

# Migration Ethology of Dalma Herd and Analysis of the Rationale Behind

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## Abstract

Asian elephants of Dalma Wildlife Sanctuary have been migrating to West Bengal 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 unexplored resource rich locations as a part of their homerange extension. We studied the behavioural patterns of this increasing population of migratory elephants from Dalma and tried to analyze the reasons behind this movement each year which is causing serious man-animal conflict in West Bengal as they are rampaging the agricultural crops.

**Key Words:** Asian Elephants, *Elephas maximus*, social organization, ethology, homerange extension

## 1. Introduction

Elephants are large mammals of the family Elephantidae and the Order Proboscidea. Elephantidae are the only surviving family of the Order Proboscidea. The Asian elephant, *Elephas maximus*, are found scattered throughout the South Asia and Southeast Asia<sup>1,3</sup>. Dalma Wildlife Sanctuary is located in the East Singhbhum district of Jharkhand in India. The Sanctuary sprawls in the catchment area of Subarnarekha about 40kms from Jamshedpur. The Sanctuary is much favoured by the elephants and the population of elephants at the Dalma Wildlife Sanctuary has swelled in the past few years<sup>16</sup>. But since 1987, large number of elephants from Dalma are entering the densely populated districts of Purulia, Bankura and

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Paschim Medinipur in West Bengal and causing serious human-elephant conflict as they are using agricultural crops as their food source and destroying huge quantity of crops<sup>2,8,9,15</sup>.

### **Number of elephants entering West Bengal over the years**

<b>Year</b>	<b>Number of elephants entering West Bengal</b>
1987-88	28-32
1995-96	50-55
2000-01	70-75
2005-06	90-95
2010-11	110-115
2013-14	135-140

### **Route followed by the elephants over the years**

In the year 1987, the migration of the Dalma elephants was restricted to Jhargram and certain areas of erstwhile Medinipur Division upto Jhitka forest of Lalgah. In the year 1995-96, when 55-56 Dalma elephants entered West Bengal, they followed a short route which included Jhargram, Medinipur and Arabari and after rampaging 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, Lalgah, 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 upto Orissa. Now in 2013-14, they follow a long migratory path which includes Jhargram, Malabati, Lalgah, Goaltore, Amlagora, Garbeta, Bishnupur, Barjora, Sonamukhi, Gangajalghati, Patrarseyar 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 Orissa. During their return journey they follow the same route through Patrarseyar back to Lalgah and then crossing Malabati go back to Dalma in Jharkhand.

### **Study Area**

The study was carried out in different areas of Paschim Medinipur and Bankura in West Bengal.

### **Time Schedule**

The Dalma herd usually moves in to West Bengal in July and after crossing their long migratory path go back to Dalma in the month of May next year.

## **2. Study of the Social organization of the Dalma herd**

The social structure of elephants is very complex<sup>4,17</sup>. In the year, 2013 the elephant herd after staying at Dalma Wildlife Sanctuary for some time, started migrating to neighbouring Bengal on 8<sup>th</sup> August. 135-140 elephants from Dalma entered West Bengal and on their way to the Study Area, a group of 25 resident elephants from Bengal entered the Dalma herd and remained together for the rest part of their journey.

## Population Dynamics

There were 137 migratory elephants in the Dalma herd when they were in the Study area in the year 2013. There were 23 males out of which 14 were tuskers and 9 were makhna. There were 50 females, 43 sub-adults and 21 babies.

In the Dalma herd, there were 21 juveniles below the age of 3 years, 43 sub-adults between the age group of 4-9 years and 73 adults of the age of 10 years and above.

## Family Units

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

It is interesting to note that elephants of the resident group from Bengal that entered the Dalma herd were always staying together as a single sub-group within their own herd. Even the males 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 5-6 female members visibly. The males did not belong to any particular sub-group but were found to guard these small female sub-groups. Usually one male guards 2-3 such sub-groups.

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



Figure 1: A sub-group of 5 females and sub-adults of the Dalma migratory elephants being guarded by a male tusked.

## **.Hierarchy Status**

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 big tusked 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 are usually responsible for remembering the migration route<sup>1,11,12</sup>. Before the herd moves, they always send an advance party of 3-6 elephants which includes a mixed group of adult males and females approximately in 2:1 ratio. The primary function of the advance party is surveillance. They check 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 move after they get the green signal from the advance party for their movement.

### **3. Study of Social Behaviour**

#### **Dominance**

Bulls assess each other's strength through fighting. The biggest tusked usually leads the group at the time of long distance migration. The level of dominance is closely related to a bull's size, power and weight<sup>6</sup>.

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 residential males try to mate with the females of the moving herd.



Figure 2: A dominant male leading the other elephants in the herd for crop raiding.

## **Mourning behavior**

The complex nature of elephant social structure is extended into the mourning behavior for the deceased companions<sup>5,10</sup>. The moving herd tries to move with the ill elephant companion till the end but leaves it when they find it impossible any more to move along with sick animal. On 16<sup>th</sup> 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 Officials on 17<sup>th</sup> and 20<sup>th</sup> October. The bull was still found to be there with the ill female elephant and it finally left the female behind and moved and joined the herd when the Dalma herd went to Nayagram on 20<sup>th</sup> October.

Sometimes, the baby elephants who are sick are being left behind by the herd. The mother elephant tries to come to the baby 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 baby.

A baby elephant was left behind when the Dalma herd finally crossed Subarnarekha and went to Nayagram. The mother of the cub must have sensed that the cub was ill and was forced to leave the cub there. The cub was being detected by the Forest Officials and was transferred to minizoo at Jhargram and was taken good care of by the Forest Officials but it ultimately expired on 3<sup>rd</sup> November, 2013.

## **4. Study of Individual Behaviour**

### **Musth**

Male elephants have a temporal gland on each side of the head between the eye and the ear which produce a heavily scented secretion which is seen to be trickling down the side of the face of males in musth<sup>7</sup>. Musth is a normal phenomenon and the males in musth randomly move to different groupings looking for reproductively receptive females in the Dalma herd.

### **Bathing/Dusting**

Bathing is both pleasurable and essential for elephants. The elephants of the Dalma herd usually goes for bathing from late afternoon to dusk. 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 radiation. This is the main reason that the elephants wallow in mud and cover themselves with dirt. This 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 a reddish tinge 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 distances.

### **Gait**

Speed of their movement generally depends on the distance from their next shelter. Their normal speed is 3-4km/hr. Their lowest speed has been recorded to be approximately 2km/hr and highest speed being 6-8km/hr.



Figure 3 : The Dalma herd moving in the dusk.

### **Activity**

The elephants of the Dalma herd are primarily active in the dusk. They usually eat while moving in the dusk after bathing and continues till midnight<sup>14</sup>. They gradually stop eating after midnight<sup>13</sup>.

## **5. Discussion**

Both African and Asian elephants migrate each year, the distance of migration depends on their habitat and the intensity of dry and rainy seasons 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 in every year for agricultural crops. They normally follow the same migratory routes on a yearly basis and the migration distances are dependant 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, changes in resource availability or a combination of all these factors. They usually move to a more resource-rich location, once the resources start getting depleted in the areas where they currently are.

The main reasons for migratory behavior of Dalma herd in South-west Bengal are related to habitat disturbances 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 West Bengal get 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 and refuge cover for the elephants.

After crossing West Bengal, the migratory elephants enter Orissa. Kuldiha Wildlife Sanctuary in Orissa is now acting as their winter terminal station at Western end which is having excellent forest quality with water and other natural resources.

The food resources, water and shelter are the main reasons for the inflating number of migrating elephants entering West Bengal each year from Dalma. The eldest elephant of the Asian elephant herd are 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 tusker. Each and every year they are not only following the same route, rather they are extending their migratory path for utilizing unexplored resource-rich locations as a part of homerange extension. Their numbers are increasing and each year they are found to deliver 4-6 cubs during their migratory movements which are growing up to become healthy adults.

In summation, 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 West Bengal and Orissa each year.

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