits, social relations, livestock they have, migration pattern for occupation or other purposes of the households, crisis management strategy etc. The regions having high concentration of tribal people are located at the forest core area and non-tribal people are inhabited at the region having less forest concentration. This reveals that the forest people are symbiotic to their forest environment and their livelihood is dependent on forest and the non-tribal communities have less dependency on forest product (Bhattacharjee and Siddique, 2016). It has been observed in India that with large assemblage of forest, the concentration of tribal people is high. Dependency on forest products is more in people of forest fringe region. The forest plays vital role in sculpturing the social and cultural life of forest inhabitants and fulfil their basic needs

by proving them fuelwood, medicinal plants, fodder and leaves that are significant for economic benefit and survival of their livestock. Household data are important for analyzing livelihood pattern which gives clear scenario of their forest-based survival technology.

People living in the close proximity of forest are dependent on forest resources because livelihood or way of life of villagers has been directly or indirectly related to forest (Dutta et al,2018; Angelsen and Wunder 2003; Yemiru et al. 2010). More than 1.6 billion people in a global scale depend on forest for sustaining their livelihood practices but different studies suggest that more or less 1.2 to 1.4 billion human beings depend on forest for their livelihood (Dutta et al,2018; Chao 2012; FAO 2014). So, livelihood involves the capabilities, material and social resources as assets and some activities that are important requirements for the means of living which these people collect or practice in direct and indirect association with forest (https://www.fao.org/4/a0273e/a0273e04.htm). There are five types of capitals, known as "Livelihood Asset Pentagon" includes human capital, social capital, natural capital, financial capital and physical capital (Dutta et al, 2018; Carney 2002; DFID 1999; Scoones 1998). Nearness of forest provides natural capital to the villagers on which livelihood of the people depends. Forest as natural capital provides

food, source of energy, construction materials, medicinal herbs, fodder etc. (Dutta et al, 2018; Warner 2000; Adedayo et al. 2010; Tumusiime et al. 2011). Thus, it can be said that forest acts like a sieving instrument which can able to filter the huge, unpredictable events and disturbances and provides income generations in such a way that can eliminate rural poverty (Dutta et al,2018; Fisher 2002; Cavendish 2003; Sunderlin et al. 2003; Kamanga et al. 2009; Angelsen et al. 2011).

The elephant movement records have been collected from Chandra Forest Range Office, Divisional Forest Office, Medinipur Division and from villagers' response.

As the study area is situated at the elephant movement trackway, the elephant attack scenario is very common phenomenon here. The data on psychological condition of the villagers during and after elephant attack have been collected by semi-structured interview schedule with 5-point Likert scale. 5-point Likert scale is used to assess attitudes and views of villagers on elephant migration and elephant attack. In this scale 5 answers or opinions are placed as "insignificant", "fairly significant", "moderately significant", "highly significant", "extremely significant" for analysing anxiety and mental trauma faced by the village people and another 5-point scale has been used to assess the qualitative status of human movement outside of their houses, sending

their children to school, going to forest for non-timber forest product (NTFPs) collection etc during elephant attack. The scale is "No Fear", "Slightly Scared", "Moderately Scared", "Highly Scared" and "Extremely Scared".

Results and Discussion:

1.3. Livelihood strategies of the villagers of study area:

1.3.1. Human Capital:

Table no.1 Gender wise educational status		
Educational Status	**Percentage of Male**	**Percentage of Female**
Non-literate	13.99	20.21
Can Sign Only	4.67	2.08
Class 5th	7.78	5.19
Class 8th	8.81	9.33
Class 10th	5.7	4.15
Class 12th	6.22	3.63
Graduate	4.15	2.08
Post graduate	1.04	1.04
Total Responses	52.36	47.71

Source: Field Survey: 2023

It includes knowledge or educational status, occupation type and hospital facility available in the village Dumurkata. In the study region among 42 households 52% villagers are male and 48% are female. Among them 14% male population is illiterate where as 20.21% female are illiterate. Among the literate persons nearly 5% male population have higher education whereas only 3.12% females have higher education. In higher

secondary level and secondary level, the scenario is quite same. So, educational status shows that male people are more educated than females (Table no:1).

Study on occupational pattern reveals that people engaged in farming is about 30% and collection of sal leaves is 23%. So, people have engaged in both farming practices and sal leaves collection. The rest of 47% are engaged in other occupation like daily labour, job in private company, teachership, pathologist, puffed rice making etc. (Table:2). Verbal interaction with the villagers reveals that as the Dumurkata village is highly affected by elephant attack and so the forest-based livelihood might be shifted to other occupational activities and extreme backwardness and poverty force people to shift from forest-based livelihood to other means of income generation.

In the study village no such hospital facility is available. In Depara, near to Dherua-Midnapore main road one "Sastha Kendra" is available for the treatment of villagers. During the primary data collection villagers told that as the region is wild elephant attack prone region it is very difficult to reach the medical centers for treatment particularly in night time.

Table no.2 Major occupation type	
Major occupational type	**Percentage of person involved**
Farming	30
Collection of Sal Leaf	23
Daily labour	30
Barber	3
Private Company	1
Cook at school	1
NVF (National Volunteer Force)	1
Mason	4
Primary Teacher	1
Tuition Master	1
Delivery Boy	1
Pathologist	1
Puffed Rice Making	1
Car Driver	2
Total Responses	100

Source: Field Survey: 2023

1.3.2. Natural Capital:

Natural resources such as nearness of forest, availability of land for agriculture and other purposes, availability of water for agriculture, agricultural inputs, livestock available in Dumurkata village are examined by primary survey.

72% of the villagers have total landholdings less than 30 katha and only 8% villagers have total landholdings more than 120 katha. Total landholdings include land uses for agriculture and housing purposes (Table No.3).

Table No. 3: Amount of total landholdings	
Amount of total land holdings (katha)	**Percentage of Households**
0-30	72
30-60	10
60-90	5
90-120	3
More than 120	8
Total	100

Source: Field Survey, 2023

Villagers who are engaged in agricultural practices, mostly perform their agricultural activity in rainy season and paddy is the major crop that is cultivated here. Most of the villagers use chemical fertilizer (28%) and chemical insecticides (16%) in their agricultural field. 21% villagers use organic manures to cultivate crops. 25% people use modern technology such as tractor and 12% uses traditional equipment for cultivation (Table No. 4). Availability of agricultural land is less. More than 55% area is forest covered with sal. Crop damage by elephants' attack is common here. People try to produce more crop by using chemical fertilizer because with the use of organic manure the production would be less. To compensate the crop damage during elephant attack, they try to maximise their crop production by using maximum chemical fertilizer.

Livestock details shows that 35% of respondent villagers have hen, 22% have goat and 34% have cow. Among other livestock animals are 6% of them have duck and 2%

Table No. 4 Amount of Agricultural Input	
Agricultural Inputs	**Percentage of Responses**
Chemical fertilizer	28
Chemical insecticide	16
Organic manures	21
Tractor	25
Traditional equipment	12
Total Responses	100

Source: Field Survey: 2023

have buffalo. Due to nearness of forest animal fodders are available throughout the year (Table No.5).

Table No. 5: Livestock Details	
Animals	**Percentage of Responses**
Hen	35
Goat	22
Cow	34
Duck	6
Buffalo	2
Sheep	1
Cock	2
Pig	1
Total Responses	100

Source: Field Survey: 2023

1.3.3. Financial Capital:

Financial capital includes economic status, annual income and savings type of the villagers.

97% of people of this village are from

BPL category and only 3% are in APL category. 60% of people have yearly income less than Rs.15000 which is less than national rural poverty level of India. Only 10% of the villagers save money in banks and other organizations but 90% people don't avail savings because they live in below poverty line category.

1.3.4. Social Capital:

Social capital includes social resources that can facilitate good social relations among the villagers; such as participation in Forest Protection Committee (FPC), number of FPC meetings in a year and existence of other organizations in the village.

25 persons out of 193 villagers are engaged in FPC committee for plantation programme, working in hullah team etc.(Household Survey,2023).

As per primary survey the respondents reveal that FPC meetings have been conducted in this region at least five times in a year but due to the frequent elephant attack, frequent FPC meeting is required for elephant management.

In the study village there are self-help groups and club members who participate to resolve any problems in their surroundings.

1.3.5. Physical Capital:

Physical capital refers to the basic infrastructure or facilities that the villagers need to make their living style better, such as sources of drinking water, house type,

availability of vehicles in the house, sanitation condition and sources of cooking fuel.58% villagers use community tap water as their source of drinking water where as 15 % uses tube well (Table No.6).

Table No. 6 Sources of drinking water	
Sources of Drinking Water	**Percentage of Responses**
Tube well	15
Community water tap	58
Own water tap	3
Shallow Tube well	8
Hand pump	5
Sojol Dhara	5
Submersible Pump	10
Total Households	100

Source: Field Survey: 2023

In the study village 84% houses are kaccha, 12% houses are semi-pucca and 5% houses are pucca in nature (Table No.7, Figure No. 2, 3).

Table No. 7 House Type	
House Type	**%**
Kaccha	84
Semi pucca	12
Puccha	5
Total Households	100

Source: Field Survey: 2023

Figure No. 2 Kaccha House

Figure No. 3 Semi Pacca House

As per the opinion of villagers of Dumurkata, the distance of the nearest market (Chandra, Depara) from the village is almost 3-5 km. So, the time for traveling to the market is the 20 to 30 minutes on a bicycle and 10 to 15 minutes in a bike. 81.7 % Respondent Villagers have bicycle and 18.3% have bike.

78.6 % villagers have private toilet but they don't use this because of the nearness of forest. Most of the villagers prefer open defection.

86% villagers use wood as cooking fuel whereas,only 14% use liquid petroleum gas.

Easy access to forest makes villagers use fuel wood in cooking purposes in maximum cases.

1.4.   Elephant Attack season:

Chandra Forest Range is highly elephant attack prone region with 3197 elephant days (Report from Divisional Forest Office, Medinipur Division, 2023-2024) compared to other forest ranges under Medinipur Forest Division. Chandra Forest Range is the entrance corridor of elephants from Jhargram Forest Division to Medinipur Forest Division by crossing Kangsabati river. Official records reveal that there is no particular season for elephant coming to this range in recent times. Easy availability of food like paddy and other vegetables makes them enter into this range and man-elephant confliction results. 62% respondents said that elephant attack mainly occurs in December to March and 38% said it is throughout the year. Field observation reveals that most of the elephants have come from Lalgarh (55%) region and they stay here for 6 to 8 days, 24% respondents answered this and 46% respondents said elephants have stayed in this village less than one day.

Impacts of elephant attack:

In Dumurkata village people are engaged in NTFPs collection throughout the year for sustenance of livelihood practices. Urgency in entering into the forest forcollection of sal leaves, fuel wood, mushrooms, mahua fruit

etc. imprints psychological impact in their mind. Respondents shared that during and after elephant attack, they remained frightened because some people chase elephant and disturb them in various way which would cause deadly impact on other human beings. 31% of villagers have responded that the psychological impact of elephant intrusion in village is highly significant and 29% have responded that the impact is extremely significant. Because nobody knows when would the elephant's behavior be changed and it would cause any human death or severe injury. At the time of elephant attack, 39% of respondentare fairly scared to move or work outside of their house. 32% of respondents respond that they are highly scared and 23 % respond that they are extremely scared to send their children in school. 20% of the respondents said that they have no fear with this elephant movement because they are engaged in elephant management practices and feel less fear to elephant attack.

Not only the psychological impact of elephant attack is prevalent here but also crop damage, hut damage, human injury and human death are very common phenomenon here (Figure No. 3,4,5). 30% of respondents said that they have lost 3.6 quintal paddy both in 2022 and 2023. 20% respondents said that their houses are severely damaged by elephant attack in 2023.

Figure No. 4 Crop Damage by elephants

Figure No. 5 Foot prints of wild elephants in Paddy field

Figure No. 6 Hut Damageby elephants

Conclusion:

This study focuses on impact of elephant attack in forest fringe villages of Chandra Forest Range under Medinipur Forest Division and it also depicts how the life and livelihood of the forest fringe dwellers have been threatened by man-elephant conflict. Agriculture is performed only in rainy season and less availability of irrigation facility in other seasons. Infertile lateritic tract are the problems of income generation in this region with agricultural practices. People are mostly dependent on NTFPs collection from nearby forest. As the region is at the trackway of elephant movement, elephant rush is very common and frequent here. Villagers of Dumurkata are trying to cope up with this adverse condition to generate their forest-based livelihood. Forest fringe location with moderate availability of agricultural crops and water bodies like "Bandh" attract these wild elephants to the village in search of food and water. This study will be helpful to identify the elephant corridors and also to understand the magnitude and intensity of damage and sufferings the residents are facing in order to prepare a sustainable management plan.

Acknowledgement:

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