Human-Elephant Conflict in South West Bengal: Study on the Behavioural Changes in the Migratory Dalma Elephants and Management Practices

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Article history:
Original paper received on: 10.03.2018
Revised paper received on: 11.04.2018
Paper accepted on: 17.04.2018

Abstract:
Asian elephants (Elephas maximus) migrate from Dalma Wildlife Sanctuary in Jharkhand to Purulia, Bankura and Paschim Medinipur in West Bengal, India each year since 1987. There has not only been an increase in the population size of these group of migratory elephants over the years but they have also extended their migratory path for utilizing the unexplored resource rich locations for home-range extension. Notably there has been some major changes in their behavioural pattern with many migratory elephants gradually becoming residential in these areas and changes in their fodder preference. The Dalma elephants with their changed behavioural patterns are resulting in havoc human-elephant conflict in this part of South West Bengal as they are using agricultural crops as their main food source. Changes in the behavioural patterns of the Dalma elephants and modern mitigation measures that should be introduced as a part of management practices to reduce the human-elephant conflict in these areas have been discussed in this paper.

1. Introduction
The Asian elephant (Elephas maximus) is distributed throughout South and South-East Asia in India, Nepal, Bhutan, Bangladesh, Sri Lanka, Myanmar, China, Thailand, Malaysia, Indonesia, Cambodia, Laos and Vietnam. The total number of Asian elephants is estimated to be approximately between 44000 – 56000 (Doyle et al, 2010). India is known to give shelter to approximately 26000 – 28000 Asian elephants which is nearly 60% of the
species population (Bist, 2002, data from Project Elephant Report, 2009). According to Eisenberg, 1981 elephant habitats range from savanna forest scrub and secondary forest to forest-grassland mosaic. Elephants are known to survive well in high forest areas too. With the availability of food and other basic provisions the elephant populations can survive in small, fragmented, isolated forest areas. Elephants being mega herbivores are known as ‘keystone species’ in an eco-system as they have an immense effect on their habitat through foraging and other activities (Sukumar, 2003). Their home-range is strongly influenced by their need for water and forage.

Over the years it has been noted that these migratory megaherbivores from Dalma have extended their home-range in South-Western part of West Bengal to explore the rich resources of the unexploited areas each year. Traditionally there was good forest cover in this part of Bengal and supported good wildlife population including elephants but after 1960s forest denudation in South-West Bengal ranges was quite extensive and hardly any residential wild elephant groups were known to be present here. This vast tract of South West Bengal was regenerated through Joint Forest Management in late 80s and from 1987 elephant herd from Jharkhand State started migrating to this area mainly in search of food, water, shelter etc. But with time increase in their number, home-range extension and changes in their behavioural pattern have made them a major issue with respect to the social aspects of the people living in this part of Bengal as this huge migratory elephant herd has created havoc disturbances leading to direct conflict with the local people.

Studies on elephant behavior, their movement, man-elephant conflict has been done all over the world specially in the regions where the elephants have their home-range like Africa (Warner, 2008; Pinter-Wollman, 2012; Okello et al., 2014), Sri Lanka (Oswin Perera, 2009) and Kenya (Sitali et al., 2006). Some studies have been conducted in India for many long years (Choudhury, 1991; Dey, 1991; Sukumar, 1991; Sar, 2006; Bhattacharjee, 2012; Sahu, 2012; Pradhan, 2013). Some studies have also been conducted in West Bengal on Dalma herd (Guha and Guha, 2014, 2016; Guha, 2017; Das Chatterjee, 2016).

The present study deals with the behavioural patterns and changes thereof seen in Dalma elephants, the resulting man-elephant conflict in South West Bengal and proposal of some management practices pertaining to the present scenario which may reduce the problem to a great extent.

2.1. Study Area and Time Schedule
The study was conducted in Paschim Medinipur in West Bengal where the migratory herd from Dalma comes every year and covers a long span of their journey. Nowadays the Dalma herd generally moves in to West Bengal in July and after crossing their long migratory path goes back to Dalma in May next year.

2.2. Methods
Direct field observations were made to collect the relevant information. Data and information was collected with regard to conflicts between the human and elephants in this area. Group discussion with the local people and Forest Officials of the area were also made to collect the relevant information. Field assessment was undertaken during day and night to directly observe the conflict and the impacts. Notes on elephant signs in the area, elephant groups involved in crop raiding, the time in the night when elephants come and leave croplands, control measures used by the local people and the response of elephants to these measures was recorded.

3. Results and Analysis
3.1. Changes in behavioural pattern of the Dalma elephants
The Dalma herd is usually led by one big tusker who leads the group for moving forward on their migration route. Another big tusker remains at the back of the herd and usually moves after the whole group moves forward. On their migratory path in West Bengal, the Dalma elephants usually have to move long distances crossing the villages and other human encroached areas including agricultural croplands. These elephants are now seen to show a shift from wild to semi-domesticated nature as they are no more afraid of entering human settlements. They show behavioural changes like insensitivity to bright light, cracker sound or human presence. Moreover they are showing affinity towards human settlements and agricultural land as there is a change in their fodder preference from wild plants like Shorea robusta (Sal), Terminalia arjuna (Arjun), Bambusa vulgaris (Bamboo),
Phyllanthus emblica (Amloki), Terminalia chebula (Hartaki), Terminalia bellirica (Bahera), Syzygium cumini (Wild jum) and Dillenia indica (Chalta), etc. to agricultural crops like Oryza sativa (Rice), Saccharum officinarum (Sugarcane), Brassica oleracea var. botrytis (Cauliflower), Brassica oleracea var. capitata (Cabbage), Solanum tuberosum (Potato), Cucurbita pepo (Pumpkin), Helianthus annus (Sunflower), Musa paradisiaca (Banana), etc.

Changes in the population dynamics from free-ranging herd animal to territorial loaner dominance is a major change observed in the behavioural pattern of the Dalma elephants and many migratory elephants of Dalma herd are now staying as residential elephants in different forest patches of this region. Nowadays the migratory herd break up to form splinter herd for maximum utilization of localized resources in a particular area. The elephants of the Dalma herd show activity and usually eat while moving in the dusk and continue till midnight as they rampage over the agricultural croplands while moving from one forest patch to another. Previously the Dalma elephants used to stay in West Bengal from Rainy to Winter season but now they have become habituated with the summer of West Bengal and they go back to Dalma only for a very short period of time. The Dalma elephants are acquiring all high protein food in the form of agricultural crops and showing a high Net Population Increment (NPI).

3.2. Resource conflict between man and elephant

The migratory Dalma elephants cross human habitat for a long distance on their migratory path as they cross from one forest patch to another. On their route they move across villages, roads and agricultural croplands. This is a major paddy growing area and the elephants have shown change in their fodder preference from food available in the wild to the agricultural crops. Moreover the palatable fodder trees are insufficient for such huge number of elephants in the forest patches which are mainly pure Sal forests in their Zone of Influence which forces them to depend on the agricultural crops. They inadvertently damage the kuchha mud houses in the villages as they move on their way. Some 20-25 persons die every year in his part of South West Bengal due to the direct or indirect confrontation with these elephants.

There is biotic interference in these forests too in the form illegal grazing of cattle inside the forest and illegal collection of fuel and firewood from forest. The Dalma elephants are also stressed due to fragmented habitat and high human population density. They have become insensitive to bright light, cracker sound or human presence. There are instances of elephants becoming rogue or being killed by electrocution. The elephants and the local people both depend on the same source of natural resources which leads to direct confrontation and severe man-animal conflict (Fig 1).

Fig 1: Tusker in agricultural crop field and in direct conflict with local villagers

3.3. Past, Present and Future Management practices to minimize man-elephant conflict in South-West Bengal

There has always been an effort from the Forest Department and also the local villagers to minimize the man-elephant conflict in these areas as it is deleterious not only for the people living in these areas but also the Dalma elephants which are Scheduled I mega-herbivores. For ‘crisis management’ the elephants are driven by hulla-groups so that they can follow a safe route causing minimum damage and disturbance to the villagers. Diesel, burnt engine–oil and Hullas are distributed among the villagers so that they can guard their properties and agricultural crops at night when the elephants usually move on their migratory path while consuming huge quantity of food. Fodder resource management is an important issue which is very important so as to provide food to such huge number of elephants in this area. Free corridor with
maximum possible continuous patch of forest is to be developed to minimize the confrontation of the local villagers and the Dalma elephants. Alternate crop cultivation like oat, chilli etc for alternate livelihood of the villagers has already been initiated in some areas. With the change in population dynamics from free-ranging herd to territorial loafer dominance, erection of more watch towers (Fig 2), introduction of more elephant proof trench (EPT) (Fig 3) and warning system are essential to monitor the regular movement of elephants and to prevent them from entering the village areas. Energized fences are also useful in protecting agricultural crops, orchards and vegetable gardens so as to restrict the megaherbivores from entering the agricultural croplands.

![Fig 2: Watch Tower for monitoring elephant movement at Village Pungiri, Beat: Nayagram, Range: Nayagram](image1.png)

At present there is an effort from the Forest Department to reduce their Zone of Influence gradually so that the havoc damage caused to this part of South-West Bengal can be restricted to some extent. Introduction of drones in future for regular monitoring of the elephant herd movement can be helpful to minimize the man-elephant conflict as the local people in the areas through which the elephant herd is expected to move through can be warned in advance through bulk sms and other warning systems available in the recent times. Introduction of contraceptives like PZP (Porcine Zona Pellucida) as used in Makalali Game Reserve in South Africa (Delsink et al. 2007) which does not affect the physiological condition of the elephants, can be helpful to restrict the elephant population size within the carrying capacity of the area. In the light of growing human and elephant population simultaneous spatial symbiosis should be developed for the well-being of the villagers as well as the Dalma elephants.

**Discussion**

Elephants are included in Schedule-I of the Wildlife Protection Act – 1972 and therefore deserve the protection of the highest order in India. In global context elephant is under Endangered (EN) category [Elephas maximus (Asian Elephant) Status: Endangered A2c ver 3.1(http://www.iucnredlist.org/search; Downloaded on 05 March 2018), Pop. trend: decreasing]. The Zone of Influence of the Dalma herd of migratory animals included Paschim Medinipur, Bankura and some parts of Purulia Division too but at present there is an effort from the Forest Department to exclude Bankura from their Zone of Influence and restrict them mainly to Paschim Medinipur. This area experiences intensive agriculture practice with water from the rainfall as well as supported by hi-tech irrigation facilities. The elephants of the Dalma herd have developed a bias towards the agricultural crops due to their huge volume and nutritional superiority over the wild fodder. Presently the Dalma herd is showing the tendency to go back to
Jharkhand only for a few days. They are showing climatic adaptation in view of West Bengal scenario. Previously they used to stay in South-West Bengal from Rainy to winter season but now they have become habituated to the summer of West Bengal. So it appears to be very difficult for local people to harvest both summer and winter crops avoiding elephant depredation. This issue is very important as it arouses their revengeful attitude towards wildlife. Moreover habitat fragmentation and degradation in the forest patches have made the situation grave both for the elephants and also for the local people as the local people also depend on these local forest patches for their daily requirements. The forests are also under great pressure on account of grazing, fire and illegal cultivation. Therefore habitat enrichment is the need of the hour to optimize the carrying capacity of these forest patches by enhancing the availability of fodder for the elephants.

The local population includes mostly tribals like Samtal, Lodha, Sabar etc intermixed with local Bengali people as well as migrants from Orissa, Jharkhand and Bihar. Most of the villages practice agriculture crop raising and the forests in these areas provide them timber, fuel wood, bamboo, cane, fibers, medicinal plants, fodder for their cattle. Thus the local people in this area and the Dalma elephants both depend on common resources which generate human-elephant conflict in such massive form that it sometimes even leads to direct casualty.

It is not only that the Dalma elephants cause damage on their migratory path but the villagers entering the forests for collection of Non-Timber Forest Products also sometimes get attacked by the elephants. Sometimes people leave their houses in panic when the elephants are in the locality and thus get into direct conflict. Sometimes the villagers also irritate the elephants when they pass through their locality. So apart from the prevailing and future management practices proposed, overall awareness program should be formulated for the local people to minimize the human-elephant conflict as simultaneous spatial symbiosis of the man and elephant in this area is the need of the hour.

Reference


Acknowledgement
I am thankful to UGC, for providing financial support (Minor Research Project No. F.PSW-097/15-16(ERO)) to my Research work. I acknowledge the support extended by the State Forest Department of West Bengal specially Sri Anjan Guha, WBFS, Divisional Forest Officer, Parks and Gardens (North) for conducting this study. The author appreciates the corrections and suggestions of the referees who contributed greatly to the improvement of this manuscript.