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P Arya Alok
Thinking Fox Academic Science Lab, Bhoisahi, Balasore, Odisha, India

Sushree Sangita Mohapatra
Thinking Fox Academic Science Lab, Bhoisahi, Balasore, Odisha, India

Correspondence Author:
P Arya Alok
Thinking Fox Academic Science Lab, Bhoisahi, Balasore, Odisha, India

Study of behavioural activity and pattern of movement of a separated elephant from its herd-by direct observation

P Arya Alok and Sushree Sangita Mohapatra

Abstract
Sometimes a single elephant gets distracted from the herd during the migratory movement of Asian elephants (*Elephas maximus*). It certainly remains in trauma especially when the migratory corridor is through the human residing area. The direct observation study of a separated female elephant was done in the area of Rasgovindpur, bordering to Mayurbhanj, Odisha which is near to Similipal biosphere reserve. The behavioural study of feeding, movement pattern and other activities of the elephant towards the presence of crowd, agricultural field etc. were conducted with the help of local forest department. During the period of 4 days (until its reunion with herd), the study revealed the reduced voracious eating habits, reduced movement during day light and hesitance of crowd interaction. To avoid the human-elephant conflict (HEC), the elephant was kept under the constant observation. As it followed the route that was followed by its herd (with small distractions), hence it can be concluded that the migratory path was known or memorised by the separated elephant.

Keywords: Migratory corridor, HEC, stress, separated, movement pattern, direct observation

Introduction
Mayurbhanj in Odisha comes under the highlighted area for human wildlife conflict whether that might be with wild bear, tiger or wild elephant. Similipal reserve and north east wildlife forest conserves endangered Asian elephants (*Elephas maximus*) and hence considered as the reserve corridor for the species. Rasgobindpur, where this work has been carried out is an area in Mayurbhanj one of the border district of Odisha which carries 61% of total forest and 42% of total elephant population in Odisha (Palei and Rath 2015) [9]. The district is also considered as the elephant migratory corrider for the migration of herds of elephants from Chhattisgarh to West Bengal, hence it is natural to have HEC with that much of human population and especially when almost all of them are dependent upon agriculture and forest products. Simultaneously, Mayurbhanj is a tribal district with most of the tribal population with less literacy and basic education, this leads to another cause of HEC.
The local forest department remains almost active throughout the year, but especially in winter (from September to February) when the migration and crop-raiding activity of the elephant is at the peak. The forest department records and monitors the movement of herds and maintains an elephant record book. Where the herds come from, numbers of individual in herds, entry path, duration of migration, and short or long stays in the area, aggressiveness of the herd, exit location, crop raiding activity etc. are being recorded in detail to mention in the record book. They also search for the separated elephant and keep tracking in both day and dim. The conflict data like crop raiding, human or animal causality, name of village, date and time and property loss is also being noted for the compensation. When a separated elephant is tracked it is a tough task to rejoin the elephant with its herd and at the same time to avoid causality for the lost one and for local people. The work is a live observation case study for the separated female elephant for 4 days period from the time of spotting until it rejoins its herd. In this period we kept tracking and recorded the feeding pattern, behavior, its reaction to crowd and finding out the way of reacting the herd.

Methodology
Being the migratory corridor, local forest department and even local people has a tentative track record of timing, season of crop raiding and movement of herds.

According to local sources of information, elephants found to be migrating and crop raiding mostly during December to January when the ripening of paddy occurs. This was a record work done exactly during those days (from 13-16 Jan, 2019) when a 14 membered elephant herd was passing the corridor and one left behind in jungle near to Rasgovindpur area. Spotted by local people in the jungle while collecting the timber, the lonely one was a female. It may be of age between 15-23 and approximately 2 meter tall. The spotters (local volunteer, researchers and forest guard) were appointed shift wise to observe the movement and activity and also to restrict local people to make any effort to retard the lost one. On each day, the initial spotting point was recorded at 5 a.m. and followed by other movement and feeding data. Since the movement of the elephant was during the dim light and night, hence the spotters had to relay the route to next spotter by wireless radio and the next spotter had to catch the elephant's sight to carry forward. If it stopped anywhere more than 3 hours, then the point was recorded as resting spot; this helped record the movement pattern of the female towards the herd. The feeding habit was monitored according to actual feeding or foraging as searching the food, breaking the branches and picking up food without eating actually. Factors like high noise level (Morgan & Tromborg, 2007) [7], confinement (Elazanwosky & Service, 2006) [2] and high light intensity (Pollard & Littlejohn, 1994) [10] might have increased the stress level hence these scenarios were avoided by the volunteers by reducing the use of possible factors. To carry out all these observations and record the data, almost 18-20 hours a day were devoted by the investigators.

Result and Discussion

The left-alone situation of this female might be due to distraction of the individual by food source, water source or due to environmental stress like human interference or vehicular movement as the herd was passing through the state and district high ways many times in the followed route. It may be any reason of separation, the stressed up elephant behaved differently to join the herd again. Here are the following observations and records were being carried out the four days of follow up.

A. Regular behaviour throughout the day

From the first day of sighting in the late morning, the elephant was hardly moving, physically aggressive; rather it used to stay calm, just hiding itself behind the bushes. Moreover, the direction of head was towards the forest area to avoid crowd interactions. The movement of the ears increased at the noon just might because of the direct heat and hence to maintain the body temperature. No alarming or attacking activities were observed even in presence of crowd.

B. Reaction towards the crowd

Usually crop - raiding or stressed elephants react aggressively towards the sound of people, deterrent efforts, loud voices of huddle; either they start moving away or they tend to show aggression and attacking behaviour to crowd. But at the first day of sighting, when the local people were trying to disturb and distract the elephant and waves of people attending to watch the presence of such huge animal, it neither reacted much aggressively, nor attacked back towards the crowd.

C. Feeding, drinking and other activities

During the period of stress of remaining isolated from the herd, the elephant decreased its feeding and foraging activity like searching for food and picking up objects using trunk. Elephants are hindgut fermenters with rapid passage times for food and low digestibility and energy intake (Dumonceaux, 2006) [1]. This, combined with their body size, explains why elephants require such a large daily intake of food. In the wild, elephants have been observed to spend 75- 85 percent of the day feeding (Vancuylenberg, 1977) [12]. But here, the voracious eater reduced its time to take food; rather it preferred leaning, standing or squatting alone. During dusk only it preferred drinking from the swamp twice in 4 days of observation. No bathing, no dust bathing, water spraying or stereotypic activities were noted during the observation.

D. Movement during day and dim light

Years of adaptation and experience has leaded the elephant to move and migrate more during the dim light rather than in full lighted day. Similarly, the individual hardly travelled far distances during day. It either remained at same spot for the whole day or just changed its position just from bush to bush may be for better hiding and foraging; this also helped it avoiding the local crowd. But when it came to dim light like the period of dawn, dusk or night it travelled long distances like 5- 8 kilometre in a single go.

Table 1: Movement pattern (Distance travelled and no. of resting spots per day)

Days	No. of Resting spots (if it stopped 3 hours or more)	Distance travelled (in Kilometre)	
		Day light	Dim light (dusk, dawn & night)
1	2	0.5	3
2	2	0.3	6
3	3	1	7.2
4	1	2	8

E. Route, distraction and re-joining the herd

The herd that left the individual was initially 23 km away from the separated one, as informed on second day by the forest guards and they were slowing down and sometimes retaining for the full day in the jungle in the same area. Sometimes they were revisiting the travelled places by turning back with the herd. This indicated that they were well known about the missing elephant in their herd. At the meantime, the lost individual also showed movement in the same route the elephant herd travelled through. All the way it maintained to restrict the movement during day and fed upon the trees in nights only for a short period of time. On the day 3 it showed a small distraction from route, which might be to find out the water reservoir or swamp to drink. But on the day 4 it travelled the maximum of 2 km in day light also, possibly due to signals of being closer to the herd. That night and day it travelled on the exact same path and spot with communicating sounds. At the end of day 4 in the

evening it re-joined the group. The herd elephants found to surround it and embracing with trunk which was social communication behaviour.

Conclusion

The four days study of the lost individual elephant leaded to some behavioural data like the remembrance of migrating path of each elderly or matured elephants of the herd. Though the baby elephant could not have achieved the reunion due to lack of experience, still it is a point of topic at what age or after how many visits through the corridor makes a baby elephant remember the small details to find the routes. There is another angle of study that being individually lost and left behind how the stress hormone reacts on the body physiology. Though it has been tested analysing elephant dung (Shreedhar V. & Anindya Singha, 2018) [8] upon the group of elephants during HEC, but what happens to the stress physiology when the individual is lost can be conducted as other research work. The physiological, behavioural study certainly has to be carried out on further lost ones to compare and correlate the data of movement and migration. During this direct observation study neither the subject nor other wildlife was being disturbed or hurt.

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