

## LIVING WITH GIANTS



### Understanding Human-Elephant Conflict In Maharashtra and Adjoining Areas

Ujjal Kumar Sarma  
P. S. Easa



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Ujjal Kumar Sarma and P. S. Easa

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## **PREFACE**

There used to be a time when Central India did not have elephants. Elephants existed in the Nilgiris and to Dandeli in northern Western Ghats and also in Jharkhand and Orissa on the south-eastern region of the country. However, the political boundaries of what was then Madhya Pradesh (now Madhya Pradesh and Chattisgarh), Bihar, Maharashtra and Goa did not have elephant populations. Such have been the relentless ravages on the elephant habitats of some of these areas, that elephants have steadily migrated to more safe and productive ecosystems. Andhra Pradesh was the first to receive elephants from Tamil Nadu a decade ago and slowly, all the other states also started receiving a few stray herds. Over the years, these populations have become resident through the year, or for most part of it, and thereby new elephant ranges have been created by man.

Maharashtra and Goa have received their share of elephants from northern Karnataka, especially from the Dandeli Wildlife Sanctuary and surrounds. These new found migrants into Maharashtra are being met with a combination of surprise, fear, hostility and aggression by the local human populace, most of who have never seen a wild elephant in their lives before. The forest department and district administration are trying their best to tackle the new found issue before it gets out of hand. The Wildlife Trust of India's conflict mitigation team recently helped the Maharashtra forest department with a workshop on how to deal with the issue and also studied some of the base issues involved. This Occasional Report is therefore of value to all the administration personnel, whether wildlife related or not-of that region of Maharashtra and Goa where these elephants have taken temporary residence.

This report should also prove useful to students of elephant–human conflict mitigation—the conservation issue that is fast threatening to be the number one elephant conservation issue in the country.

Vivek Menon  
Executive Director, WTI



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The study was supported by the International Fund for Animal Welfare (IFAW). Mr. Vivek Menon, Executive Director was a source of encouragement and suggested improvements in the report.

## **EXECUTIVE SUMMARY**

Human–wildlife conflict occurs to a varying extent throughout the elephant's range. Elephants often make forays into areas of human settlement and destroy crops, raid food stores, damage man-made structures, occasionally injuring or killing people in the process. Crop damage affects subsistence farmers directly through loss of their primary food and cash resources, and indirectly through a variety of social costs. The retaliatory measures more often injure the animal and sometimes lead to its death.

To collect information on human–elephant conflict (HEC) and understand the problem, the HEC (Human–Elephant Conflict) Mitigation Cell of WTI visited the conflict affected parts of Southern Maharashtra and adjoining areas in March, 2006.

The major findings of the study are:

1. In the recent times elephants from the forests of adjoining states have moved to parts of Maharashtra, which is traditionally not an elephant ranging state, thus creating panic. Forest Department records confirm that elephants from Karnataka first reached Maharashtra in 2002. Human–elephant conflict incidences have also been reported from Goa, another state not included in the list of elephant ranging states. Elephants in both these states have been causing immense damage particularly to crops like paddy, coconut and cashew. Equally important is the amount of fear and anxiety it has created in the minds of the local people and also among the Forest department staff who patrol the affected areas, though the reality is that they are hardly trained to mitigate such conflict problems.

2. The routes followed by elephants in Maharashtra and adjoining areas were recorded. In Chandgad, elephants generally restrict their movement close to water sources (reservoirs) wherever possible. Frequent sightings of elephants at Damne, Hajagoli, Maduvale, Jangomhati, Ambevadi, Patne, Jalugude and Karanjgaon support this statement. In Dodamarg, elephants generally take shelter in the forested areas on the fringes of the Tiları reservoir in Konal Forest Round, which is now almost devoid of human habitation. Records show that elephants here have raided more villages. Elephants have also made their way into northern Goa from Dodamarg taluk along the areas adjoining Maneri River (Sindhudurg district) of Maharashtra. However, there is no report of elephants staying back in Goa for long.

3. In all these areas, elephants often raid crops, especially paddy after dusk and are back to the nearest forest before dawn. Elephants have been seen to feed on paddy, ragi (finger millet), coconut, cashew, banana etc., but cause greater damage by trampling. The reluctance on the part of the local people to chase the raiding elephants from the crop fields, or initiate any systematic effort to mitigate the problem could also be aiding the elephants in their raids.

4. The importance of considering small wildlife habitats as part of a larger ecosystem also needs to be considered. Forest contiguity ensuring larger habitat is important to mega-herbivores like elephants, presently living in fragmented habitats. The forest cover of the Western Ghats, in the districts of Kolhapur, Sindhudurg, Belgaum, Uttara Kannada and Goa has immense potential as a unit to support a viable population of an array of wildlife.

Based on the observations in the field and discussions with the Forest department staff and villagers, the following actions are recommended:

**(i) It is important to look at the issue on a landscape scale, considering that the forested areas of Karnataka, Maharashtra and Goa are part of the larger Western Ghats ecosystem.** Though the preliminary survey undertaken suggests that the contiguous forest patches near Damne, Jalugude, Ambevadi, Kaliyade and Jangomhati in Chandgad taluk have the potential to provide habitat for a small elephant herd, it is not sufficient for a viable population of elephants unless connectivity with a larger habitat in the forest areas of Uttara Kannad district (Karnataka) is secured and maintained (Table 1). It is also pertinent to have closer interaction with the officials of these areas for successful implementation of mitigation measures.

**(ii) Capacity building and sensitizing the staff of the Forest Department as well as the local communities is vital for conservation.** Each team should be equipped at least with a vehicle, wireless set, binoculars, high-beam mobile spot lights and first aid medical kit. The level of conservation awareness across all hierarchies, including the government departments, politicians, panchayats, village leaders, local people and local media needs to be increased. Apart from helping in achieving the objectives of wildlife conservation, this would also promote co-operation between the general public and the Forest Department staff.

**(iii) Compensation scheme can be improved.** Even more important is a single compensation scheme that ensures prompt disbursement of compensation.

**(iv) Research is required for the preparation and implementation of a sound management plan.** For this purpose, basic monitoring can be carried out at the local level after capacity building. For advanced research, the Forest department can tie up with organizations with the required expertise and willingness to work in the area. Satellite imagery should also be procured and classified to know the present status of forest cover. This can be used for overlaying the movement paths of the elephants. It is also worthy to study the effect of the various reservoirs of Tilari Dam and other minor irrigation projects in the districts of Kolhapur, Sindhudurg, Belgaum and Uttara Kannad. Similarly, proposed and ongoing mining activities need to be examined from a wildlife perspective before giving clearance.

## **1. INTRODUCTION**

The situation facing the Asian elephant is critical. According to IUCN (2006), one of the main contributing factors to the decline of elephant population is the increase in human–elephant conflict, which results in damage to property and the death of a large number of animals and people every year. The rise in conflict is inevitable as Asian elephants have less and less natural habitat to feed and roam. Out of an original nine million square kilometers of the Asian elephant’s habitat, only 55.55% (five million square kilometers) remains today. The population of Asian elephants has also declined over the past half-century to an estimated 30,000–50,000 animals in the wild (IUCN, 2006). Habitat destruction and fragmentation are the root causes of many conservation problems (Debinski and Holt, 2000).

In Asia, conflict between wild elephants and people occurs to a varying extent throughout the elephant's range (Seidensticker, 1984; Sukumar, 1989; Easa and Sankar, 1999). Elephants often make forays into areas of human settlement and destroy crops, raid food stores, damage barriers or other man-made structures, occasionally injuring or killing people in the process. People retaliate by injuring, killing or using deliberate measures to displace elephants. Conflict between elephants and people is a major concern for wildlife management. In some areas, the problem is chronic, predictable and threatens the livelihood security of farmers living near wildlife habitats (Hill, 1998). This issue can also threaten the viability of wild animal populations by creating a confrontational atmosphere between farmers and wildlife managers (Taylor, 1999).

Crop damage affects subsistence farmers directly through loss of their primary food and cash resources, and indirectly through a variety of

social costs. Rural people express their frustration of unchecked crop loss through passive resistance to, or even sabotage of, development projects (Hill, 1998). Wildlife personnel, who have the authority to manage elephants, are generally impeded by lack of funds, trained personnel and equipment. Farmers often feel powerless to combat the problem and hold wildlife managers as responsible for crop losses and expect some form of compensation (AfESG, 2000).

The broad definition of human–elephant conflict (abbreviated as HEC) adopted by the IUCN/SSC African Elephant Specialist Group (AfESG) is "any human–elephant interaction which results in negative effects on human social, economic or cultural life, on elephant conservation or on the environment" (Hoare, 2001). There is increasing agreement in conservation and political circles about the need to mitigate the negative effects of this conflict on both humans and elephants. HEC is now mostly taken to mean direct conflict, but it is part of a complex interaction between people and elephants which in most countries has been going on in some form for centuries. Unfortunately, the present day circumstance can make it a very difficult problem to address.

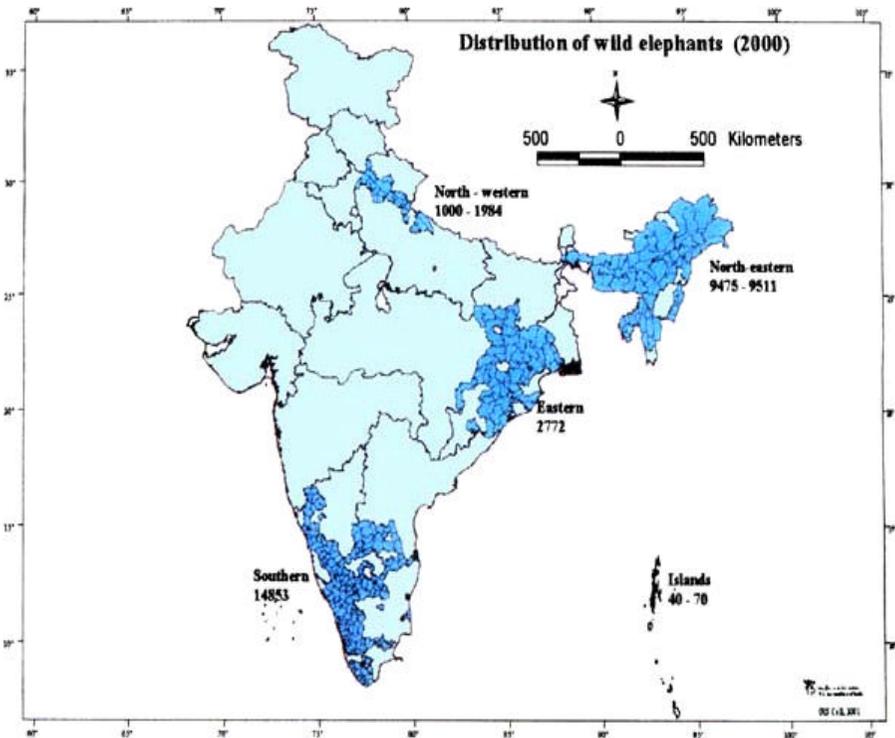
While as many as 300 people are claimed to have been killed in India in confrontations with elephants annually (Kemf and Jackson, 1995), government figures show an average of 192 per year over a period of ten years, from 1991–92 to 2001–02 (8th Meeting of the Steering Committee, April 2002, Project Elephant).

In certain areas, the situation is worsening to the extent that, given a choice, most elephants would be eliminated. The tolerance level, however, varies from farmer to farmer depending on various factors including land availability, success of the growing season and so forth. In

addition to the monetary loss incurred during raiding, farmers also invest in deterrents, including a great deal of time in guarding their fields, mostly at nights (Sukumar, 1994).

### 1.1 Status and Distribution of Elephants in India—an overview

Information on the distribution of the elephant in ancient India is available from the memoirs and writings of the Moghul Emperors of the 16th and 17th centuries A.D. The Emperor Babur (1526–30) notes in his memoirs that the elephant "inhabits the district of Kalpi (and the higher you



**Figure 1:** Distribution of wild elephants in India (2000); *Source: WII website*

advance thence towards the east, the more do the elephants increase in number)". His grandson, Akbar, who ruled from 1556 to 1605 describes an elephant-capturing hunt in the forests of Narwar, and his son, Jahangir, (1605–1627) describes a similar hunt in Dahad in the Panchmahals. Kalpi (26° 38' N, 77° 54' E) is in present day Rajasthan, Narwar (25° 39' N, 77° 16' E) in present day Madhya Pradesh; and Dohad (22° 50' N, 74° 16' E) in Gujarat represents the westernmost distribution of the population in the peninsula during the 16th and 17th centuries and thus provides an indication of the extent of loss of habitat up to that period (Daniel, 1998).

The historical range of the elephant in India has shrunk, confining the elephants into distinct geographical zones. The Indian sub-continent has an estimated population of about 27000–29000 elephants, which is about 50% of the Asian elephant population. These range in eleven Elephant Reserves spread over about 110,000 km<sup>2</sup> forests in north-east, central, north-west and south India (Bist, 2002) (Figure 1).

Elephants in north-eastern India range in the states of Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura. Once contiguous with that of Bhutan, Bangladesh, Nepal and Myanmar, the north-eastern elephant population is now discontinuously distributed. The elephant population on the north bank of the Brahmaputra extends from northern West Bengal through the Himalayan foothills and the Duar touching southern Bhutan, northern Assam and Arunachal Pradesh. About 7900 km<sup>2</sup> area is available to an estimated elephant population of 2700–3000. On the other hand, elephants on the south bank of the Brahmaputra are divided into eastern, central and western populations. About 16400 km<sup>2</sup> area is available to an estimated elephant population of 6800–7200 (Choudhury, 1999).

The elephants in northern West Bengal form the western most extension of the north-east Indian elephant population (Choudhury & Menon, Unpublished IUCN Draft Action Plan). There are about 300 elephants in this region spread over Darjeeling and Jalpaiguri districts. Although the elephant population in this region is only about 1% of the total elephant population of India, the human–elephant conflict in the region is one of the highest in the country.

The north-west India elephant population was once distributed over parts of Uttar Pradesh from Katerniaghat Wildlife Sanctuary to the Yamuna River. Currently about 1000 elephants are distributed as six isolated populations. The elephants in the range form six populations with 150–200 elephants west of the River Ganga occupying about 1500 km<sup>2</sup>. About 4000 km<sup>2</sup> between the Ganga and Gola Rivers has about 650–700 elephants whereas the 1800 km<sup>2</sup> stretch between Gola and Sharda River has only 50 elephants. About 50 elephants are distributed over 2500 km<sup>2</sup> between Khatima Range and Katerniaghat (Johnsingh *et al.* Unpublished Draft Action Plan).

The Central India population, sometimes also known as the Eastern India population extends over 1700 km<sup>2</sup> in the states of Orissa, Jharkhand and southern West Bengal and hold a population of about 2400–2700 elephants. Orissa has about 57% of the elephant habitat in central India with 1800–2000 elephants spread over about 11,000 km<sup>2</sup> (Choudhury, Unpublished Draft Action Plan).

The South India population is distributed over the Western Ghats and parts of the Eastern Ghats in Kerala, Tamil Nadu, Karnataka and Andhra Pradesh (Easa, 2005). Northern Karnataka is the northern-most limit of elephant distribution in South India. The Brahmagiri-Nilgiri-Eastern Ghats population extends from the Brahmagiri Hills to the south through the

Eastern Ghats in the state of Karnataka, Tamil Nadu and Kerala with a splinter group in Andhra Pradesh. About 6300 elephants are distributed over 12000 km<sup>2</sup> of habitats.

Elephants however, sometimes also migrate to new habitats for different reasons. Rao (1995) has reviewed the status of elephants in Andhra Pradesh. According to him, elephants were not known to occur in Andhra Pradesh for the last 300 years. However, during 1984, a small group of seven elephants migrated to the forests of Kuppam and Palamaner area of Chittoor district from Tamil Nadu. Subsequently this group was supplemented with further migration of a herd of 22 animals in 1986. Initially the elephants moved between Chittoor district and the adjoining areas of Tamil Nadu. But by 1987, they made the Palamaner forests their home. To protect this group of elephants and to improve the habitat of the Palamaner forests, an area of 353 km<sup>2</sup> of forest was declared as Koundinya Sanctuary in 1990. To improve the thorny scrub forest type, habitat improvement works like deepening of *Kuntas* (water tanks) and restoration of breached bunds were carried out. Planting of bamboo seedlings, coupled with fire protection work were also taken up. However, till 1993, at least 30 human deaths were reported. During the same period 12 elephants died. Death due to electrocution was the cause in eight cases.

## **1.2 Elephants in Maharashtra**

Maharashtra is traditionally not an elephant ranging state. However, in recent times, elephants from adjoining areas have moved to parts of the state and created terror in some areas. Forest Department records confirm that elephants from Karnataka first reached Maharashtra in 2002. Human–elephant conflict incidences have also been reported from Goa, another state not included in the list of elephant ranging states.

Interestingly, elephants went to Goa from Maharashtra. Elephants in both these states have been causing damage particularly to paddy crop. Elephants also fed on and damaged banana, cashew, coconut etc. There were also a few sporadic cases of human deaths due to elephants. Equally important is the amount of fear and anxiety this creates in the minds of the local people and also among the Forest department staff, who patrol affected areas irrespective of the fact that they are hardly trained to mitigate such conflict problems. Today, human–elephant conflict has reached an alarming situation in these areas. Recently four elephants (three adult female elephants and a male calf) were found dead near Jalugude village in Chandgad taluk of Kolhapur district (reported on 22nd February 2006).

Considering the severity of the problem, the HEC (human–elephant conflict) Mitigation Cell of WTI (Wildlife Trust of India) visited the area in March 2006 to collect information on human–elephant conflict (HEC) from Chandgad and Dodamarg taluks and adjoining areas and to provide preliminary suggestions for the mitigation of human–elephant conflict.

## **2. PROJECT AREA**

The project primarily focused on the human elephant conflicts in Chandgad taluk of Kolhapur district and Dodamarg taluk of Sindudurg district, Maharashtra. It also looked into the areas in Maharashtra from where elephants entered North Goa district, Goa and returned to Maharashtra. The study attempted to identify the areas through which elephants enter Maharashtra from Karnataka.

The forest covers of the concerned districts in the landscape are as shown in Table 1:

**Table 1:** Forest cover in the landscape

District	Kolhapur (Maharashtra)	Sindhudurg (Maharashtra)	North goa (Goa)	Belgaum (Karnataka)	Uttara kannada (Karnataka)
Geographical area (in km <sup>2</sup> )	7,685	5,207	1,736	13,415	10,291
Very dense forest (in km <sup>2</sup> )	95	54	0	19	104
Moderately dense forest (in km <sup>2</sup> )	1068	1,286	432	703	6,255
Open forest (in km <sup>2</sup> )	543	883	456	390	1,483
Total forest (in km <sup>2</sup> )	1,706	2,223	888	1,112	7,842
Percentage	22.20%	42.69%	51.15%	8.29%	76.20%

Source: Forest Survey of India ([www.fsiorg.net](http://www.fsiorg.net))

### 3. METHODS

Field surveys were conducted for presence-absence and status of elephants. Presence-absence survey was used to gather very basic information; the strategy being to rapidly cover as much area as possible while ensuring that a false result is not recorded, as this survey involved very low intensity sampling. Status surveys involved more intense work and assessed the elephant distribution within the survey area, status, habitat quality and availability, threats etc. Efforts were also made to identify those areas preferred by elephants and also those that they avoid. The movement paths of elephants in the area were recorded and plotted in an area map.

The survey focused on areas with key resources for elephants and where elephant signs were most likely to occur such as waterholes, and preferred microhabitats which are used more than the major habitat. Attitudes and perceptions of the local people towards elephants were also sought through observations and interviews.

## **4. RESULTS**

### **4.1 Status of the Elephant in Maharashtra in Recent Times**

Elephants had moved from the Halyal Forest Division of Uttar Kannad district in Karnataka. It is presumed that the elephants had a safe place in Dandeli Wildlife Sanctuary till 1990. Thereafter, it is reported that due to construction of Kali hydro electric project, the elephants shifted to the adjoining Borchhi and Junglepet Ranges of the Halyal Forest Division and subsequently advanced towards Londa, Nigarmali and Khanapur Forest Ranges of Belgaum Forest Division.

In 2001, a herd of 21 elephants reached upto Kankumbi Forest Range in Karnataka (bordering Maharashtra), but did not cross over to the adjoining areas in Maharashtra. A herd of seven elephants entered Mangeli village of Dodamarg taluk, Sindhudurg district of Maharashtra state from the adjoining Mani village of Khanapur taluk, Belgaum district of Karnataka state on 11th October, 2002. The herd raided and damaged the paddy crops and plantations of coconut, banana, cashew etc. in Mangeli, Patiye, Shirange, Konal, Khanyale, Ghodge, Waigantad, Bodadye and Khokral villages of Dodamarg Forest Range till 7th August, 2003.

In 2003, the elephants moved to Konal and Maneri Forest Rounds in Dodamarg taluk, Maharashtra. The movement of elephants from Karnataka as understood is given in Figure 2.

During the study period, the elephants were present in Chandgad and Dodamarg taluk of Maharashtra. Since there is no apparent evidence of intermingling between the two herds, it is also possible that they are probably two different herds. Thus, in the present report, these are discussed independently.

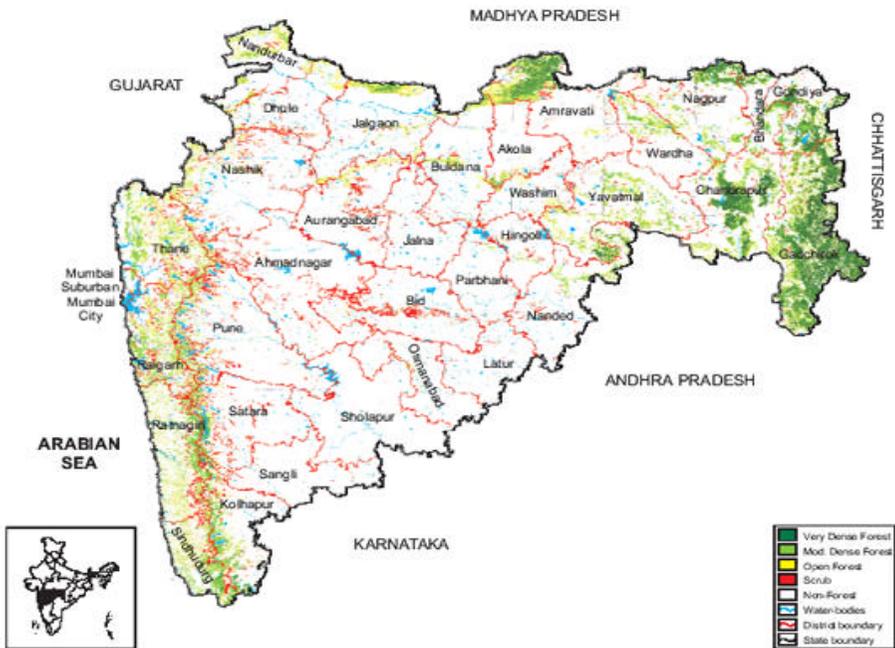
#### 4.1.1 Chandgad Taluk

Elephants were sighted and recorded by the Forest department in Maduvale, Jangomhati, Kaliyade, Kitvade and Jalugude between 17th March and 13th April, 2005. The area has a number of water bodies along with fairly good forest cover. Low density of human population and availability of paddy, ragi, coconut and cashew perhaps make the area tempting to the elephants.

**Aigaon → Chikhole → Parvad → Betna → Kankumbi → Chorle (all in Karnataka), and thereafter Mangeli of Sindhudurg district, Maharashtra.**

**Figure 2:** The route followed by elephants from Karnataka to Sindhudurg district, Maharashtra Chandgad Taluk

Between 17th April and 4th May, 2005, elephants were sighted again in Dhamne and Hajagoli area bordering Karnataka. It is believed that from here the elephants went back to Karnataka via Mahalange area (Figure 7). The forest cover of the area can be seen from Figures 3 and 4.



**Figure 3:** Forest cover of Maharashtra (Source- Forest Survey of India)

Data suggest that elephants entered Chandgad taluk from Karnataka again in November 2005. A small herd of elephants (authentic details about herd size and composition not available) was first sighted in Mahalange on 13th November, 2005. The same herd was believed to have been sighted in the Dhamne forest area on 14th November, 2005. From 15th November to 18th November, 2005, the herd was seen moving in the Dhamne-Hajagoli area. The next day, the herd moved to Jangomhati via Maduvale. Since then, the herd was believed to have spent most of its time in the forested areas of Jalugude, Shevale, Kaliyade, Ambevadi and Kitvade. The movement of elephants in Chandgad taluk as understood is given in Figure. 5.



**Figure 4:** Forest cover of Karnataka (Source- Forest Survey of India)



**Figure 5:** The route followed by elephants in Chandgad Taluk, Maharashtra

A herd of nine elephants (including a calf) was sighted near Jalugude at about 11:30 pm on 9th March, 2006. It is assumed by the field staff of the Forest Department that the four elephants which died of electrocution in February 2006 in the agricultural field of Mr. Vishu Ganpati Deori (Malkigut No. -124) Jalugude village, were members of this particular herd (Figure. 6).

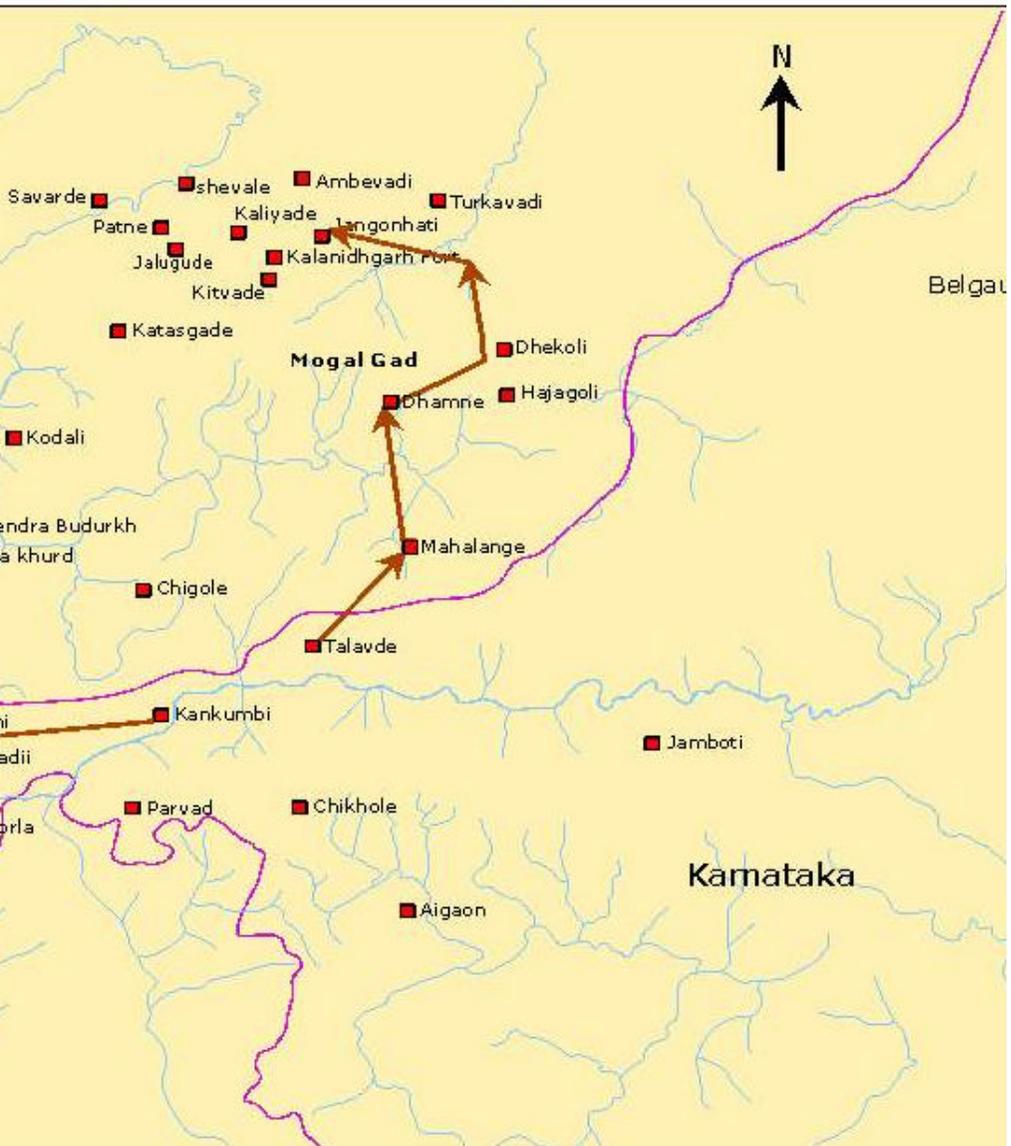


**Figure 6:** The electricity line that is suspected to have electrocuted four elephants at Jelugude village

It has also been observed by the local people and the Forest Department staff that the elephants generally restrict their movement close to water sources (reservoirs) wherever possible. Frequent sightings of elephants at Damne, Hajagoli, Maduvale, Jangomhati, Ambevadi, Patne, Jalugude and Karanjgaon support this statement.

Being undulating, the terrain also plays a role in determining the pattern of the elephant movement. Once the elephants reach Dhamne from Karnataka, the Mogal Gad ridge does not allow the elephants to cross it, so they take a route between Mogal Gad on the one side and Hajagoli and Dhekoli on the other. From here, elephants reach Jangomhati via Maduvale. From Jangomhati they move to Jalugude via Kaliyade. In doing so, they also avoid Kalandhgarh Fort area, which is another ridge.





The area around Jalugude, Shevale, Patne, Kitvade, Kaliyade, Ambevadi and Maduvale, accounting for the highest number of elephant sightings by the Forest Department staff and crop raiding, tentatively constitutes the habitat for the elephants in Chandgad taluk. The area has water bodies, forest cover and crop fields in the vicinity of the forests and low density of human population. The Forest type in the area is dry deciduous and thorn scrub. Elephants often raid crops in this area after dusk and are back to the nearest forest before dawn. They have been seen to feed on paddy, ragi, coconut, cashew, banana etc., but damage more by trampling (Figure 8). The availability of water bodies in the fringe of villages also persuade the elephants to stray near the human habitation. However, due to paucity of data, the seasonal pattern of elephant movement for the entire year with reference to water availability and agricultural practices cannot be ascertained at present.



**Figure 8:** Depredation by elephants, Chandgad Taluk

From interactions with the villagers, it is apparent that lack of awareness about elephant and absence of skill to initiate any mitigation measure has made the farmers feel more helpless. As a point of caution, such silence should however not be read as eternal. There are examples from other places where farmers faced with helplessness resorted to extreme steps like poisoning, electrocution etc. Perhaps the worst was in Sonitpur, Assam where according to WTI database, at least 18 elephants were poisoned to death between July and November 2001.

The details of the elephant sightings in different villages between 1st December, 2005 and 10th March, 2006 is given in Appendix-I and represented in Figure 9.

### ***Steps taken by the Forest Department***

The following major steps were taken by the forest department:

- (i) Round Office (a number of Rounds constitute a Forest Range) staff of the concerned area usually patrol at night and try to chase the elephants from the agricultural fields and human settlement into the nearest forest area. However, since the departmental staff are neither adequately trained nor equipped, their efforts do not always yield the best results. There is rarely any participation of the local people, which could be attributed to the lack of awareness about elephants.
- (ii) The local people are regularly requested by the Forest Department not to chase and disturb elephants.
- (iii) Forest department has also started recording cases of elephant depredation for compensation and to document elephant sightings.

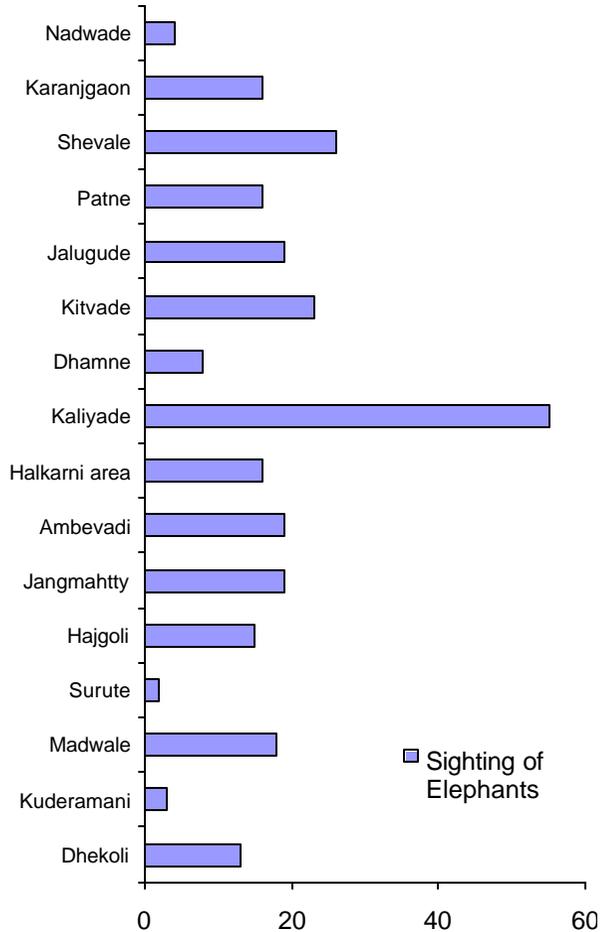
### **Attitude of the local villagers and their response towards elephants**

Interactions with the local people reveal that:

(i) Most of the people avoid confrontation with the elephants, even if their crop is being raided. This was revealed by the local people as well as the staff of the concerned Forest Round Office.

(ii) A few families in Jalugude and Ambevadi have stopped cultivating in plots close to forest. There are also incidences of families shifting their houses from the fringe of the forest to a 'safer place'. Many people have stopped taking their cattle to the forest for grazing to avoid confrontation with elephants.

(iii) The local villagers are not happy with the compensation being given by the Forest



**Figure 9:** Elephant sightings between 1st December, 2005 and 10th March, 2006 in different villages of Chandgad Taluk

*Data Source: Forest Range Office, Chandgad, Maharashtra*

Department, which they say is far too less. They are also unhappy with the method of assessment of the damage for compensation. The compensation for one hectare of seasonal crop like ragi is the same as one hectare of coconut plantation. The farmers resent that the effort and loss is different for each crop, which is overlooked in the current method of loss assessment.

(iv) Some of the villagers who expressed resentment are those who are yet to get compensation for the relocation of their homestead during the construction of reservoirs about 14 years ago.

#### **4.1.2 Dodamarg Taluk**

Despite gaps in data, some records of elephant sightings since October 2002 are available with the Forest department. The available records suggest that elephants, since 2002, have followed a path via Kankumbi and Mani in Karnataka to reach Mangeli in Maharashtra (see Figure 3). One of the prominent factors that determine this movement path is the undulating terrain, whereby the elephants avoid sharp gradients.

Once inside Maharashtra, the elephants generally take shelter in the forested areas in the fringe of the Tilari reservoir (Figure 10) in Konal Forest Round which is now almost devoid of human habitation. For food, the elephants depend on both the primary forests such as in the hills around the reservoir as well as secondary forests, such as the one near Shirange, with plenty of bamboo (Figure 11).

Records show that, though the present (March 2006) herd in Dodamarg taluk is smaller than that in Chandgad taluk, elephants here seem to have raided more villages including some in the state of Goa. Some of the areas with high incidences of crop raiding are Mangeli, Shirange, Patiye, Khanyale, Konal, Girode and Pikule (see Figure 7). There seems to be no definite pattern followed in crop raiding by the elephants.



**Figure 10:** The area around the Tiları reservoir provides shelter to the elephants

Incidents of crop raiding and conflict in Dodamarg taluk also appear to be higher than Chandgad taluk. The local people also seem to be getting involved in some active mitigation measures like chasing by beating drums, using crackers etc. However, lack of awareness about elephant and mitigation measures among the local people is perceptible. The situation is not very different with the hard working Forest Department staff, who patrol regularly after dusk.

Though there were no direct sightings, indirect evidences and other secondary data suggested that there were six elephants in Dodamarg taluk in March 2006. This also included the two adult females and a calf that raided crops in the state of Goa and were chased back to Maharashtra in August 2005.

The two adult females and the calf have been in the Dodamarg taluk for more than a year now. Even when elephants were driven away from Maharashtra under the Elephant Back to Home campaign, they stayed back hidden around Shirange, Patiye and Pal, which is now partially submerged due to the Tilari dam.

The details of elephant sightings in different villages between 1st November, 2005 and 31st January, 2006 is given in Appendix II and is represented in Figure 12.

The crop raiding pattern of elephants in Dodamarg is similar to that in Chandgad. Elephants usually raid the crop fields after dusk. They have been seen feeding on paddy, ragi, coconut, cashew and banana. The elephants also cause substantial damage by trampling the paddy crop



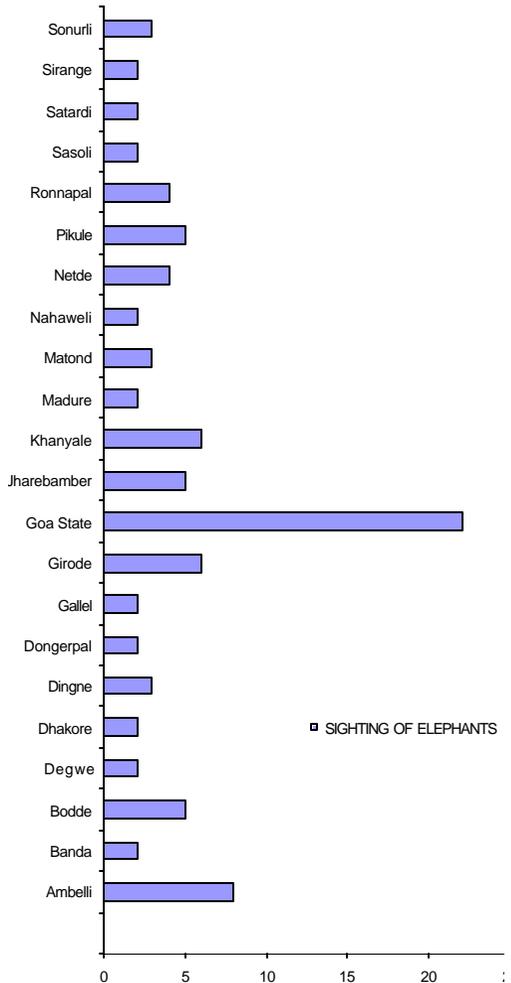
**Figure 11:** Bamboo forests like this at Shirange often provide food to the elephants

and uprooting the banana trees, which particularly infuriate the farmers. However, as in Chandgad, since data on elephant movement for the entire year is not available, seasonal movement cannot be ascertained.

**Steps taken by the Forest Department**

The following are the major steps taken by the Forest Department:

(i) The Round Office staff of the concerned area usually patrols at night and tries to chase the elephants from the agricultural fields and human settlement into the nearest forest area. Unlike in Chandgad, people in Dodamarg often join the forest department staff in chasing the raiding elephants. But, it is a matter of concern that neither the departmental staff nor the local people are adequately trained or equipped to carry out mitigation measures, thus exposing themselves to enormous risk.



**Figure 12:** Elephant sightings between 1st November, 2005 and 31st January, 2006 in Goa State and villages of Maharashtra

*Data source: Forest Range Office, Dodamarg, Maharashtra*

(ii) The Forest Department has also made an effort to stop the entry of elephants from Karnataka into Maharashtra by erecting a chilli rope fence near Mangeli (considered to be the entry point for elephant from Mani, Karnataka). A mixture of powdered chilli and used automobile lubricant was smeared on the rope fence that was erected using wooden posts. Discussions with the local people hint that the technique was not very effective. However, the success of the fence is yet to be fully examined.

(iii) The local people are regularly requested by the Forest Department not to confront and disturb elephants.

(iv) The Forest department also regularly documents the cases of elephant depredation for compensation and records the elephant sightings.

### ***Attitude of the local villagers and their response towards elephants***

Interactions with the local people reveal that:

(i) Most of the people still avoid confrontation with the elephants, except when chasing them accompanied by the forest department staff. This was revealed by the local people as well as the staff of the concerned Forest Round Office. People also avoid going to forest areas in Shirange, Khanyale and Mangeli after dusk.

(ii) The villagers are not happy with the compensation being given by the forest department, which they say is far too less (Rs. 2000/- per hectare for any crop). Some people seem to be in favour of a scheme similar to the one practiced in Karnataka.

#### **4.2 Elephant Movement between Chandgad and Dodamarg Talukas**

An incidence has been reported in May 2005, when elephants (four adults and a calf) had gone from Dodamarg taluk to Chandgad taluk (from Kendra-Budurkh to Jalugude via Kodali and Katasgade). However, it is yet to be confirmed whether this movement is a trend or an aberration.

Thus, instead of drawing conclusion that elephants in Chandgad and Dodamarg belong to the same herd and enter Maharashtra from a single point, we may abide by the general belief that the elephants in Chandgad and Dodamarg come from Karnataka using different entry points.

#### **4.3 Elephant Movement from Maharashtra to Goa**

Cases of human–elephant conflict have also been reported from Goa. Interestingly, though the source state (Karnataka) is not far, in all the reported cases, elephants have made their way to north Goa from Dodamarg taluk along the areas adjoining Maneri river (Sindhudurg district) of Maharashtra (see Figure 7). The Chorla ridge does not seem to enable elephants to reach Goa directly from Kankumbi area of Karnataka.

There is no report of elephants staying back in Goa for long (Appendix II). During December 2005 and January 2006, elephants from Maharashtra moved to Goa thrice (4th to 7th December 2005, 15th to 24th December 2005 and 19th to 29th January 2006), and reportedly caused immense distress to the farmers.

As in Maharashtra, crop raiding and associated damages are the main causes for concern for the villagers in Goa. Lack of awareness about elephants is also responsible for perplexity and fear.

Reports mention that when elephants were chased from Goa by the Forest Department staff accompanied by local people, they entered Dodamarg taluk at Sasole village along Halkheni river. In another instance in August 2005, elephants (two adult females and a calf) were driven back to Kurase (Maharashtra) from Kodshel via Pirna (Goa). There are also reports of elephants going to Madura via Dingne in Maharashtra after being chased from Goa (see Figure 7).

The most common step taken by the Forest Department is to chase the elephants in the desired direction with the help of temporary squads comprising villagers and the Forest Department staff. The Forest Department of Goa also erected a chilli rope fence (Figure 13) on the Goa -Maharashtra border(Dodamarg taluk). However, the effort was not effective as the chilli powder used to get washed away due to heavy rainfall in this area.



**Figure 13:** Chilly rope fence near Dodamarg erected to stop elephants from entering Goa

## **5. DISCUSSION**

Almost all the available reports and personal communications with local people and officials firmly suggest that elephants enter Maharashtra from Karnataka. Discussions with the forest department staff at Kankumbi Forest Range Office (Karnataka) further endorse this argument. Thus, it seems very likely that elephants reach Kankumbi area from Chikhole, from where they enter Dodamarg taluk near Mangeli via Mani. In doing so, they avoid the Chorla ridge and other areas with steep gradients. Another route for elephants to enter Maharashtra (Chandgad taluk) is most likely through Talavde, Mahalange and Dhamne (see Figure 7).

From the study, it appears that crop raiding by elephant is one of the most prominent and common cause of distress to the farmers. The farmers on the other hand, lack awareness and the knowledge to initiate any human–elephant conflict mitigation measures. The situation is not much different for the forest department staff, who despite all odds are making an effort to mitigate the problem at hand. Such factors also impede the understanding of the problem. Therefore, it becomes imperative to understand what prompts elephants to do what they are doing.

The diet of a herbivore is influenced by the various anatomical and physiological characteristics of the animal, the structural and chemical composition of the plants and the community structure (Owen-Smith, 1982). The prehensile trunk, the high-crowned (hypsodont) molar teeth structured for grinding fibrous material and the advantage of cellulose fermentation in the caecum and colon (Clemens and Maloiy, 1982) enable the elephant to exploit a wide range of plant resources.

Raiding of agricultural fields by elephants can be explained in terms of proximate factors, such as contact with cultivation, especially in fragmented habitats, in the course of their movement for foraging or drinking water. This may be the possible reason for higher crop raiding incidences in villages like Jangomhati, Ambevadi, Maduvale, Hajagoli and Jalugude, which are in the vicinity of forested areas. These villages are also affected due to the close proximity of some irrigation reservoirs, which are often used by the elephants. However, in Dodamarg taluk, where water seems to be available for the elephants even in the forest, crop raiding can be seen as an extension of their natural optimal foraging strategy.

In both cases, it also becomes apparent that the frequency of raiding is directly proportional to the size of the cultivated area and its perimeter adjoining the forest. This is due to the higher probability of an elephant making contact with its boundary. Crop raiding also seems to depend on the type of crop being cultivated. Discussions with the villagers and the Forest Department staff suggest that crop raiding occurs mostly between October and March when paddy matures. This is also the period when rain is scanty, and many water holes, except the reservoirs dry up.

The degraded forest areas in the vicinity of a village also induce the elephants to enter cultivation, which provides better nutrition than by foraging on wild plants.

Ratnam (1984) while discussing the problem of crop depredation by elephants in peninsular Malaysia considers three factors:

- (i) Where a group of elephants has been marooned by development into a tiny pocket of forest, which is unable to meet

their food requirements, they are compelled to raid the surrounding agricultural crop.

(ii) Where a group of elephants with sufficient useable habitat, for various reasons, still raids large adjacent development areas with a broad but unified boundary with the forest.

(iii) Where a group of elephants with sufficient useable habitat raids a patch of villages, farms, orchards or small holdings with no clear-cut or unified boundary between the forest and the development areas.

The reluctance on the part of local people to chase the raiding elephants from the crop fields, or initiate any systematic attempt at mitigating the problem must also be aiding the elephants in their act. The reluctance is primarily a result of their ignorance about elephant behaviour and on techniques to prevent crop raiding, which needs to be addressed promptly. The helplessness of the farmers in preventing crop raiding by the elephants may instigate some of the farmers to take drastic measures to vent out their frustration. To prevent such an unfortunate step, attempts should be initiated to make the farmers self reliant.

Studies elsewhere show that farmers often like to get involved in conflict mitigation. An attitudinal survey on elephant conservation in Sri Lanka conducted by Bandra and Tisdell (2003) reveals that 81% of the respondents in the urban sample rejected a proposal on local farmers in the vicinity of the nature reserves being granted more freedom to control the 'problem elephants' which cause crop and property damage. However, about 79% of the farmers in the rural sample stated that they should be allowed more freedom to control elephants.

The villagers in Wyanad in South India, suffering higher economic loss due to elephants supported wildlife conservation but demanded effective mitigation measures (Easa and Sankar, 1999). This tolerance, however, cannot be taken for granted in the long run.

Another complex issue is elephant movement to new areas. Though at first glance, the movements seem to be mainly triggered by the need for food and water, there could be other factors. Adequate space with forest cover and minimal human settlements and associated activities, could be responsible for motivating the elephants to stay back in Maharashtra (Figures 3 and 4).

There are examples, in the recent past, when elephants migrated to new habitats. During 1984, a small group of seven elephants migrated to the forests of Kuppam and Palamaner area of Chittoor district (Andhra Pradesh) from Tamil Nadu. Elephants were not known to occur in Andhra Pradesh for 300 years before that. The group was supplemented with further migration of a herd of 22 animals in 1986. Initially, the elephants moved between Chittoor district and the adjoining areas of Tamil Nadu but by 1987, they had made Palamaner forests their home (Rao, 1995).

Finally, the issue of considering small wildlife habitats as part of the larger ecosystem should be taken seriously. Forest contiguity with larger areas are important to mega-herbivores, such as elephants that live in fragmented habitats. The forest cover of the Western Ghats, in the districts of Kolhapur, Sindhudurg, Belgaum, Uttara Kannada and Goa (Table 1) has immense potential as an unit to support a viable population of an array of wildlife. This region is recognized as that housing some of the richest, most diverse and complex ecosystems in the world by Sanctuary Asia (June 2006). The region has also been classified as:

- A Level 1 Tiger Conservation Unit by WWF.
- One of the world's 12 ecological hotspots, as part of the Western Ghats (WG), by the Rio Earth Summit, 1992.
- The Union Government has recognized the ecological sensitivity of the Western Ghats in its sixth Five Year Plan.

It was also proposed to declare part of this area as:

- The Bhimgad Wildlife Sanctuary by the Karnataka Government in 1999
- A Biosphere Reserve by the Karnataka Government in 2001.

The area fulfils all the primary criteria defined for inland area to qualify as an Ecologically Sensitive Area (ESA) as per the Pranab Sen Committee appointed by Ministry of Environment and Forests (Durgesh Kasbaker vs State of Karnataka and ORS, Application No. 218 of 2004, before the Hon'ble Central Empowered Committee). Thus, it is important to look at this critical forest region on a landscape scale, rather than compartmentalize it on the basis of administrative boundaries.

It thus follows that it is imperative to assess the ongoing and proposed development projects, as well as threats to the biodiversity in the entire landscape utilized by the elephants. In this context, it seems worthy to study the effect of various dams and other minor irrigation projects on wildlife in the districts of Kolhapur, Sindhudurg, Belgaum and Uttara Kannad. Similarly, mining of minerals, mining dump, and sand-mining needs to be examined from a wildlife perspective before giving clearance. It may be noted that as per the Proceedings of the Government of Karnataka, Department of Forest, Ecology and Environment (Government Order No FEE 14 ENV 2000(p), Bangalore, Dated: 21.08.2003), "any project proposed to be located within the radius of 25

kms boundary of reserved forests, ecologically sensitive area which may include national parks, sanctuaries, biosphere reserves, critically polluted area and within 50 kms of inter state boundary shall require environmental clearance from the Central Government".

Human–elephant conflict is now a major cause of individual elephant deaths through indiscriminate poisoning, electrocution, shooting, trapping, etc. in most of the elephant range states. It is, therefore, critical to find ways to minimize this conflict and integrate strategies into land-use to ensure the long-term survival of the species. The conservation of the Asian elephant will, however, require a pragmatic synergy of scientific knowledge, cultural pride, and political will.

## **6. RECOMMENDATIONS**

Based on the observations in the field and discussions with the Forest department staff and villagers, the following actions are recommended:

**(i) It is important to look at the issue on a landscape scale, considering that the forested areas of Karnataka, Maharashtra and Goa are part of the larger Western Ghats ecosystem.** Though the preliminary survey undertaken suggests that the contiguous forest patches near Damne, Jalugude, Ambevadi, Kaliyade and Jangomhati in Chandgad taluk have the potential to provide habitat for a small elephant herd, it is not sufficient for a viable population of elephants unless connectivity with a larger habitat in the forest areas of Uttara Kannad district (Karnataka) is secured and maintained (Table 1). It is also pertinent to have closer interaction with the officials of these areas for successful implementation of mitigation measures.

**(ii) Capacity building and sensitizing the staff of the Forest Department as well as the local communities is vital for conservation.** Each team should be equipped at least with a vehicle, wireless set, binoculars, high-beam mobile spot lights and first aid medical kit. The level of conservation awareness across all hierarchies, including the government departments, politicians, panchayats, village leaders, local people and local media needs to be increased. Apart from helping in achieving the objectives of wildlife conservation, this would also promote co-operation between the general public and the Forest Department staff.

**(iii) Compensation scheme can be improved.** Even more important is a simple compensation scheme that ensures prompt disbursement of compensation.

**(iv) Research is required for the preparation and implementation of a sound management plan.** For this purpose, basic monitoring can be carried out at the local level after capacity building. For advanced research, the Forest department can tie up with organizations with the required expertise and willingness to work in the area. Satellite imagery should also be procured and classified to know the present status of forest cover. This can be used for overlaying the movement paths of the elephants. It is also worthy to study the effect of the various reservoirs of Tilari Dam and other minor irrigation projects in the districts of Kolhapur, Sindhudurg, Belgaum and Uttara Kannad. Similarly, proposed and ongoing mining activities need to be examined from a wildlife perspective before giving clearance.

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## Appendix I

**Number of elephant sightings between 01/12/2005 and 10/3/2006 in different villages of Chandgad Taluk**

Village	Dec-05	Jan-06	Feb-06	1st-10th March-06	Total
Dhekoli	12	2	0	0	14
Kuderamani	3	0	0	0	3
Maduvale	13	5	0	0	18
Surute	2	0	0	0	2
Hajagoli	11	4	0	0	15
Jangomhati	8	5	0	1	14
Ambevadi	2	15	2	1	20
Halkarni area	2	14	0	0	16
Kaliyade	4	11	29	10	55
Dhamne	4	4	0	0	8
Kitvade	0	12	12	0	24
Jalugude	0	1	9	9	19
Patne	0	1	14	2	17
Shevale	0	0	17	6	23
Karanjgaon	0	0	15	1	16
Nadwade	0	0	4	0	4

## Appendix II

**Number of elephant sightings between 01/11/2005 and 31/01/2006 in different villages of Dodamarg Taluk**

Village	Nov-05	Dec-05	Jan-06	Total
Addali	0	0	1	1
Ajgaon	0	1	0	1
Ambelli	7	1	0	8
Banda	0	0	2	2
Bhikekonal	1	0	0	1
Bodae	0	1	0	1
Bodde	5	0	0	5
Dandelli	0	1	0	1
Degwe	0	0	2	2
Dhakore	0	2	0	2
Dingne	1	2	0	3
Dongerpal	1	1	0	2
Gallel	0	2	0	2
Girode	5	1	0	6
Goa State	0	12	10	22
Godge	1	0	0	1
Harijanbadi	1	0	0	1
Jharebamber	5	0	0	5
Kalne	1	0	0	1
Karnataka State	0	1	0	1
Karmalwadi	1	0	0	1
Kasai	0	1	0	1
Khanyale	6	0	0	6
Khas	0	0	1	1
Kudal	0	0	1	1
Kudasa	0	1	0	1

<b>Village</b>	<b>Nov-05</b>	<b>Dec-05</b>	<b>Jan-06</b>	<b>Total</b>
Maderi	0	1	0	1
Madure	0	1	1	2
Molegaon	0	1	0	1
Maleward	0	1	0	1
Maneri	1	0	0	1
Matond	0	1	2	3
Nahaweli	0	0	2	2
Nirwade	0	1	0	1
Netde	1	1	2	4
Netarde	0	1	0	1
Pandlose	0	0	1	1
Pandur	0	1	0	1
Phendiya	1	0	0	1
Pikule	5	0	0	5
Ronnapal	0	0	4	4
Sasoli	1	1	0	2
Satardi	0	1	1	2
Setwewade	1	0	0	1
Shirange	1	1	0	2
Sonurli	0	0	3	3
Sunurli	0	1	0	1
Tanbole	0	0	1	1
Tilari	1	0	0	1
Vayangadtad	1	0	0	1

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Over several decades, elephants have steadily moved out of their range states into non-elephant ranges in search of more conducive ecosystems. This leads them to direct conflict with humans, who have never lived in the vicinity of elephants before. This report throws light on the issue of human-elephant conflict in Maharashtra and Goa and provides recommendations to deal with the same.



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