MATHEWS

Research Article

Mathews Journal of Veterinary Science

# Inter-State Migration and Movement of Pachyderms from Dalma to Baripada Division, Odisha, India: A Case Study

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## ABSTRACT

Asian elephants of Dalma Wildlife Sanctuary have been migrating to Odisha each year since 1987. The study of their migration ethology is showing that the biggest tusker leads the migratory herd as it remembers the migration route and each year they are extending their migratory path for utilizing the unexpected resource rich locations as as a part of their home range extension. We studied the behavioral patterns of this increasing population of migratory elephants from Dalma and tried to analyze the reasons behind this movement each year which causing serious Man-Elephant conflict in Baripada Division as they are rampaging the agricultural crops. Normally in Baripada division elephants of Jharkhand (Dalma Wildlife sanctuary) use to migrate through the corridor that extends from west Bengal-Deuli-Suliapada. From the year 2010, there is deviation noticed in their normal track, changing their route from Rasgovindpur (Baripada Forest Division)-Nilgiri of Balasore wild life Division through Morada-Chitrada (Rasgovindpur Range) to Asanbani-Jugal-Dalki of Betnoti Range. Dalma wildlife sanctuary is at a distance of 10km south of Jamshedpur in Jharkhand State, having an area of 193 Sqkm. It Carries around 158 elephant population (as per 2007 census), which is beyond the carrying capacity of that sanctuary. Since last sixteen years herd of more than 100 elephants enters to Baripada Division area through Deuli and Rasgovindpur Ranges. They use to migrate in Baripada Forest Division for at least 15 to 30 days through Deuli-Rasgovindpur-Betnoti ranges raiding standing paddy and other cash crops, damaging houses, injuring human beings during their onward journey to Nilagiri Range of Balasore wildlife Division. Migratory route and forest used by elephant in Baripada division are Phuljhari Forest, Dalki RF, Nadapur Forest, Dalki RF&Asanbani forest. The most vulnerable area in Baripada division are Sarai under Betnoti Range and Baladia under Rasgovindapur Range.

**Keywords:** Migratory Elephants, Dalma, Human-Elephant Conflicts, Baripada Divisions, Inter-State, Herd Composition..

## INTRODUCTION

Main land Asian elephants are large social, intelligent, endangered and long ranging migratory animal which are trying to come into conflict with people with large number of people and elephants killed and injured during train hits, electrocution, crop raiding, poaching, poisoning etc,

**Vol No: 10, Issue: 02**

Received Date: February 19, 2026

Published Date: April 16, 2026

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**Citation:** Mishra SR, et al. (2026). Inter-State Migration and Movement of Pachyderms from Dalma to Baripada Division, Odisha, India: A Case Study. Mathews J Vet Sci. 10(2):106.

India being the home of 60% of the Asian elephant global population, has a primary duty and responsibility for ensuring survival of Asian elephants. India being natural home of largest population of mainland Asian elephants wishes to promote conservation of this species, by seeking natural migration of elephants in all range countries through bringing the subspecies under Appendix I. Asian elephants migrate over long distances in search of food and shelter, across states and Countries, Some elephants are resident while other migrate regularly in annual migration cycles: proportion of resident and migratory populations depends up on size of regional populations as well as on extent, degradation and fragmentation of their habitats.

Female Asian elephants live in clans, which in natural conditions are mostly made up of related individuals [1] and males are largely solitary but form loose social bonds with other males. Both females and males have well defined home ranges and show fidelity to their established home ranges [2]. Home range sizes in india have been estimated to vary between 550 to 700 km2 for female clans in tropical deciduous forests of south India and between 188 to 407 km2 for different males and female clan in north India. Movement within home ranges has been shown to be influenced by seasonal changes in resources [2,3]. These seasonal movements are both cyclic and predictable. When home ranges cover jurisdictional boundaries such movement across jurisdictional boundaries is both cyclic and predictable. A crictical reproductive strategy in elephants is the dispersal of males from their natal home range when they attain puberty. This helps in avoiding inbreeding and is critical for gene flow through the population. Although studies on male dispersal distances are lacking any dispersal greater than one or two home ranges away would result in distances of 100 km or more. The ranging behavior of elephants has been studied in different parts of Africa and Asia. The African studies were started by Douglas-Hamilton [4,5]. Leuthold W & Sale JB [6], Leuthold W [7], Merz G [8], Hall-Martin AJ [9], Viljoen PJ [10] and mainly described the size of home range relation to environmental factors, Vegetation shape and Spatial distribution. The home range was studied by Wyatt JR & Eltringham SK [11], Leuthold W [7].

In Asia home range were studied by Khan [12]. Olivier RCD [13]. Easa PS [14] and Desai AA [15]. Olivier RCD [13] studied home ranges of elephants in Malaysian primary and secondary rain forests. Easa PS [14] carried out similar studies in forest of Kerala States. Estimated home ranges of clans and bulls in the eastern ghat area. Management issues like identification maintenance and corridors that like sub-population were studied by Desai AA [15]. A review of the literature on the ranging pattern of elephants reveals that information on home range of elephants in fragmented areas where the habitat was rapidly lost to urban development and was continuously degraded is not available. In India there is no protected area for elephants as small as Dalma wildlife sanctuary (193 sqkm/) having heavy biotic pressure. The Chandaka Wildlife Sanctuary in Orissa also small in area for elephant population.

## STUDY AREA

The Study area was conducted in Baripada forest division is situated towards northern most part of Odisha between *$22^0$ 33' 45* and *$21^0$ 17'* North latitude and *$85^0$ 45' 30* and *$87^0$ 13' 15* east longitude and is bounded on the North by the singhbhum medinapur district and Keonjhar district on the east. Total area of Baripada division is 4666.539753 $sq^{km}$. As the division situated boundary touch the West Bengal (70km) and Jharkhand State (40km).

## METHODOLOGY

Field monitoring: The study was conducted during the period of 2009-2016. During these periods the migratory places of elephant and affected villages were visited. Data were collected by following two methods.

### Direct Observation

Migratory and elephants their migration routes, shelter sites, Reserve forest, affected Villages were observed directly during filed visits.

### Discussion with local people

Interaction was taken place with local people along with victims of human-elephant conflict through questionnaires to collect data regarding different aspects conflicts.

### Official Collection data

Data were collected officially from the Divisional Forest Offices on human elephant conflict and migration route in previous year from 1997 to 2014 to make a comparative study on human elephant conflict in Baripada Division of Mayurbhanja Elephant Reserve.

## RESULT AND DISCUSSION

Phuljhari, Dalki, Asanbani and Nadapur are the major forest area covered with dense Sal forests became the alternate home for all the migratory elephants during their migration period. They used to start moving out of forest at 4 pm every day and continued foraging on adjoining crop fields till morning 6Am next day. When they returned to forest for shelter they kept themselves hidden inside forest during the day time. Although all 180 elephants belonged to 6 families they moved under a unified common. All in one group used to move to crop field a particular village in the evening for crop raid. Agriculture fields were full of paddy crop not matured for harvest.

After reaching the reserve forest the entire herd under a unified command moved for foraging in a single group to the surrounding villages crop fields in rotational basis. Change of direction of rotational grazing followed an interestingly typical pattern of anticlock wise direction. They were not only feeding the crops in the field but also entering in to human habitation and damaging houses, killing domestic animal and human being.

Continuous migration of elephant occurred from Jharkhand and West Bengal to Baripada division from last 17 Years. During the Study period the largest herd was observed during 150 numbers in 2008-09 followed by 120 numbers in 2012-13,108 numbers during 2013-14,102 numbers during 2000-01. Only one migratory elephant observed during 2001-02 [16,17].

Similarly highest Male elephant observed during the year (28) nos in the year 2012-13 followed by (26 ) nos in 2013-14 and (21) nos of male elephant in the year 2008-09. Highest female elephant observed (65) nos in the 2000-01 followed by (62) nos in the year 2008-09,(52) nos of elephant observed during (52) 2013-14,(48) no of female elephant observed during 2012-13.Highest number of calf observed during the year (67) in the year 2008-09 followed by (44) nos during the year 2012-13and (30) nos of calf observed during the year 2013-14 and 2000-01 (Table-1).

Information from 1997 to 2013-14 from the forest Department records were used to quantify elephant depredations in Baripada Division. Data on crop damage and house damage in incidents, human kill, human injury and elephant mortality was collected from the office of The Divisional Forest Offices. To get a quantitative measure of economic losses due to the crop raiding and to evaluate people's attitude, a survey of affected villages and migratory route was followed. These data were verified through field visits to specific sites and by conducting informal interviews with government officials, local people or local community leaders Rapidly assessments were carried out using the focus groups. Field visits to area of elephant damage and reconnaissance in to the forest with villagers to observe habitat types. To find out the nature of the conflicts questions were asked about the use pattern and details of human death and injury.

About 36 villages were severely affected due to human-elephant conflicts in Baripada Division. Human death, elephant death, crop damage, house damage, harm to livestock, injury to human are the consequences of this conflicts. Peak depredations seasons were October to December.

**Table 1.** Inter-state migration of elephant from 1997-2014

| Year | State from where entered | Entry point | No of Elephant entered | No of Days stay in Odisha |
|---|---|---|---|---|
| 1997-98 | West Bengal | Deuli Range | 12 nos (M-2,F-6, C-4) | 06 |
| 1998-99 | West Bengal | Deuli Range | 9 nos(M-3,F-5,c-1) | 01 |
| 1999-00 | West Bengal | Deuli Range | 45 nos ( M-4, F-35,C-6 | 04 |
| 2000-01 | West Bengal | Deuli and Rasgovindpur Range | 102 nos(M-7,F-65,C-30) | 01 |
| 2001-02 | West Bengal | Bangiriposi | 01 nos(M-01) | 10 |
| 2002-03 | West Bengal | Dukura and Deuli Range | 24 nos(M-2,F-18,C-4) | 03 |
| 2003-04 | West Bengal | Deuli and Rasgovindapur | 07 nos(M-3,F-2,C-2) | 03 |
| 2004-05 | West Bengal | Deuli | 05 nos(M-1,F-2,C-2) | 02 |
| 2005-06 | West bengal | Dukura Range | 21 nos(M-2,F-9,C-10) | 35 |
| 2006-07 | West Bengal | Deuli Range | 24 nos(M-4,F-8,C-12) | 21 |
| 2007-08 | West Bengal | Deuli Range | 63 nos(M-19,F-13,C- | 19 |
| 2008-09 | West Bengal | Deuli Range | 150 nos(M-21,F-62,C-67) | 25 |
| 2009-10 | West Bengal | Deuli Range | 04 nos(M-1,F-2,C-1) | 21 |
| 2010-11 | West Bengal | Rasgovindpur | 65 nos(M-19,F-13,C-33) | 19 |
| 2011-12 | West Bengal | Rasgovindpur | 80 nos-(M-17,F-34,C-29) | 25 |
| 2012-13 | West Bengal | Rasgovindpur | 120 nos-(M-28,F-48,C-44) | 23 |
| 2013-14 | West Bengal | Rasgovindpur | 108 nos-(M-26,F-52,C-30) | 27 |

### Human-Elephant conflicts

From the year 1997 to 2014 collected data from field level and also from the Divisional Forest offices. Crop damage was the most common incident during the study period.

### Human Death and injury

A total 12 human Death and 19 injury occurred from 2000 to 2014.All of them are accidental as the victim came face to face with wild elephants (Table-2).

**Table 2**. Conflict and Depredation due to Migratory elephant in Baripada Division

| Year | Human Kill | Human Injury | House Damage | Crop Damage |
|---|---|---|---|---|
| 1997-98 | 00 | 00 | 30 | 9.3 |
| 1998-99 | 00 | 00 | 14 | 2.5 |
| 1999-2000 | 00 | 00 | 03 | 10 |
| 2000-01 | 01 | 02 | 125 | 52 |
| 2001-02 | 00 | 01 | 00 | 00 |
| 2002-03 | 00 | 00 | 01 | 00 |
| 2003-04 | 01 | 01 | 00 | 00 |
| 2004-05 | 01 | 05 | 05 | 00 |
| 2005-06 | 02 | 00 | 10 | 2.5 |
| 2006-07 | 01 | 01 | 07 | 00 |
| 2007-08 | 01 | 01 | 04 | 00 |
| 2008-09 | 00 | 00 | 157 | 295.95 |
| 2009-10 | 00 | 00 | 00 | 00 |
| 2010-11 | 03 | 00 | 124 | 374.54 |
| 2011-12 | 00 | 00 | 131 | 259.94 |
| 2012-13 | 00 | 00 | 100 | 570.37 |
| 2013-14 | 02 | 02 | 97 | 334.09 |
| G. Total | **12** | **13** | **808** | **1934.19** |

### Crop and House damage

From 1997 to 2014 total 2925.36 acre of crop damage and 808 house damage occurred during the study period (Table-2 & Chart -2,3).

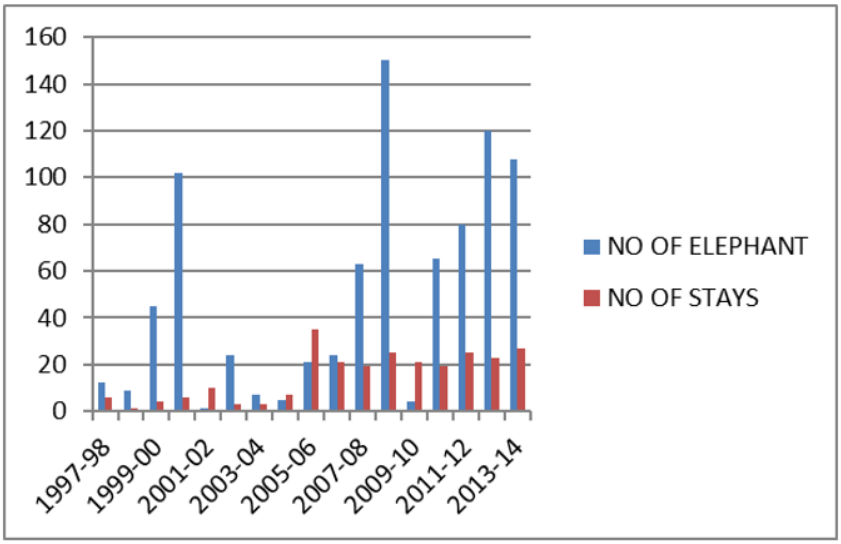


**Chart 1.** No. of Elephant Migration During 1997-2014.

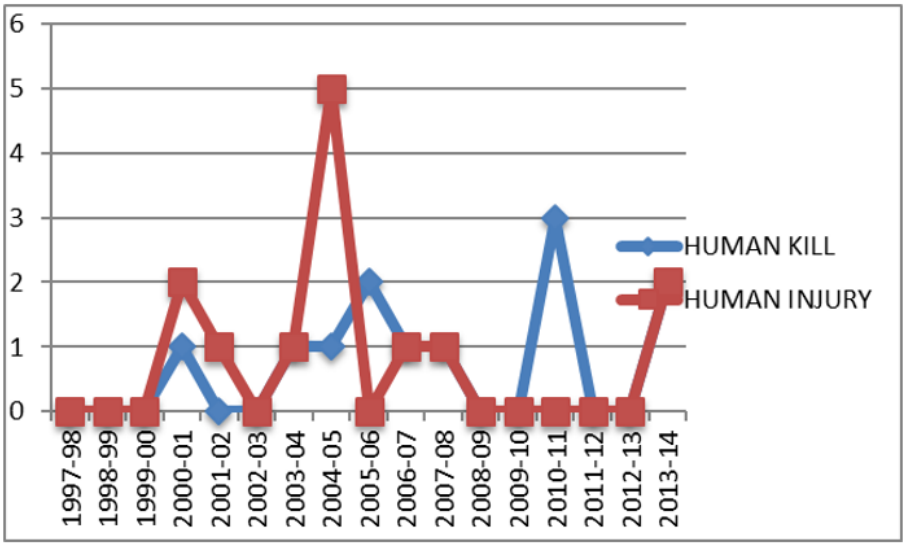


**Chart 2.** No of Human Kill & Injury.

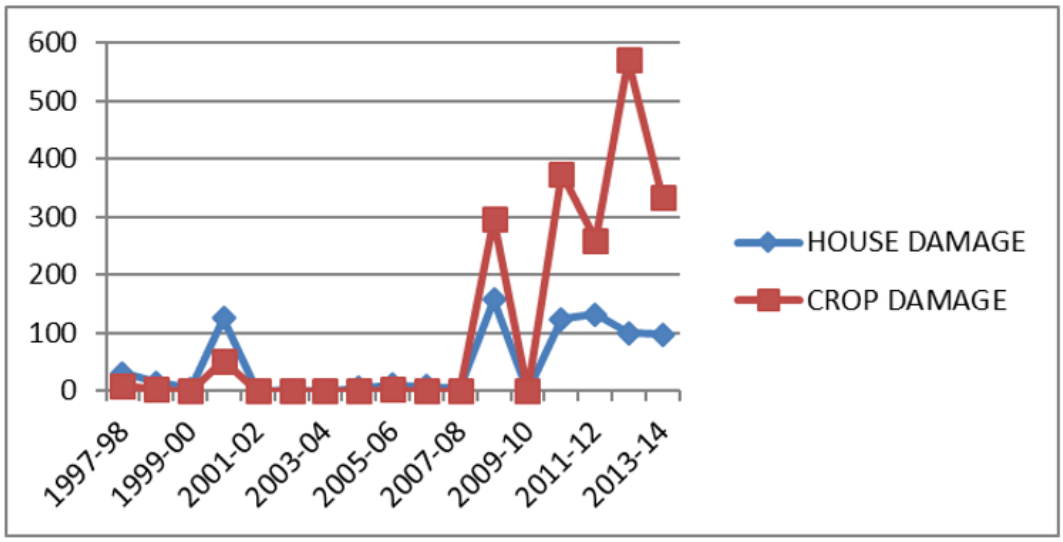


**Chart 3.** No of House & Crop Damage.

**Migratory Route Followed by Elephants from Dalma**

In the year 1987, the migration of the Dalma elephants was restricted to Jhargram and certain areas of the erstwhile Medinipur Division up to Jhitka forest of Lalgarh. In the year 1995-96 when 55-56 Dalma elephants entered into West Bengal they followed a short route which included Jhargram, Medinipur and Arabari and after ramping through these areas they used to return back to Dalma after touching the terminal area of Garbeta Range of the then East Medinipur Division. In the year 2000, they rampaged through a longer distance including Jhargram, Medinipur, Lalgarh, Garbeta, Bankura and Nayagram and from Nayagram they started their return journey back to Dalma. In the year 2010, they extended their migratory path and crossing West Bengal border, started moving up to Orissa. Now in 2010-11 they follow a long migratory path which include Jhargram, Malabati, Lalgarh, Goaltore, Amlagora, garbeta,Bishnpur, Barjora, Sonamukhi, Gangajalghati, Patraseyar and then again move to Malabati following the same route and from there they rampage over kalaikunda, Nayagram and finally cross West Bengal Border and move to Baripada Division,Odisha.During their return journey they follow the same route through Patraseyar to Lalgarh and then crossing Malbati go back to Dalma in Jhargarm.

**Migration History in Baripada division**

Late in the night of February 18 a herd elephant probably the biggest so far in the recorded history of migration from Dalma crossed Hatimara in west Bengal and entered Bhugudakata village in Baripada, Mayurbhanja district. The 47-strong herd entered west Bengal on 20 January 1999 and plodded through villages and acres of croplands in the state before entering Orissa. The area which they passed through in Bengal are Naragram, Nimainagar, Malan, Narsinghpur,

Panchkahania, Rangium, Khakri, Birbedia, kiyajharia, Tapoban, patina, Phulboni, Nuhamalia and kakhrapada. Vast stretches of sugarcane and potato crops were damaged by the herd. Not for off from the forest Range office at Nayagram West Bengal a pregnant cow elephant gave birth to a calf at uthaninayagram on February 5. The baby was hardly 15 days old when the herd entered Odisha. The mother elephant carried the baby across river Baudhabalnga on her trunk. At Balichhatri village in Mayurbhanja the elephants raided a house and consumed about 120 kg of paddy. Being nocturnal in nature the elephants took shelter at the Chandua reserve forest during the day on February 19 and resumed their march at about 6pm in the evening the next day. At kasiabeda village two houses were damaged by the herd and at Dhangdisol also it repeated the destruction. It damaged potato crop at Bhrungasol before marching through Bankati, Matiabeda and Belgaria and ultimately reaching Netrapahada in Nefri reserved forest on 20th February at about 6.30am in the morning close to the Nefri reserved forest, the herd found the reservoir of the Nedam Minor irrigation Project that cold meet its water requirement. On 25-28 February the herd along with their claves was found near kachudhan in the North- central Similipal. In eight days they roamed inside Similipal entering the park near Nedam in the North-east and reaching Kachudhan they return back to Dalma.

**Observation on Migratory Herd**

**Herd Composition**

There were 140 migratory elephants in the Dalma herd when they were entered in to Baripada division. Out of 140 total numbers 23 males including 14 adult tuskers and 9 Makhana, 50 numbers of females and 43 sub-adults and 24 calfs. Below the age of 3 years and 43 sub-adults between the age group 4-9 years and 73 adults of the age of 10 years and above.

**Family member**

In case of elephants, female social structure is similar to concentric rings with the innermost circle comprising a family unit of releated adult females. Bulls associates with these non-natal family units.

It is interesting to note that elephants of the residents group of Odisha that entered the Dalma herd were always staying together as a single sub-group within their own herd. Even the male belonging to this sub-group always remained within this sub-group itself. In case of the rest of the 137 migratory elephants that came from Dalma it was noted that they were living in small sub-groups of the 5-6 female members visibly. The male did not belong to any particular sub-group but were found to guard these small female sub-groups. Usually one male guards 2-5 sub-groups.

The primary function of elephant's family units is the protection and rearing of calfs. Adult females co-operate in the assistance of the calf movements, foraging, protection and social experiences. The survivality of juveniles greatly increase with an increased number of females taking care of them. The family units have consistent, friendly interactions with other such as groups. The associated families are called kin or bond groups and mingle, feed and interacted with one another frequently.

**Chain of command**

The females usually lead the small sub-groups within the herd but at the time of migration over such a long distance the biggest bull is usually the leader. Basically one adult tusker leads the group for moving forward and another one remains at the back which actually moves after the whole group moves forward. Matriarchy is usually seen in the small groups but at the time of long distance migration, patriarchy is the usual phenomenon. The eldest elephant of the herd is usually responsible for remembering the migration route. Before the herd moves they always send an advance party 4-6 elephants which includes a mixed group of adult males and females approximately in 2:1. Ratio. The primary function of the advanced party is surveillance. They ensure whether there can be any problem for the movement and foraging of the herd in the route the herd is supposed to follow. The rest of the herd always moves after they get the green signals from the advance party for their movement.

**Community behavior**

The biggest tusker usually leads the group at the time of the long distance migration. The level of dominance is closely related to a bull's size, power and weight.in case of the Dalma herd, bull fighting is usually observed between the dominant bulls of the herd. Fighting with the residential males living in the area through which the migratory herd moves occurs when these ressidental males try to mate with the females of the moving herd.

**Bereavement behavior**

The complex nature of elephant social structure is extended in to the mourning behavior for the deceased companions. The moving herd tries to move with the ill or sick elephant companion till the end but leaves it when they find it impossible any more to move along with sick animal. On 16th October 2013 when the Dalma herd moved towards Nayagram from Jatia a seriously ill elephant was found to be left behind by the herd. But this female elephant was still found to be guarded by a bull. The ill elephant was being given treatment by the forest Officals on 17th and 20th October. The bull was still found to be there with the ill female elephant and it finally left behind and moved and

joined the herd when the Dalma herd went to Nayagram. Sometimes the baby elephants who are sick's are being left behind by the herd. The mother elephants try to come to the baby elephant but mother's sentiment is usually being ignored by the migratory behavior of the herd and the mother has to move with the herd when the baby comes in human contact. The mother usually gets detached from the baby only when it finds it impossible to move further with the calf. A calf elephant was left behind when the Dalma herd finally crossed Subarnarekha and went to Nayagram. The mother of the Calf must sense that the calf was sick and was forced to leave the calf there. The calf was being detected by the forest officials but ultimately death.

**Musth**

Male elephants have a temporal gland on each side of the head between the eye and the ear which produce heavily scented secretion which is seen to be trickling down the side of the face of males in musth. Musth is a normal phenomenon and the males in musth randomly move to different grouping looking for reproductively receptive females in the Dalma herd.

**Swim**

Bathing is both pleasurable and essential for elephants. The elephant of the Dalma herd usually goes for bathing from late afternoon to dusk even in the late night. The mothers usually go into the water first being followed by their babies. The males go for bathing separately occupying the outer periphery of the water bodies in which the females and babies take bath. It has been observed that at least one big tusker goes around this group taking bath in the middle. The dry but soft and supple skin of the elephants lack any sweat glands and is sensitive to UV radiations. This is the main reason that the elephants allow in mud and cover themselves with dirt. These also help protect the skin from parasites and biting insects. The elephants of the Dalma herd usually cover their bodies with loose morrum soil and so their natural grayish black colour gets reddish in this area.

**Sleeping**

The elephants of the Dalma herd travel for a long distance and take rest in a safe forest area from dawn till late noon. They usually lie down and sleep may be due to the exhaustion for travelling long distance.

**Way of walking**

Speed of their movement generally depends on the distance from their next shelter. Their normal speed is 3-5 km/hr.Their lowest speed has been recorded to be approximately 2km/hr and highest speed being 10km/hr.

**Activity**

The elephants of the Dalma herd are primarily active in the dusk. They usually eat while moving in the dusk after bathing and continue till midnight. They gradually stop eating after midnight.

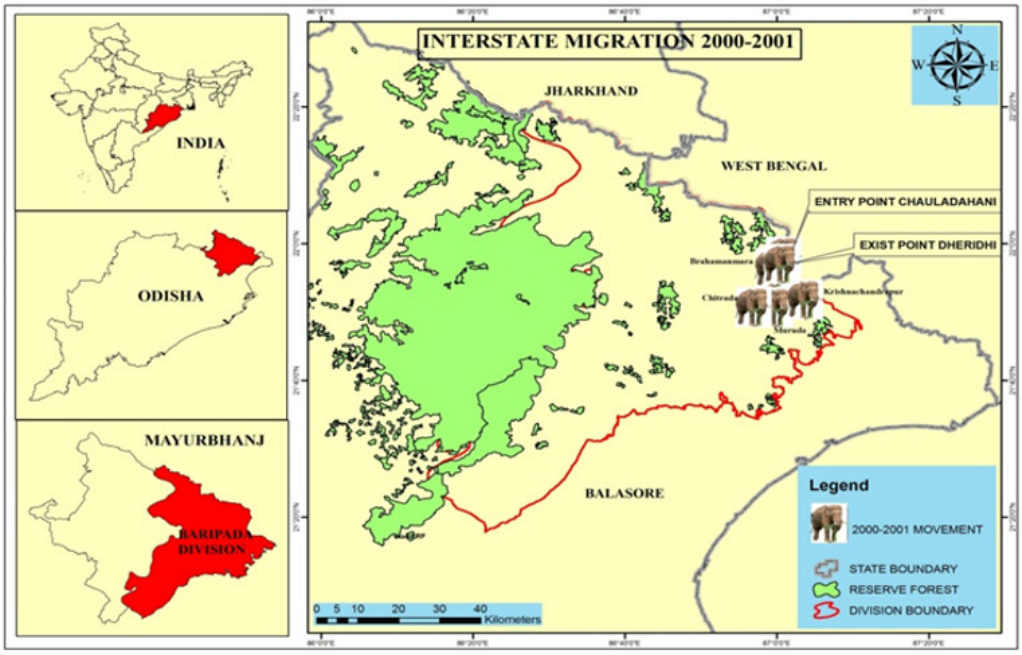


**Figure 1.** Elephant migration during 2000-01.

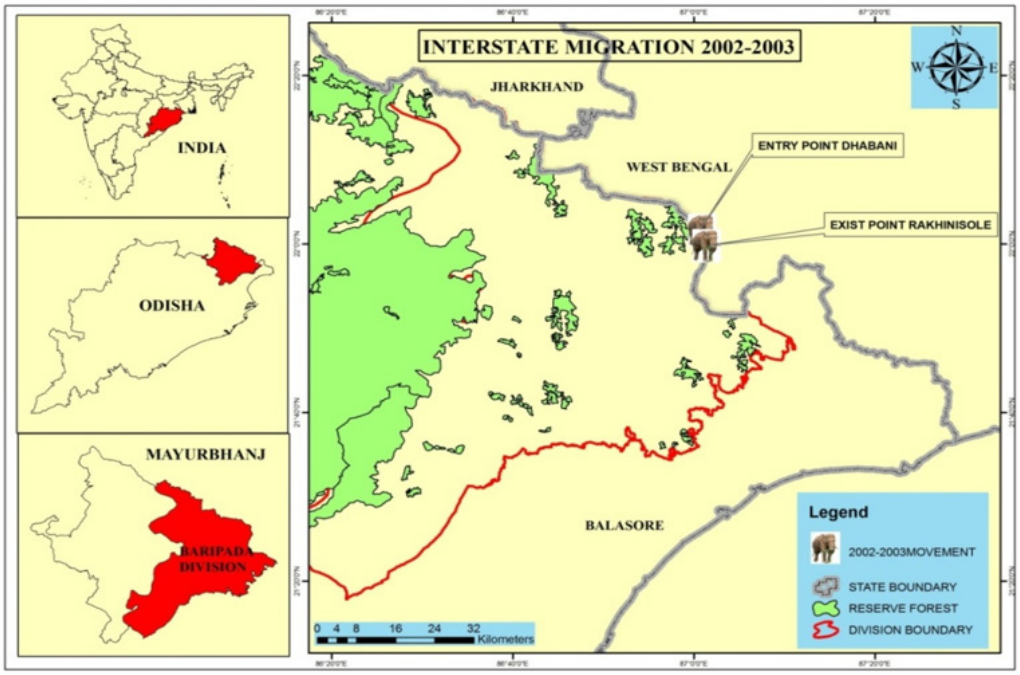


**Figure 2.** Elephant migration during 2002-03.

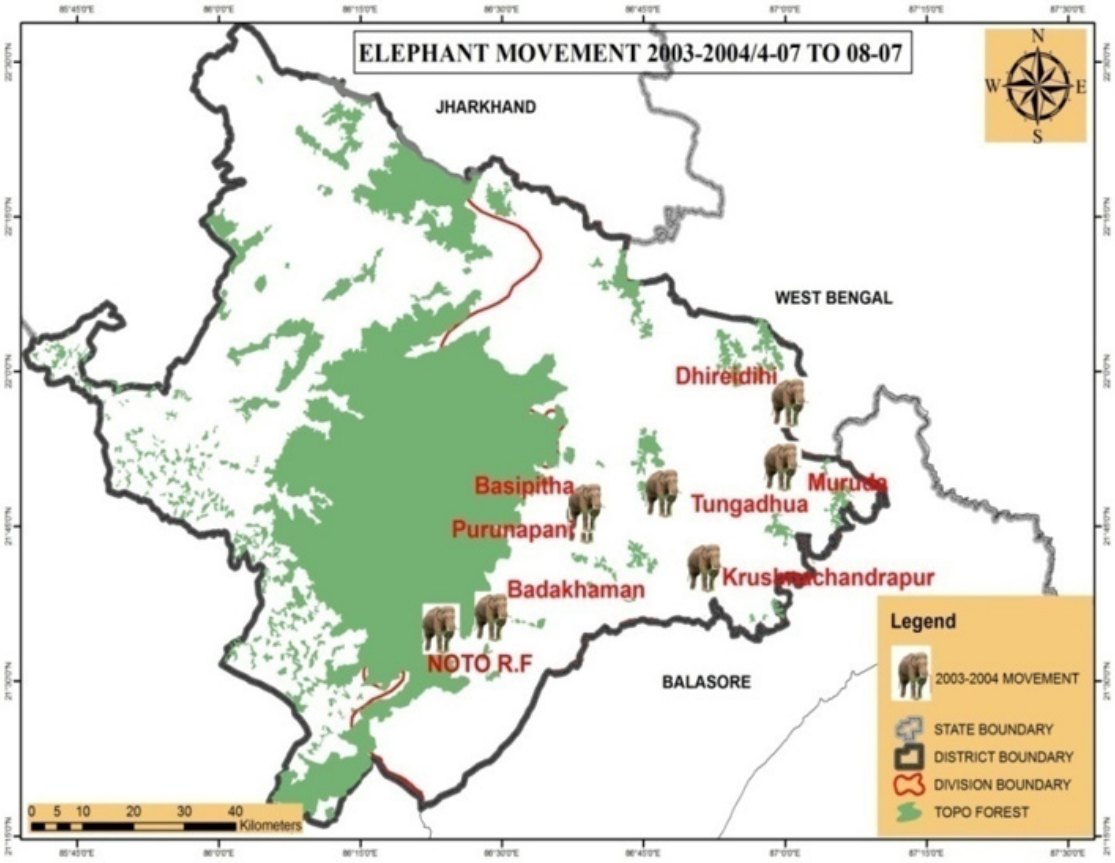


**Figure 3.** Elephant migration during 2003-04.

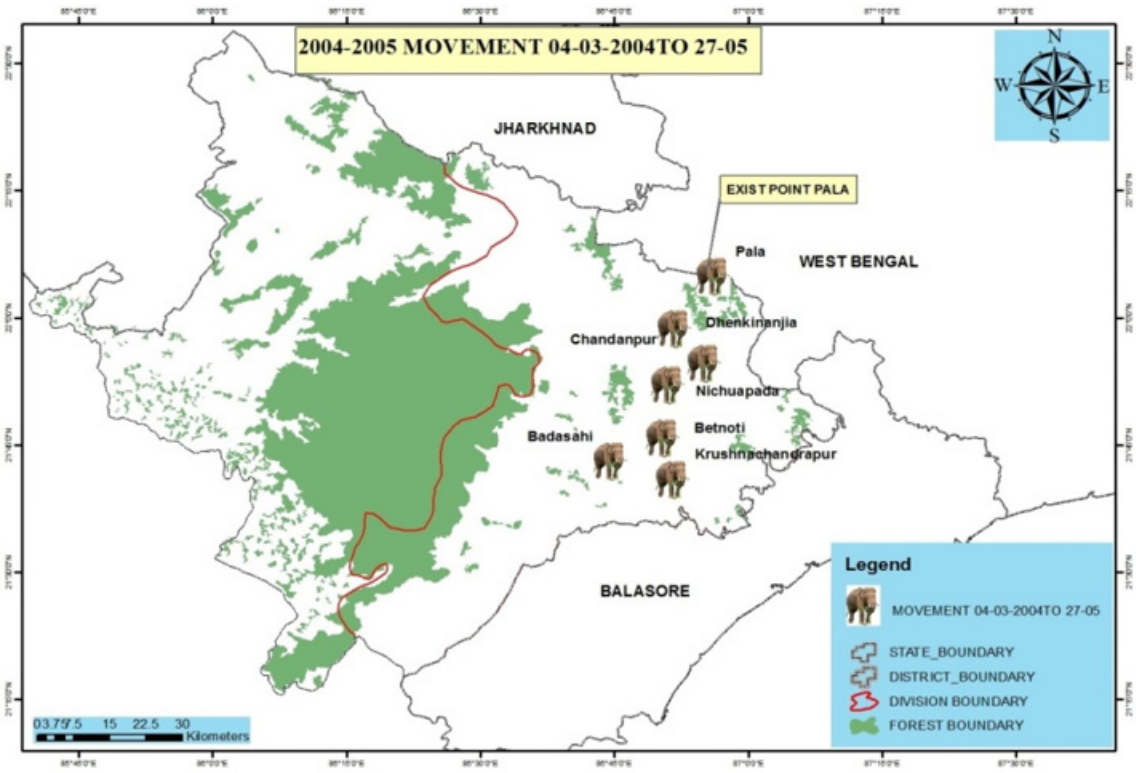


**Figure 4.** Elephant migration during 2004-05.

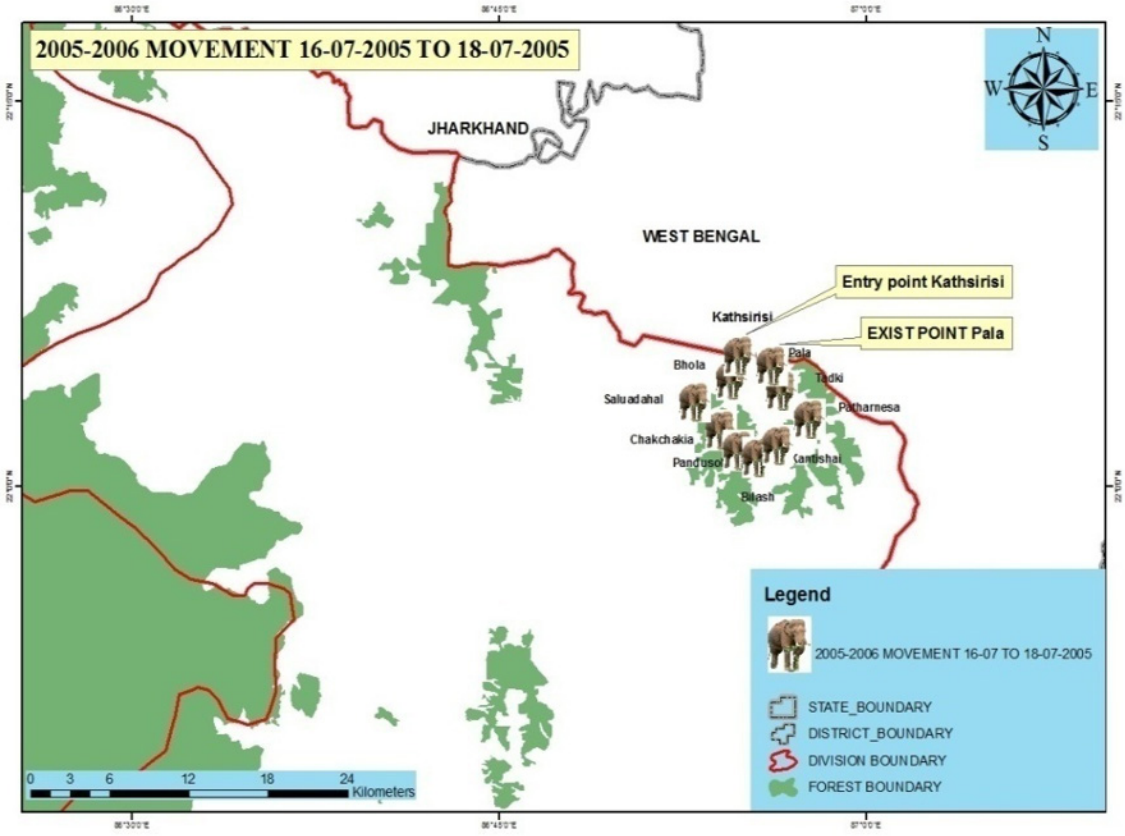


**Figure 5.** Elephant migration during 2005-06.

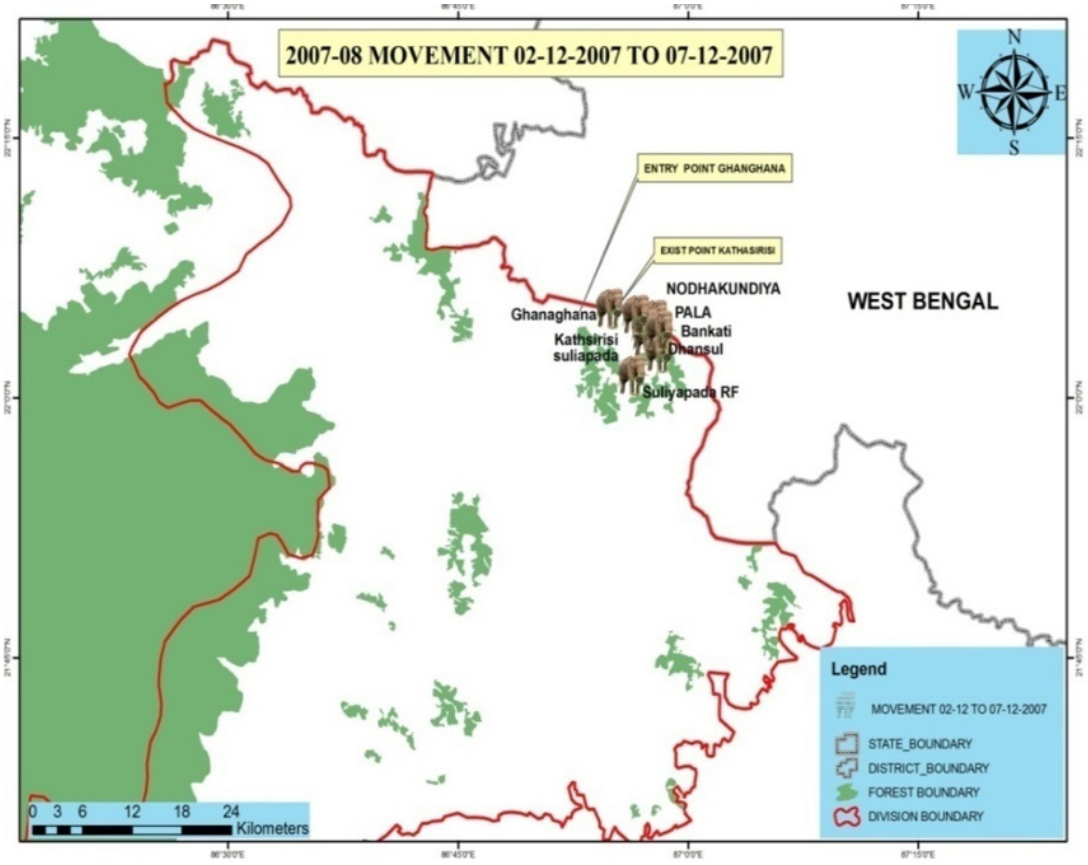


**Figure 6.** Elephant migration during 2007-08.

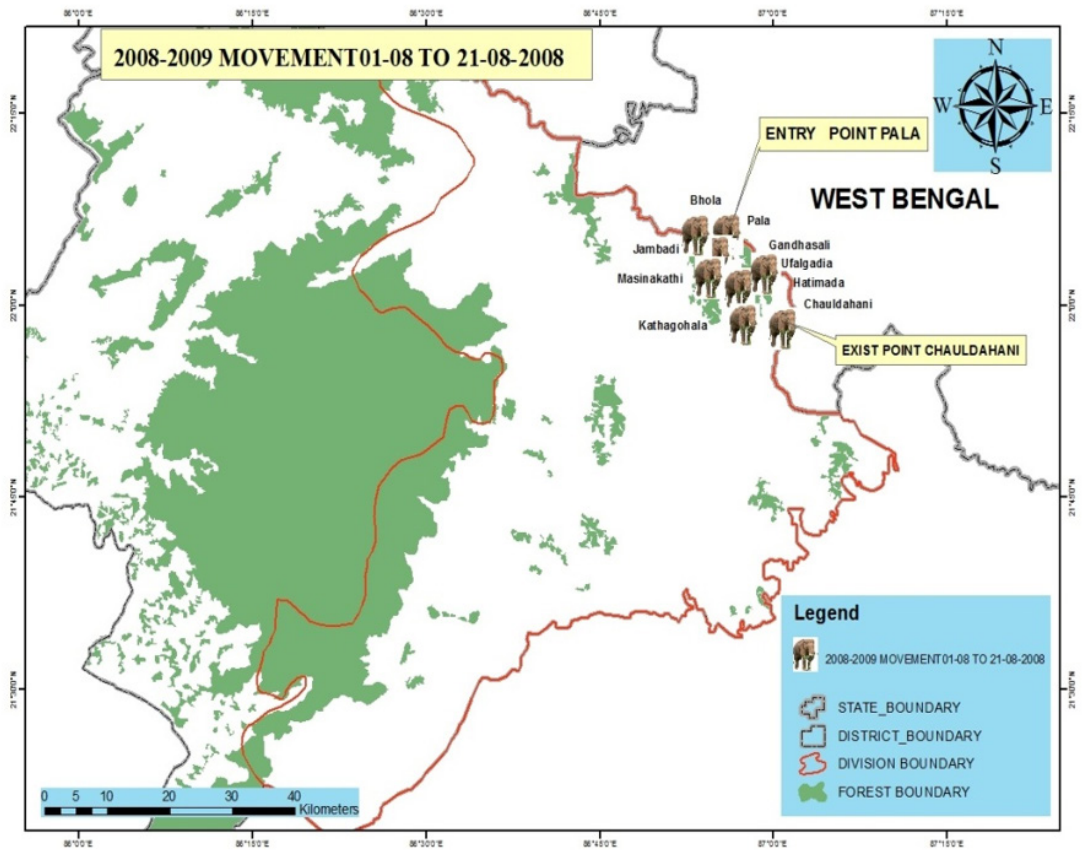


**Figure 7.** Elephant migration during 2008-09.

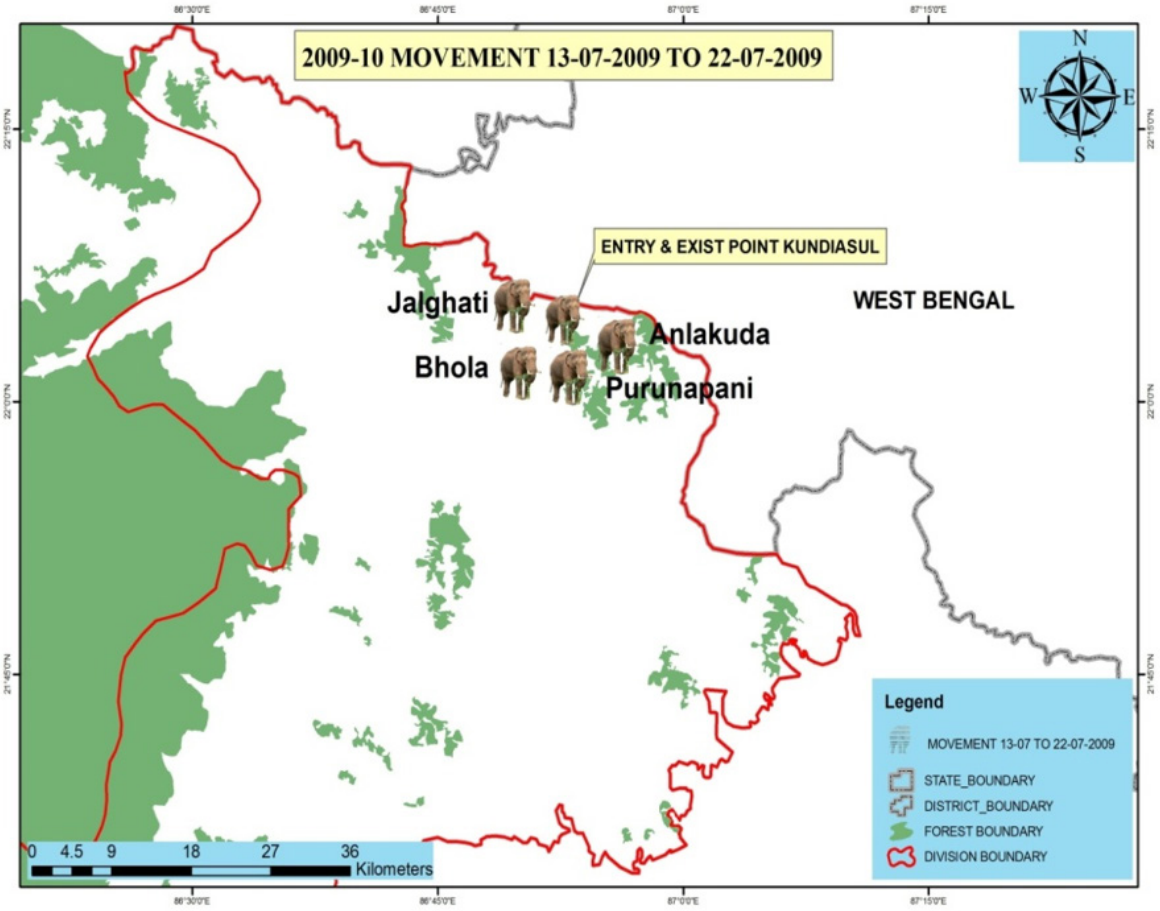


**Figure 8.** Elephant migration during 2009-10.

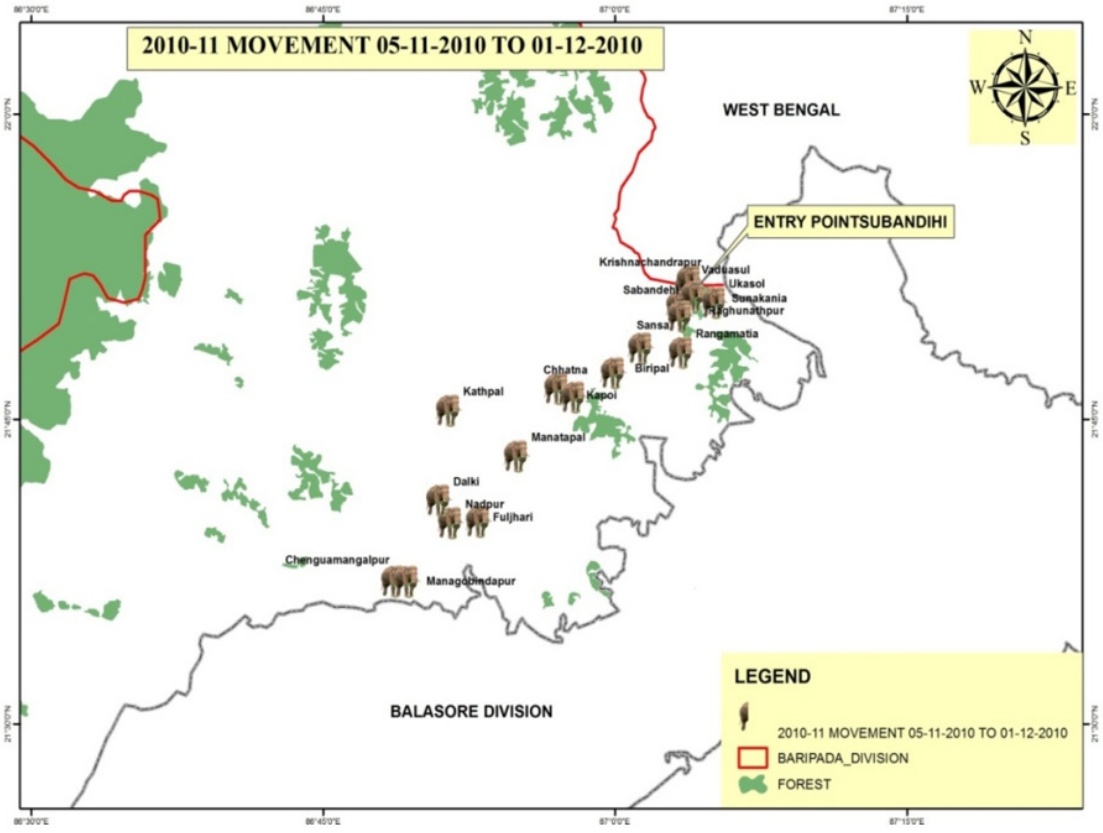


**Figure 9**. Elephant migration during 2010-11.

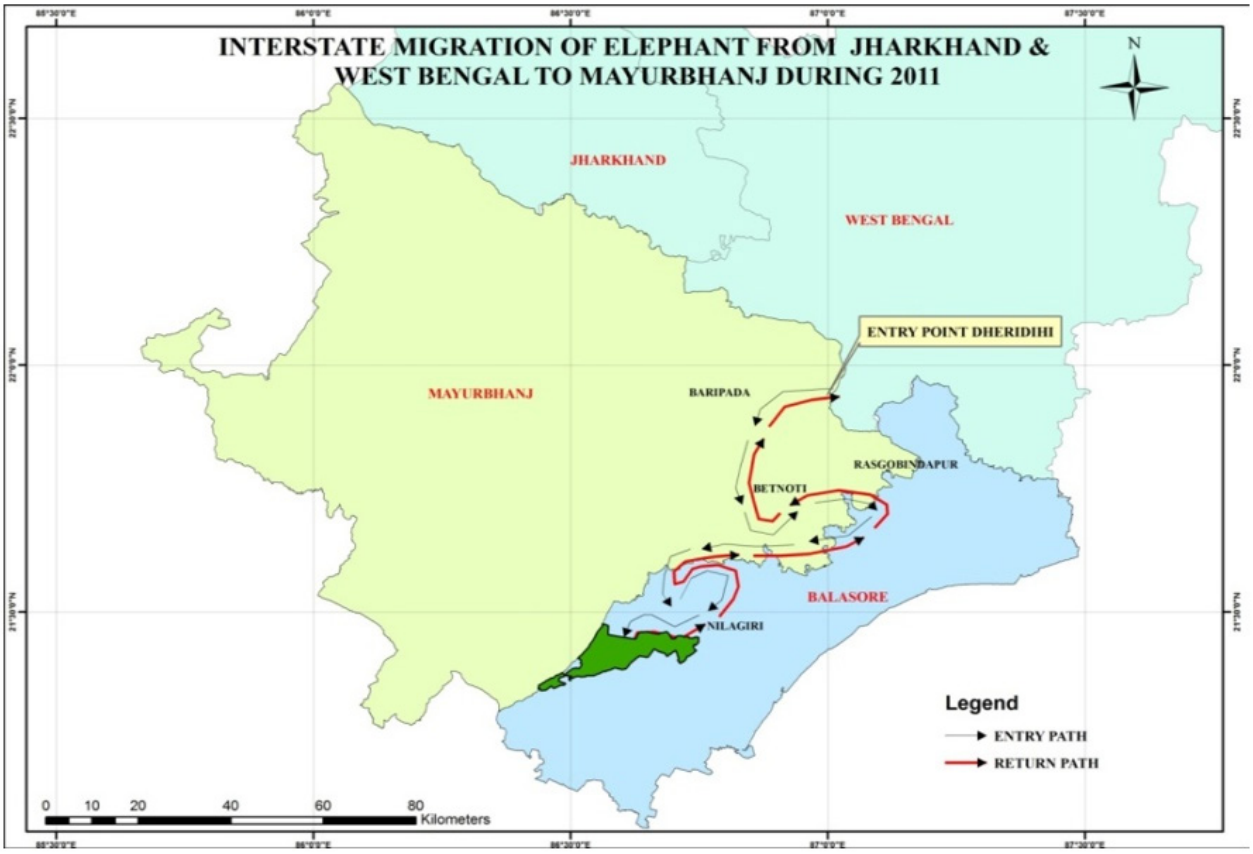


**Figure 10.** Elephant Movement during 2011.

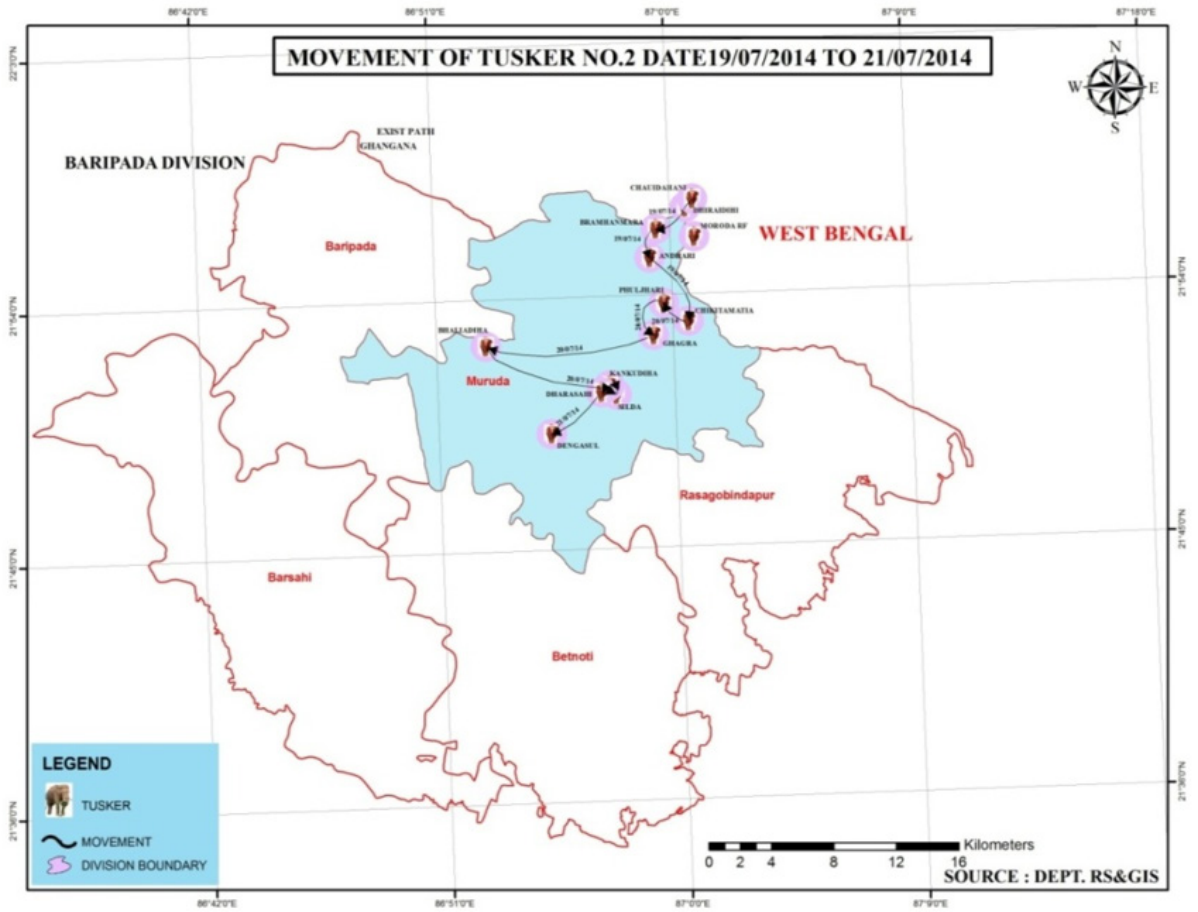


**Figure 11.** Elephant migration during 2014 (tusker movement).

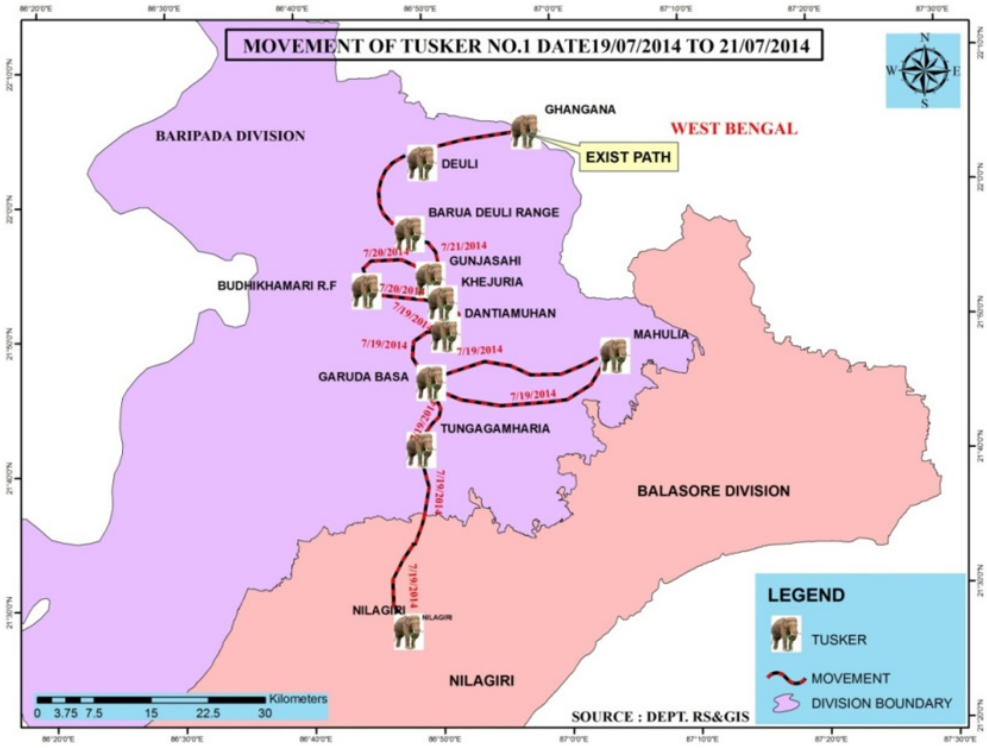


**Figure 12.** Elephant Movement during 2014.

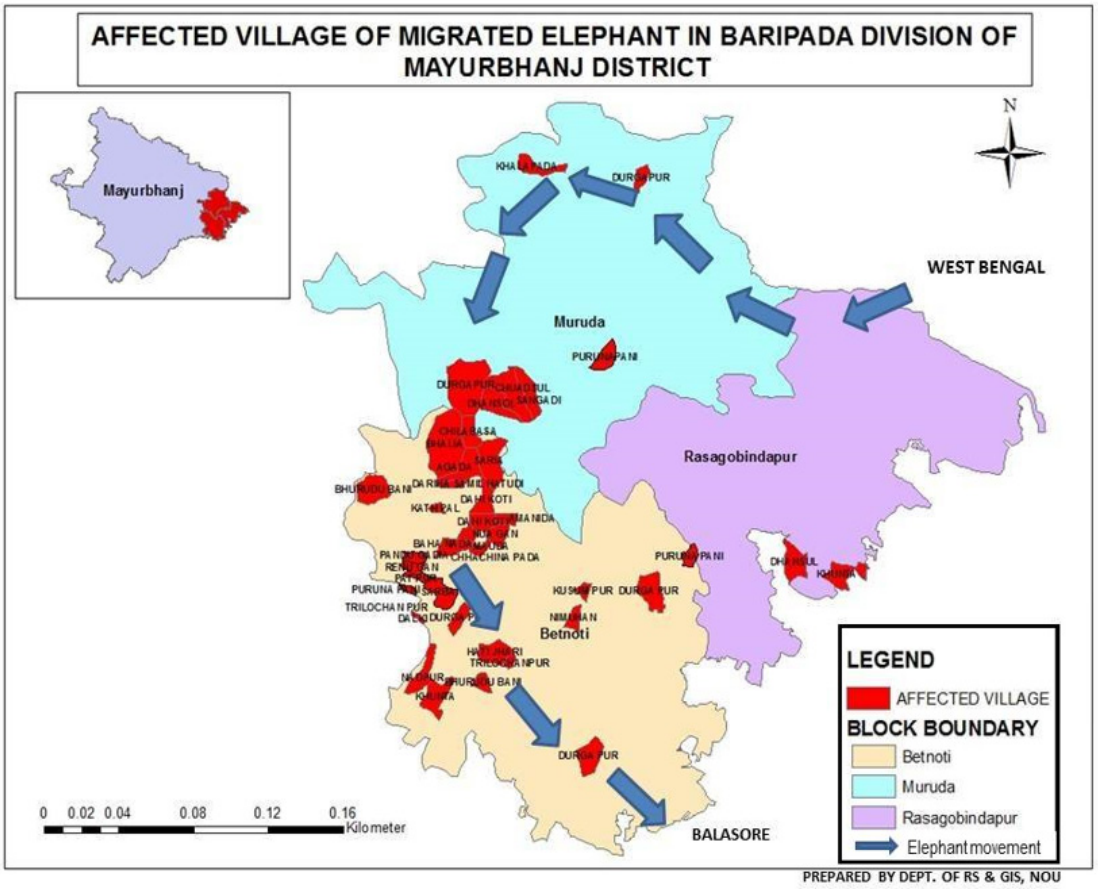


**Figure 13.** Affected villages in Baripada Divison.

## DISCUSSION

Both African and Asian elephants migrate each year the distance of migration depends on their habitat and the intensity of dry and rainy season and in consequence the availability of food in the form of agricultural crop. Asian elephants in south west Bengal are also found to follow the same migration path every year for agricultural crops. They normally follow the same migratory route on a yearly basis and migration depends on the environmental conditions. The migration the African and Asian elephants endure could happen for various reasons including habitat degradation, avoiding threat from predators, Climate change, and changes in resources availability or combinations of all these factors.

The main reasons for migratory behavior of Dalma herd in forest Baripada releated to habitat disturbance in Dalma area as a result of the direct and indirect effects of mining in the area. Mining in the Dalma area has resulted in biotic interference, habitat degradation, deterioration of the quality of drinking water and loss of refuge cover and breeding cover for the elephants.

The Dalma herd after entering Odisha border gets an ample quantity of agricultural crop as food rich in protein and carbohydrate. Potable drinking water sources are also available in the areas through which they move during their migration. Good forest cover is also available in patches which act as shelter, breeding cover. The food resources water and shelter are the main reason for the inflating number of migrating elephants entering Odisha each year from Dalma. The eldest elephant of the Asian elephant herd is usually responsible for remembering the migration route and in case of Dalma migratory herd also it is noticed that the migratory movement is being led by the oldest elephant tusker. Each and every year they are not only following the same route rather they are extending their migratory path for utilizing un explored resources –rich locations as a part of home range extensions. Their numbers are increasing and each year they are found to deliver 4-10 cubs during their migratory movement which are growing up to become healthy adults.

It can be concluded that this migration of the Dalma herd is beneficial for their population growth as they are getting a good source of food, water and shelter as a result of which they are showing a tendency to change their food pattern from natural fodder to agricultural crop and stay longer in Odisha.

The challenges confronting Asian elephant conservation in most elephant Ranges States are habitat loss and fragmentation, human elephant conflict and poaching and illegal trade of elephants. Loss and fragmentation of habitat to eater to the end of a growing economy and increasing human population is perhaps the most important factor impacting elephant populations in most range countries in Aisa.Habitat loss and fragmentation is results in direct loss of habitat for elephants leading to their death due to lack of resources or due to retaliatory killing or capture and removal when they come into conflict. Habitat loss and fragmentation also creates smaller populations that are compressed in to smaller and smaller space. Such small populations face threat of reduced likelihood surviving environmental catastrophes or disease and through stochastic threats (e.g., chance leading to highly skewed sex ratios). It also results in habitat patches declining below the average home range size of a single clan which due lack of resources.

## CONCLUSION

Habitat degradation is another threat which is neither easily visible nor easily measurable. For example, in India there are an estimated 173,000 forest fringe villages and enclaves inside forests with an estimates human population varying from 275 million (World Bank,2006) to 350-400 million (MoEFCC,2009). Such large populations which are wholly or partially dependent on forests for resources will invariably degrade the forest. Degradation eventually makes the habitat unsuitable for elephants even though the presence of trees would give the impression of an intact forests. The situation is the same in most Range States with the possible exception of Malaysia which does not have a large forest dependent human population. Where data was available and analysis done Sumatra makes a good case study, it has lost nearly 69% of its elephant habitats in the last three decades and this is largely due to large scale conversion of native forests to oil palm and softwood plantations. Similarly, Malaysia and the same also happened in Sabah and continues to happen, but adequate data and analysis are lacking. Such development and habitat losses are fragmenting conservation is not possible in the long term. When habitat is lost, fragmented or degraded the affected elephants are bound to come in to conflict and thus end up getting killed retaliatory action by farmer or are captured and removed to mitigate conflict. Conflicts between people and elephants result in loss of more than 600 humans and 450 elephants live every year in Asia: 80-85% of these reported from India and Sri Lanka alone. Some will also die due to poor nutrition and distress if they cannot successfully raid crops. Poaching remains a significant threat in Southeast Asia as there is a ready market for elephant products, from meat, skin, tusk/tushes, tail/tail hair etc. However, retaliatory killing of elephants using trap guns, poison, electrocution etc. are on the rise in most countries. Such killing retaliatory killing is countries like India is exceeding the number of elephants killed by poachers.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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