30 Years of Project Elephant

Special Edition

TRUMPET

PROJECT ELEPHANT DIVISION

MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE

WORLD ELEPHANT DAY, 12th AUGUST 2022

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

Project Elephant Division & Elephant Cell

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PROJECT ELEPHANT DIVISION
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE 2022
GOVERNMENT OF INDIA

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और
श्रम एवं रोज़गार
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MINISTER
ENVIRONMENT, FOREST AND CLIMATE CHANGE
AND
LABOUR AND EMPLOYMENT
GOVERNMENT OF INDIA

भूपेन्द्र यादव
BHUPENDER YADAV

MESSAGE

The Indian culture and ethos are closely related to revering elephants and enshrine the philosophy of protection of elephants as our moral responsibility. As keystone species, elephants contribute significantly to balancing the integrity of ecosystems. Elephants play a vital role in shaping the landscape and maintaining the biodiversity of the forests and considered as ecosystem engineers. India hosts 60% of the global population of Asiatic elephants. A large portion of the elephant's range is vulnerable to anthropogenic threats and up to 60% of elephants traverse outside Protected Areas. The survival of the species continues to be threatened by fragmentation and degradation of natural habitat, human-elephant conflict and poaching for ivory.

Despite various challenges, India remains deeply committed to protecting the country's National Heritage Animal. Elephants have been given the highest level of protection in India by its inclusion in Schedule I of the Indian Wildlife (Protection) Act 1972. The country has been doing immensely good in managing human-elephant conflicts through in-depth adoption of various innovative, cost effective, advanced measures and inclusion of information technologies. Several steps are also being proactively taken towards better healthcare, management and welfare of elephants in captivity.

This illustrious work encompassing the approaches, management regimes, processes and outcomes of elephant conservation initiatives from all across the nation addressing the whole gamut of elephant conservational issues will serve as a navigation input to help the forest officers, State Governments, civil societies, local communities and other stakeholders to deal with issues of elephant conservation more effectively.

With best wishes.

Date: 04.08.2022

(Bhupender Yadav)

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अश्विनी कुमार चौबे
Ashwini Kumar Choubey

सत्यमेव जयते
आहारशुद्धौ सत्त्वशुद्धिः
एक कदम स्वच्छता की ओर

राज्य मंत्री
पर्यावरण, वन एवं जलवायु परिवर्तन
उपभोक्ता मामले, खाद्य और सार्वजनिक वितरण
भारत सरकार
MINISTER OF STATE
ENVIRONMENT, FOREST AND CLIMATE CHANGE
CONSUMER AFFAIRS, FOOD & PUBLIC DISTRIBUTION
GOVERNMENT OF INDIA

Message

Elephants have been revered for centuries in India, playing an important role in the country's culture and religion. Elephants play a crucial functional role in the forest ecosystem and are widely known as effective long-distance seed dispersers and ecosystem engineers. The elephants are capable of modifying and maintaining habitats as they modulate the availability of resources of other species.

In spite of the imminent threats of habitat fragmentation & degradation, human-elephant conflict and ivory poaching, India is home to 29,964 wild elephants and around 2675 captive elephants and is a bastion of 60% of the global population of wild Asian elephants.

It is heartening to see the results of the concerted efforts of nation in conserving the largest threshold of Asiatic elephants. With increase in both human and elephant population, it is necessary to develop innovative technologies, policies and regulatory frameworks to prevent the human – elephant conflict

I am confident that this publication will serve as a repository of information and a valuable source for conserving and managing elephants. I congratulate the entire team in bringing out this important document on the auspicious occasion of World Elephant Day.

(Ashwini Kumar Choubey)

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Indian Elephants as Umbrella in Conserving Tropical Biodiversity in India

C.P. Goyal
DGF&SS, MoEF&CC

Introduction

The current era of accelerated climate change and incompatible human actions have been causing an unprecedented biodiversity crisis resulting in species extinctions at an alarming rate. Climate change threatens not only biodiversity, but human existence too as humanity depends on environmental services that natural ecosystems provide. Indeed, it is well recognized that biodiversity conservation is man-kind's best defence against the perils of climate change. Every species in the ecosystem has an important functional role, which can seldom be compensated. This being the case, choosing a representative species that can help in conserving the entire biodiversity of the landscape would be an important conservation strategy. Being a large animal requiring vast swathes of forested landscapes for survival, Asian elephants (Elephas maximus)act asideal umbrellaspecies in conserving tropical biodiversity. In India, elephants are conserved not only for their biodiversity values, but are also revered as cultural icons. Therefore, conservation of elephants has always been a priority in India.

India is a rapidly growing economy that caters the aspirations of over a billion people. India is also a region of biodiversity hotspot and in fact it is one among the megadiverse countries in the world. The country is home to over 1310 species of birds and over 400 species of mammals besides harbouring several species of endemic fauna. India is also home to the largest population of Asian elephants in the world harbouring close to 30,000 elephants that constitute over 60% of the entire Asian elephant population in the world. The country's wild elephant population occurs in four major regions that include the (i) the North-west region located along the foothills of the Western Himalaya, Shivalik hills and the Terai grasslands (ii) the North-east region covering the north-eastern states located along the East-Himalayan foothills, Brahmaputra flood plains, and Garo, Khasi, Naga, and Patkai hills (iii) the East-Central region occurring in the Indian peninsular region of Central Highlands, Chota Nagpur plateau, and the Eastern Ghats (iv) the Southern region primarily occurring in the Western Ghats and the Eastern Ghats mountain ranges.

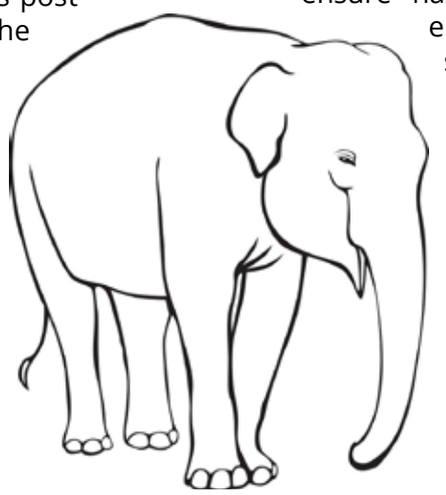
From the dawn of the Indian independence, the country's elephant population has remained steady, and in a few landscapes, the populations have even increased. This is a major achievement given that elephant populations in most other range countries in Asia have declined alarmingly. Thus, elephant conservation in India amply demonstrates the country's commitment and concurrent development of Institutional mechanisms to conserve biodiversity. Elephant conservation in India has been relatively more challenging since the species is endangered, but at the same-time get into conflict with people. Therefore, it is acknowledged that elephant conservations requires a fine balance between protecting elephant populations and their habitats, while at the same time keeping human–elephant conflict within socially acceptable limits. Recognizing the need to have a dedicated body to focus on elephant conservation in India, the Government of India launched Project Elephant during the year 1992 as a centrally sponsored scheme. Since its inception, the Project Elephant has been active and has been continuously evolving. Under the ambit of Project Elephant, 31 elephant reserves across 14 statesencompassing 2.5% of country's land area have been notified. The concept of elephant reserves embraces the landscape approach and therefore, their

boundaries often extend beyond protected areas and include multiple-use forest areas and also include some areas outside of forests that would be essential for elephants. As a main task, the Project Elephant provides technical support and guidance to the States in addition to providing financial assistance on diversity of management themes ranging from habitat improvement, conflict mitigation, training, combating illegal trade and improving captive elephant welfare. Based on the recommendations of the elephant task force constituted under the aegis of Project Elephant, Further, the elephant was declared as India's National Heritage animal so as to reinforce the cultural ties between people and elephants.

India has undoubtedly done much more than any other Asian country in protecting elephant habitats and populations. This becomes evident by looking at elephant population trends post-independence. India is certainly one of the last remaining bastions of elephants in Asia. The long-term objectives of elephant conservation in India are clearly spelled and would include sustaining viable populations of wild elephants across viable landscapes in the country, effectively managing human–elephant conflict, and improving captive elephant welfare. Numerous focussed activities are being systematically carried out across India to strengthen elephant conservation. Some of the important tasks have been summarized.

1. Improving Habitat Condition for Elephants

Conserving elephants rests on securing viable habitats, which are primarily tropical forests and associated habitats. Considering this, emphasis has been placed on maintaining the resilience of elephant habitats by minimizing the impacts of fragmentation and degradation of forests. The MoEF&CC along with elephant range states had been actively liaising with other ministries such as the Railways and National Highways to ensure habitat connectivity for elephants and at the same-time reducing the potential risk of rail-induced elephant mortality. Innovative, technology-driven approaches like provisioning of seismic and thermal sensors to detect



elephant presence in the forests along the Railway tracks so that early-information can be passed to train crew have been continuously experimented.Further to this, eco-friendly measures have been made mandatory in smart infrastructure projects so that the habitat impact in the form of fragmentation does not affect the habitats of elephants and other wildlife. On the same lines, there is active dialogue with the power corporations to carry out tasks like insulation of naked wires, trenches to transformers, monsoon patrolling by power supply agencies, shorter span of poles to prevent wire sagging, and higher pole heights to minimize threats related to power-transmission for elephants. The Project Elephant has also recently come up with a comprehensive report on the status of Land-use Land-cover classification of the Elephant Reserves across India along with an atlas of Elephant Reserves across India. The land-use land-cover report would enable visualizing the trends in the land cover classification and also making comparison between the reserves.

Further, in order to minimize or prevent habitat degradation, impetus is provided in developing alternative livelihood programs like development of self-help groups, value addition of products, regulated eco-tourism so that the income generated through these schemes would reduce the livelihood dependence of local communities on forest resource base. There are examples of effective eco-development programs such as the one in Periyar Tiger Reserve in Kerala that minimized resource dependence of local communities, which benefited from alternative livelihood options like that of eco-tourism. In addition to aforementioned tasks, systematic habitat restoration of degraded forest patches by removing invasive weeds, improving water regimes, creating grasslands and other fodder base have been carried out across elephant habitats in India.

2. Combating Ivory Poaching and Illegal Trade of Elephants

In both Asia and Africa, poaching of elephants is a serious threat to elephant populations. In Asia, the threat vests with bulls as they only carry ivory-bearing tusks. The female elephants and makhnas (tuskless males) have rudimentary tusks known as tushes. Ivory poaching had been a menace during 1970s and 1980s. India responded to the menace of ivory poaching by strengthening field protection measures, intelligence gathering, developing wildlife forensics, proper investigation and effective prosecution of the offenders. The combination of the aforementioned factors led to crackdown of elephant poaching and several habitual offenders were brought to books. The MoEF&CC, State Forest Departments and other Institutions including the Wildlife Crime Control Bureau (WCCB) contributed by enhancing the Institutional capacity of the overall system in tackling ivory poaching. These sustained efforts had paid off resulting in improved sex-ratio of elephants in many areas throughout India. Further, to have a long-term solution to the menace of live trade of elephants, the MoEF&CC had embarked on a very crucial assignment of genotyping all captive elephants and creating a robust database that can be readily referred. The task has been initiated and with technical support from the Wildlife Institute of India and active field support by the State Forest Departments,

3. Improving Habitat Connectivity through Corridors

Integrity of elephant landscape rests on the connectivity between habitats through corridors so that elephants can move across habitat patches with minimal of human–elephant conflict. Loss of corridors could lead to isolation of elephant populations. Isolated elephant populations accelerate habitat degradation and eventually get into human–elephant conflict. The long-term genetic viability of the population would also be compromised if elephant populations get isolated with minimal of genetic exchange. Recognizing the importance of elephant corridors, the elephant corridors in India were duly identified. Presently, the Project Elephant Division along with the State Forest Departments have been validating the efficacy of corridors on the ground by assessing each of the identified corridor. Due to sustained efforts by the State Forest Departments and civil society organizations, many critical elephant corridors in the country have been recovered. The MoEF&CC is earnestly working towards identifying and validatingmajor elephant corridors in India so that isolated elephant populations can redistribute in potential habitats and the movements of species is ensured.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4. Addressing Human–Elephant Conflict

The East-Central region states of Jharkhand, Chhattisgarh, Odisha, and South Bengal suffer disproportionately high conflict compared to other States. The conflict situation in States like Assam and North West Bengal in the North East region and Tamil Nadu, Kerala and Karnataka in South India is also relatively high than the other elephant range States. Addressing conflict through multipronged approach has been a priority task for the State Forest Departments and the MoEF&CC through the Project Elephant. The Project Elephant and supporting institutions have brought out very relevant and user friendly field manuals and recommended operating procedures (RoP) that can serve as tool kits for field managers to manage human–elephant conflict in their respective sites. There has been impetus in capacity enhancement as conflict is a challenge that require long-term commitment to address. In this regard, capacity building programs to the frontline staff of the forest department including the mahouts, veterinary personnel, and elephant handlers that are in the forefront of addressing issues related to human–elephant conflict.

5. Improving Captive Elephant Welfare

India has over 2675 captive elephants across different States under both private and government custody. Regardless of ownership captive elephants are legally protected and come under the direct control of the State Chief Wildlife Wardens. Captive elephants are living laboratories that can be readily observed so that aspects of behaviour and health of wild elephants can be understood better. Improving captive elephant welfare has been a priority for the MoEF&CC. The Project Elephant recognizing the importance of captive elephant welfare and health has constitute health and welfare committees that actively travel across different sites in India and assess welfare conditions of captive elephants. The best practices in captive elephant welfare are being documented and disseminated for wider applicability. There is also active engagement of the State Forest Departments and the Project Elephant with the leading veterinary professionals, experienced elephant handlers and knowledgeable elephant biologists to improve upon captive elephant welfare. Over the years, numerous good ready reference manuals and books have been published by MoEF&CC and its institutions to improve captive elephant welfare in general. This includes the book "Caring for Elephants: Managing Health and Welfare in Captivity" published by the Project Elephant and Wildlife Institute of India, and comprehensive manual on the elephant necropsy targeting field personnel that is currently in the process of being finalized by Project Elephant.

Conclusion

Conserving iconic species like elephants entails conserving intact ecosystems over very large spatial scales comprising over 1000 km2 of tropical forests. By investing on elephant conservation, very large areas that harbour astounding biodiversity ranging from undescribed microbes to elephants themselves can be conserved. Such large elephant habitats would also secure our life-supporting systems like water catchments that we are overwhelmingly dependent on for our own existence. Recognizing the importance of conserving large and vibrant ecosystems, more areas have been brought into the ambit of elephant reserves. The 1198 km2Agasthiyamalai Elephant Reserve in the State of Tamil Nadu is in the process of getting duly notified. Similarly, the much awaited Terai Elephant Reserve spanning 3049 km2 would be notified in the State of Uttar Pradesh. Government of Odisha had also sent proposal to expand Mahanadi and Sambalpur Elephant Reserves in the State. This would result in over 60% of Odisha's elephant population being brought under the ambit of the Elephant Reserves. Further to this, as part of continuous engagement to achieve overall excellence, and as a gesture towards recognizing stewardship in elephant conservation, the MoEF&CC has constituted Gaj Gaurav awards for select expert elephant handlers. As powerful mascots of Indian culture, religion, mythology and folklore, elephants would continue to be an integral part of our tropical forest ecosystem for generations unborn.

WWF India

Thirty Years of Project Elephant in India and Beyond

Ramesh Kumar Pandey
Inspector General of Forests (Project Elephant)

1. Introduction

The Asian elephant, Elephas maximus, is a mega-herbivore with large home ranges requiring large forested habitats to harbour viable populations. Thus, without doubt, conservation of elephants clearly rests on securing large forested habitats. Elephants play a crucial functional role in the tropical forest ecosystem through seed dispersal, nutrient cycling, biomass removal, and assisted vegetation generation through trampling and other effects that eventually shape forest communities. Owing to their overarching role in tropical forest ecosystem, elephants are rightly referred to as ecosystem engineers. Considering their ecological importance, elephants are considered as one of the keystone species of biodiversity conservation. Further to this, elephants are identified as umbrella species as a wide array of tropical biodiversity can be conserved under the ambit of elephant conservation given their large and heterogenous habitat requirements. Furthermore, because of cultural and religious importance and aesthetic appeal, elephants also serve as flagship species in biodiversity conservation. It is only remarkable that a single species act as keystone, flagship, and umbrella species of biodiversity conservation amply justifying India's decision to declare elephants as National Heritage animal. To grasp the trajectory of elephant conservation in India post-independence, and particularly since the inception of Project Elephant, understanding the global perspective on Asian elephant conservation would be important.

2. India: The Bastion of Long-term Elephant Conservation

Across Asia elephants suffered a major range contraction. The historic range of elephants that once spread from Tigris-Euphrates River basin in the west, to Yangtze River basin in the east has been reduced to just 5 to 7% in the present. Therefore, elephants suffered a major range contraction and became locally extinct from many countries. Even a very large Asian country like China could only secure less than 200 elephants in the present considering the fact that the whole of China had large populations of elephants not very long ago. This illustrates the drastic and alarming decline of elephants from whole of Asia. Although elephants' range declined drastically in India too, the due to factors like cultural affinity, religious reverence and nature friendly Indian societies together with strong public opinion towards elephants, and backed by political will, better institutional capacities, and strong laws, India managed to secure the largest Asian elephant population in the world. Among the 13 range countries in Asia, India holds more than 60% of the Asian elephant populations across four regional populations namely Northwest, Northeast, Eastcentral and Southern. The population in India has been relatively more stable than other countries. Elephant conservation in India has been a conservation success demonstrating to the world how political will and commitment towards species can augur well to biodiversity conservation even in a country that is densely populated with high demand for every square-inch of land. Regardless of the demand for land for human–use in the country, people have set aside areas for conservation. Those areas under conservation come in myriad forms that include sacred groves, reserved and protected forests

including the conservation and community reserves, community-managed forests, protected areas and reserves specifically designed and demarcated for managing species like tigers and elephants.

3. The Geneses of the "Project Elephant"

Elephant conservation had always proven to be far more difficult than conservation of many other iconic species owing to large range requirements, the propensity of the species to get into direct conflict with people that sometimes result in loss of human lives, and global demand for high-value body parts of elephants like their tusks that carry ivory. Thus, even though elephants always have a special place in the Indian culture, religion and mythology, embarking on a mission mode to conserve elephants was long-felt. In particular, during 1970s to 1990s, poaching of bull elephants was a major challenge. In fact, ivory poaching was so severe that even some of the best elephant habitats like Periyar Tiger Reserve in Kerala had a highly skewed sex ratio (male to female) of 1:100 during 90s threatening the very survival of the species. Ironically, during the same period, human–elephant conflict started becoming acute in some of the landscapes. Such conflict not only threatened local livelihood, but also started eroding support towards elephant conservation and led to retaliatory killings. Alongside, with India economically progressing steadily and aspirations of people increasing, remnant elephant habitats faced threat of loss and fragmentation of habitats. Thus, consolidating the imminent threats to the species in the form of ivory poaching, human-elephant conflict and habitat threats, Foresighted Government of India contemplated having a dedicated body that can steer elephant conservation in India by actively coordinating with the State Forest Departments that actually manage elephant habitats and populations.

The year 2022 marks the completion of 30th year for Project Elephant, a Centrally Sponsored Scheme aimed at ensuring long-term survival of elephants in their natural habitats in India. Project Elephant was officially launched by the Ministry of Environment and Forests, Government of India during the year 1992 to provide technical and financial assistance to elephant conservation in India with a clearly laid-out objectives that included (i) protecting elephants, their habitats and corridors (ii) addressing human–elephant conflict (iii) welfare of captive elephants. Under these main objectives, there were specific tasks that were clearly spelt out. Since its inception, the Project Elephant along with the partner institutions that included State Forest Departments across India had striven hard to prioritize elephant conservation while at the same time reconciling the livelihood needs of local communities that live alongside elephant habitats through diversity of conflict mitigation strategies.

4. Governance of the Project Elephant

4.1 Organization structure

The Project Elephant is directly guided and managed by the Ministry of Environment, Forests and Climate Change (MoEF&CC) of the Government of India. The Project Elephant functions out of the headquarters of the MoEF&CC based at New Delhi. An Indian Forest Service officer in the rank of Inspector General of Forests oversees Project Elephant as its Director. The Director of Project Elephant is assisted by the staff of the Project Elephant. The State Forest Departments implement elephant conservation strategies in the respective states and wherever appropriate, the Project Elephant provides technical and financial assistance. The international concerns facing elephant conservation in India including the transboundary issues between India and neighboring countries of Bangladesh, Bhutan, Myanmar and Nepal are directly dealt by the Project Elephant Division.

4.2 Technical support

Project Elephant constitutes a Steering Committee chaired by Hon'ble Minister E &CC that includes the State Chief Wildlife Wardens in addition to scientists and non-government expert members. Steering Committee identifies and deliberates crucial issues facing elephant conservation in India from time to time. During the period 1992 to 2022, 16 project elephant steering committee meetings have been conducted and the discussion points have been duly minuted. The latest Project Elephant Steering Committee meeting was held under the chairmanship of Hon'ble minister of MoEF&CC on 29th April 2022 in Dehradun.

Quite recently, the Project Elephant initiated the CPEMC (Central Project Elephant Management Committee) that comprises of domain experts and officials to specifically look into contemporary challenges with renewed focus. In addition to the above, the Project Elephant also works closely with the State Forest Departments of elephant range states in India and also with technical bodies such as the Wildlife Institute of India (WII), Central Zoo Authority (CZA) and the National Tiger Conservation Authority (NTCA).

Furthermore, the Project Elephant had constituted a very active and vibrant committee "Captive Elephant HealthCare and Welfare Committee (CEHWC) with a specific objective of improving the welfare and health conditions of the captive elephants in the country.

4.3 Task Force Reports

The guiding documents for Project Elephant include the elephant task force reports that clearly elucidate the priorities of elephant conservation in India. The Elephant Task Force Report of 2010 (of the Gajah Report) has been an important document guiding elephant conservation in India since 2010. It is noteworthy that based on the recommendations of the Gajah report, the elephant was declared as National Heritage animal during the year 2010. The National Elephant Action Plan currently in the making will make amends in the Gajah report based on current elephant conservation priorities.

5. Elephant Reserves in India

The management unit pertaining to Project Elephant is the Elephant Reserve. Right from the year 1992 when Project Elephant was begun, the concept of "landscape approach" to elephant conservation has been emphasized considering the large range requirements of elephants. The concept of Elephant Reserves encompasses areas much beyond the Protected Areas and even forests. Less than 40% of elephant range in India falls within Protected Areas. Thus, focusing only on PAs is not sufficient to ensure long-term conservation of elephants. Certainly, we need to focus both in PAs and also areas beyond PAs. Therefore, in contrast to tiger reserves that largely fall under the jurisdiction of forest department, elephant reserve management calls for active coordination with other ministries, line agencies and local communities.

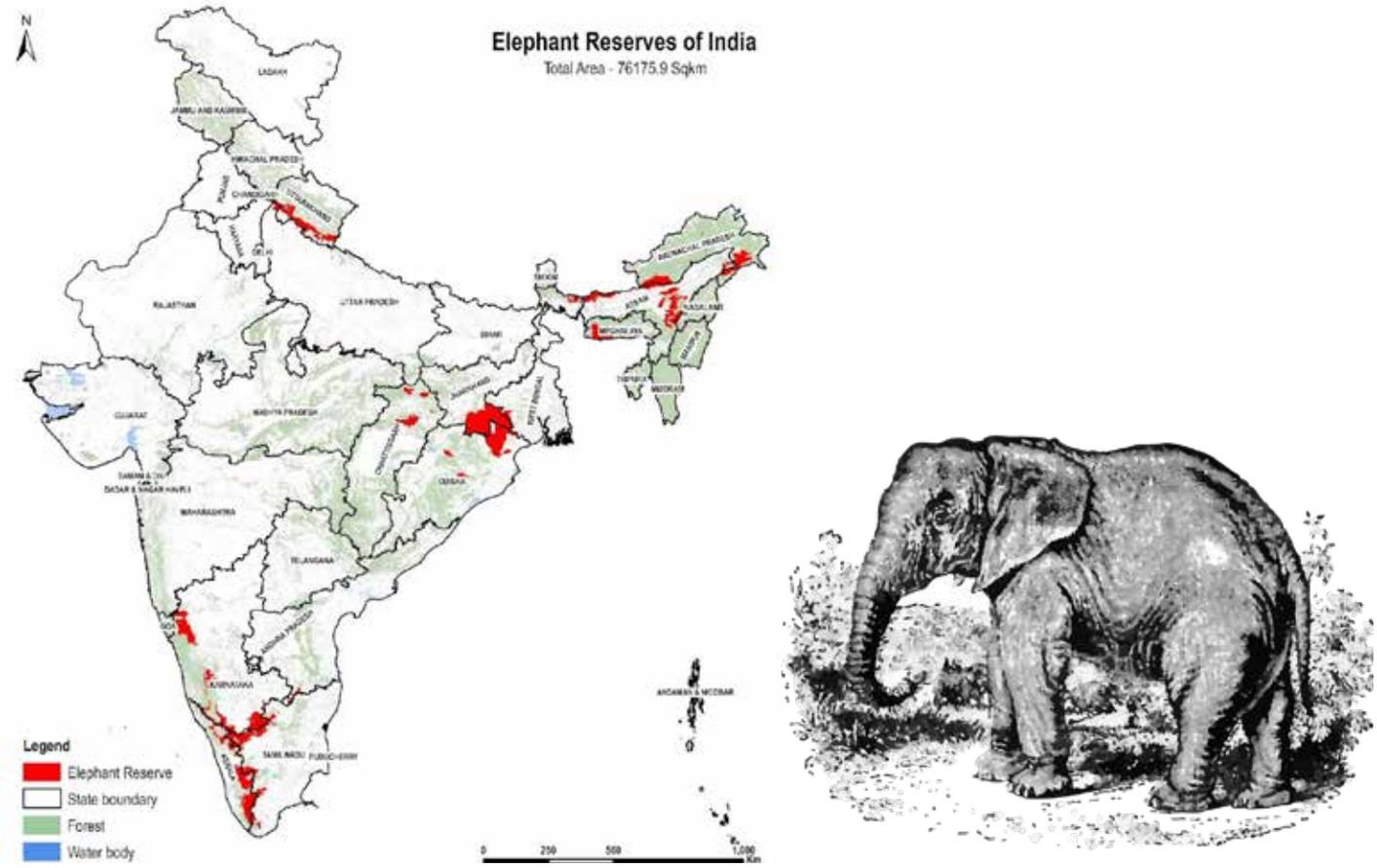

Figure-1: Elephant Reserves of India

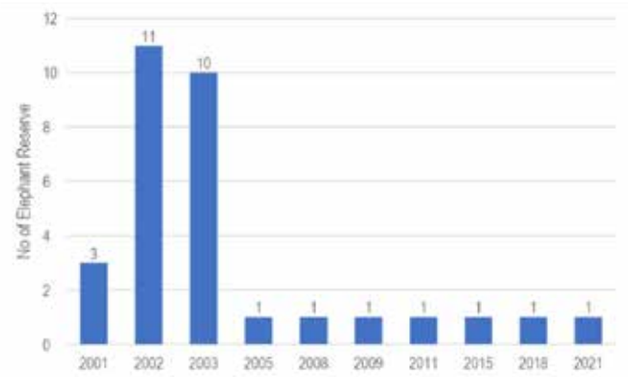

Figure-2: Year-wise declaration of Elephant Reserves in India

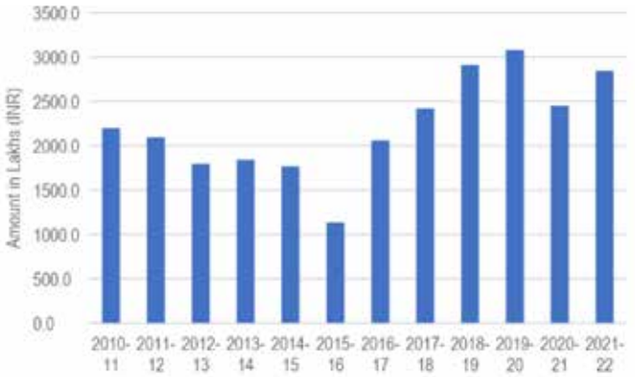

Figure-3: Year-wise central assistance provided by Project Elephant to the State Forest Departments

India has notified 31 Elephant Reserves as on date (Figure-1). The total extent of the ERs in India 76,508.4 km2 (Average ± SD = 2468.0 ± 2677.8 km2, Range = 23.5 to 13440 km2). The smallest ER in India is Singphan ER (23.5 km2) in Nagaland and the largest ER is Singhbhum (13440 km2) in Jharkhand. The ERs are spread across 14 States. The approval of Ministry for declaring "Agasthiyarmalai Elephant Reserve" in Tamil Nadu as 32nd Elephant Reserve in the country has been communicated to Government of Tamil Nadu. The declaration of "Agasthiyarmalai Elephant Reserve" will bring 77,705.8 km2 area under umbrella of ER. The year-wise details of ERs declared in India are provided in Figure-2. The Gajah report of 2010 rightly favoured declaring Elephant Reserves as "Ecologically Sensitive Areas" under the Environmental Protection Act, 1986 so as to secure elephant reserves from ecologically damaging incompatible land-use changes in and around elephant habitats.

6. Financial Assistance to Elephant Range States

Since the inception of the Project Elephant by Government of India, the PE division has been providing central financial assistance to States that manage elephants (both wild and captive elephants). Presently the Project is being implemented in 22 States/UTs, viz. Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Nagaland, Odisha, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh, West Bengal, Rajasthan, Bihar, Punjab and Haryana (Support provided for captive elephants). During the period 2010 to 2022, total financial assistance to the tune of Rs. 26,605 lakhs were provided to the State Forest Departments. Each year an average of Rs 2217.1 (± 560.0) lakhs were provided as assistance to the States (Figure-3). On an average 17 to 18 Indian States receive central assistance from Project Elephant.

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7. Inter-ministerial Coordination

Elephant conservation in India calls for active inter-ministerial coordination and active involvement of a variety of stakeholders.

• Recognizing this, the Project Elephant has been actively working with other ministries such as Railways, particularly on the issue of rail-induced elephant mortality that has been continuously increasing in India. Project Elephant along with WII, Uttarakhand Forest Department and WWF-India collaborated with Central Scientific Instruments Organization (CSIO), a CSIR institute and experimented use of thermal and seismic sensors in detecting elephants. The experiment results have been quite encouraging. The issue of elephant deaths due to train accidents has also been discussed regularly in the Inter-Ministerial meetings with Ministry of Railway.

• Another concern of direct consequence to elephant conservation is the power transmission related elephant deaths. To mitigate the threats posed by power transmission lines to elephant populations, Project Elephant Division has been continuously engaging with power ministry and power corporations.

• The support of district administration and police on matters relating to consolidation of critical areas in the ambit of elephant management and managing crowd during conflict situations has often been highlighted during inter-ministerial meetings

• Project Elephant has also been working with Ministry of Finance in combating elephant-related illegal trade happening through ports and harbors of the country

8. Steering Elephant Conservation in India: Major Initiatives

8.1.Monitoring Elephant Populations in India

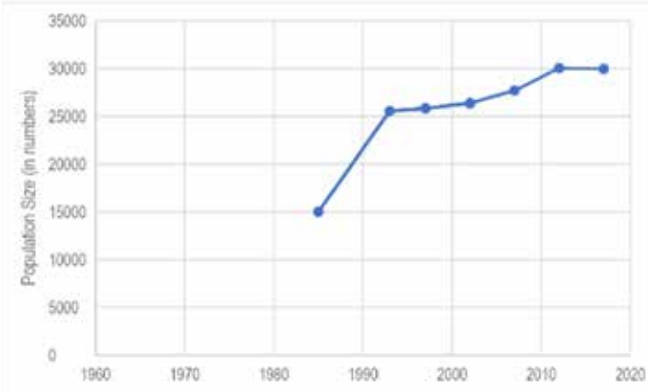
Information on population parameters like elephant distribution and abundance are important for effective management of elephant populations. India has been monitoring its elephant population for a long period of time. The first systematic elephant census was carried out in the erstwhile undivided Uttar Pradesh under the supervision of Imperial Forest Service officer Fred. W. Champion during the year 1938. The first official estimate of elephants in India was provided by IUCN – Asian Elephant Specialist Group during the year 1980, which estimated that about 14000 to 16000 elephants occur in India. Many State Forest Departments of the elephant range States in India have been individually conducting systematic elephant censuses since post-independence.

Since the year 2000 onwards, Project Elephant has been actively coordinating with the State Forest Departments in carrying out systematic elephant censuses/population estimation. In a daunting effort, the Project Elephant enabled synchronized elephant census where all the States in an elephant range carries out population estimation during the same-time to avoid duplication. The direct count method involving counting of elephants in blocks (usually forest beats) has been the conventional approach to estimate elephant populations. Although the method has seen wide acceptance amongst the Forest Department staff, considering the statistical uncertainties that arise due to inadequate spatial sampling and variable detection probabilities, approaches rooted in strong statistical theories have been promoted by Project Elephant. Accordingly, approaches like dung-based distance sampling have been used in population estimation of elephants.

The Synchronized Elephant Census exercise of India involves three processes namely (i) direct block count of elephants (ii) dung-based distance sampling and (iii) water hole count to register age-sex structure of elephants. During the 2017 synchronized elephant census, elephant distribution was systematically mapped. since 2021, by collaborating with NTCA, WII and State Forest Departments, MoEF&CC is experimenting synchronized elephant and tiger population estimation considering the high habitat overlap between tigers and elephants. The modalities have already been finalized and statistically sound population estimation approaches including the use of genetic “Capture-Recapture” method has been envisaged.

The population trend of elephants in India is provided in Figure-4. From the figure it is evident that the elephant population in India has been holding steady since 1990 with a marginal increase in some areas.

Figure-4: Population trend of elephants in India enumerated using direct count method



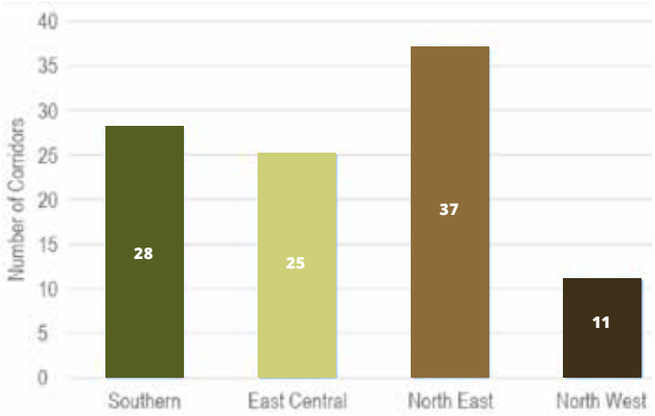
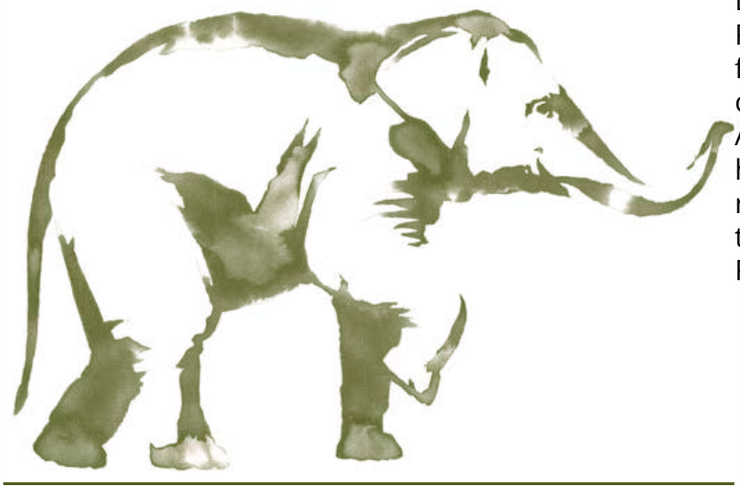


Figure-5: Elephant corridors across India

8.2.Securing Elephant Corridors of India

Wildlife corridors are essentially strip of habitat patches that connect the otherwise disjunct forest patches. Elephant habitats – even the largest of them occur in the midst of human-use areas. Being a wide-ranging animal, elephants cannot be conserved in small and isolated forest patches. Thus, habitat connectivity holds the key towards long-term elephant conservation in Indian conditions. In patchy habitats, habitat connectivity between forest patches is maintained through a network of corridors. As stated in the Gajah report of 2010, several elephant corridors across the four regional populations in India were identified (Figure-5). As a sequel towards rationalization of elephant corridors in India, Project Elephant has constituted technical committees to ground-validate the identified corridors. The task has already been initiated and ground validation of corridors have already been completed in a few states.

Elephant corridors that fall outside of forests, in human-use areas do not have legal protection currently. Thus, Project Elephant is contemplating in identifying critical corridors falling outside of forests and notify them as ecologically sensitive areas under the Environmental Protection Act of 1986 so that the status quo of the corridors can be maintained and elephants could continue to use those corridors for passage between forest patches. As a precursor to this, the Project Elephant has embarked on the task of ground validating the identified corridors.



8.3.Addressing Human–Elephant Conflict

In India, human–elephant conflict claims over 500 human and over 100 elephant lives annually. Thus, addressing human–elephant conflict assumes greater importance in light of both elephant conservation and safeguarding local livelihoods. The Project Elephant Division of the Ministry of Environment, Forests and Climate Change, which is at the helm of elephant conservation and management in India endeavours to bridge the knowledge gap in field management of elephant-related issues through dissemination of resource materials, conducting stakeholder consultations, and actively engaging at the field-level with the State Forest Departments of the elephant range states. The Project Elephant has been imparting intensive field and off-field training to forest officials on a variety of conflict mitigation strategies. Additionally, best practices in management of human–elephant conflict has been reviewed and released from time to time. Even recently, with technical support from WII and WWF-India, the Project Elephant has come up with a user-friendly

guidebook "Field manual for managing human–elephant conflicts in India" that forest officials in the field could refer during conflict situations and take actions, as appropriate. The manual was released by Hon'ble Minister of Environment, Forests and Climate Change during the 16th Project Elephant Steering Committee meeting held on 29th April 22 in Dehradun.

Further to this, well-maintained database can provide wealth of information including directions on prioritizing mitigation strategies. Recognizing this, the Project elephant has started maintaining a centralized database by collating information on HEC from all the affected states. The PE Division in collaboration with Elephant Cell at WII and State Forest Departments has already completed mapping of HEC pertaining to 8 different states.

Furthermore, recognizing that until long-term conflict mitigation strategies reap benefits, it would be important to minimize the losses incurred by stakeholders, as most of them are marginal farmers. In this regard, Project Elephant has been continuously trying to improve on the ex gratia paid to affected farmers. In a recent initiative, the crop losses due to wild animals have been covered under Prime Minister's Fasal Bhima Yojana (PMFBY) – a central Insurance scheme towards crop losses. Many of the State Forest Departments across India have significantly increased the ex gratia amount towards elephant-related losses. The response time too has improved in many states in paying ex gratia.

8.4.Improving Captive Elephant Welfare and Management

Wildlife (Protection) Act, 1972 does not discriminate between wild and captive elephants. Indeed, majority of elephants currently in captivity were either wild caught or born to elephants captured from the wild. There are no domestic elephants. We only have captive elephants. Elephant capture and training in India is about 4000 years old. As on date, India has about 2700 elephants in captivity. Amongst them over 1800 elephants are under private ownership. Admittedly, captive elephant welfare has been a major source of concern and embarrassment for elephant conservation in India. There is scope for enormous improvement in welfare and betterment of elephants in captivity. In fact, improving captive elephant welfare and providing

humane care is one of the stated mandates of Project Elephant.

As a step towards improving captive elephant welfare and to have better control over illegal trade and transportation of elephants within India and across borders, the Project Elephant in collaboration with Elephant Cell of WII and the State Forest Departments had embarked on an ambitious project of DNA profiling all captive elephants in India. The state-wise sample collection and genotyping is currently going on.

The Project Elephant has also been engaged in capacity enhancement of veterinarians and handlers to improve captive elephant welfare. During early 2022, a major training program involving forest veterinarians managing elephants from across the country was conducted. As a sequel a comprehensive book titled "Caring for Elephants: Captive Elephant Welfare and Husbandry" has been brought out jointly by Project Elephant and WII.

8.5. Addressing the Threats Posed by Linear Infrastructure Development

Development of linear infrastructure such as roads, railway lines and the associated mining activities form the most serious threat to elephant habitats in India. Reconciling India's developmental needs with conservation priorities of elephants continue to be a challenge. Project Elephant has been actively guiding on the Environmental Impact Assessments that are carried out in elephant habitats. To mitigate the potential impact of linear infrastructure, wherever possible, Project Elephant in collaboration with the State Forest Departments and technical institutions has been recommending strategies, as appropriate.

8.6. Combating Trade on Elephant Body Parts

Illegal poaching of male elephants for ivory is one of the major threats to elephant survival. Gajah report of 2010 indicated that although the elephant population in India is around 30000, the number of adult tuskers would be not more than 1200. Thus, protecting large tuskers from the omnipresent threat of ivory poaching is crucial. The ivory-poaching related threat to elephants peaked during 1980s and 1990s. Combating trade and addressing the threat of poaching of elephants are extremely challenging requiring excellent intelligence network, personnel to carry out sting operations, evidence gathering and support from judiciary to prosecute habitual offenders. To improve on the tasks of intelligence gathering, field patrolling to detect offences and offenders, and successful prosecution of offenders, Project Elephant has been working closely with WCCB, State Forest Departments and other enforcement agencies in imparting critical training and hands-on experience in handling cases through well-structured workshop and training programs.

8.7.Forging International Collaboration in Elephant Conservation

The Project Elephant has been actively engaging with international bodies engaged in elephant conservation. This includes active coordination with IUCN Asian Elephant Specialist Group and its MIKE (Monitoring Illegal Killing of Elephants) Program. The Project Elephant Division had been sending data on illegally killed elephants and ivory seizures to the MIKE and ETIS. Further to this, Project Elephant has been actively engaging with the neighboring countries in fostering elephant conservation. A protocol on transboundary elephant conservation between India and Bangladesh was signed on 17/12/2020.

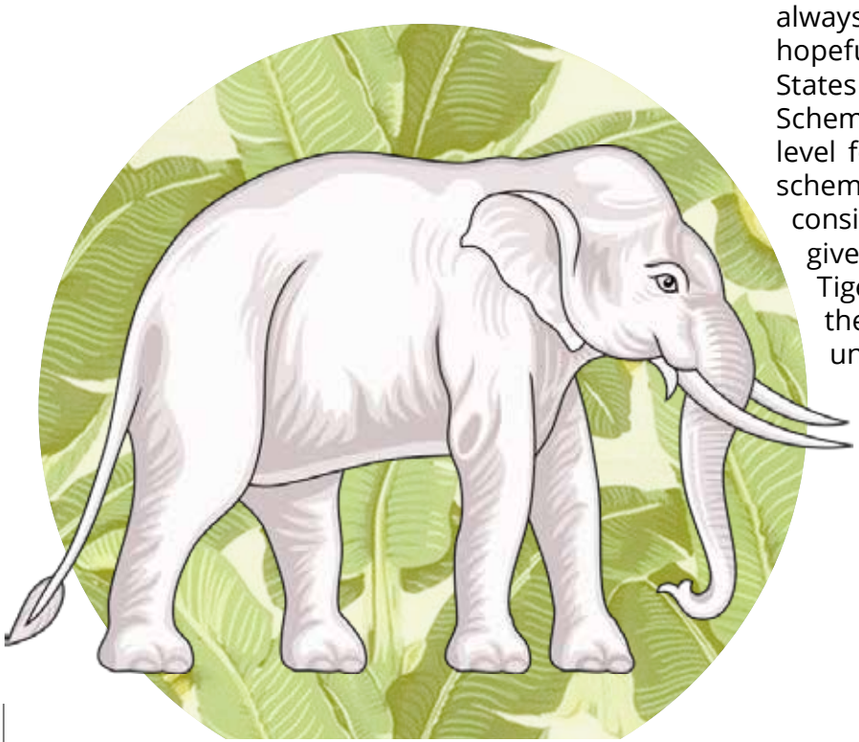
Concluding Remarks

Securing elephants is a challenge that has been taken up by India, which has been steadfast in prioritizing conservation strategies. While it is certainly a remarkable feat to have secured elephant populations against all odds, there is no room for complacency as threats to elephant habitat continue and human–elephant conflict is showing an ever-increasing trend. Since the year 1992 when Project Elephant was formed, it had done much appreciable work towards elephant conservation. However, there is much more to do and renewed focus and mission mode of working closely with all stakeholders seem need of the hour to take elephant conservation to the next level. In doing so, it hopes to take up elephants to the people so that India remains a leader in elephant conservation forever.

Penny for a Thought: Former IGF & Directors of Project Elephant

Shri Vinod Rishi

To safeguard the future of Asiatic wild elephant in India, Project Elephant must revert back to its initial landscape approach. Elephant conservation cannot be carried out meaningfully in smaller fragmented sections of the elephant range. It is the number of family units, and not absolute numbers, that reflect the true status of the viability of the elephant population. Elephant conservation cannot ignore the lifestyle of this highly sensitive, gregarious and social animal, and the research on habitat management affected by Human-Elephant Conflict.



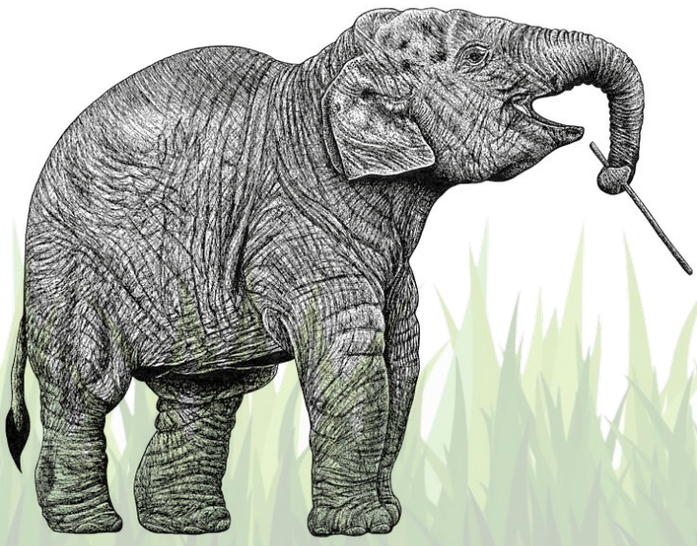
Shri A. N. Prasad

Wildlife conservation in India got a major boost with enactment of Wildlife (Protection) Act in 1972. It was further strengthened by launch of Project Tiger and Project Elephant to protect and conserve the two flagship species. The introduction of Project Elephant in 1992 as a management intervention has certainly achieved the main objectives with which it was launched. Whereas increasing population in wild, creation of Elephant Reserves and steps taken for welfare of captive elephants like creating rescue centres are very assuring, there are some issues like human - elephant conflict and continued degradation & fragmentation of its habitat that needs serious attention. Inadequate fund allocation to the Project has always been a constraint and limitation but hopefully CAMPA fund can be leveraged by the States to meet many major activities under the Scheme. Administrative restructuring at State level for more effective implementation of the scheme is another issue which requires serious consideration. One school of thought is to give legal status to Elephant Reserves like Tiger Reserves but I think it is better to treat them as management unit as major area under Elephant Reserves have already legal protection either as National Parks or Wildlife Sanctuaries or Tiger Reserves.

Shri S. K. Khanduri

Project Elephant of the Union Ministry of EF&CC exclusively dedicated to the Elephant reflects the resolve of our Country to bring back the species to a vibrant and resilient status. This exclusive life form is rightly recognised as a "Keystone Species" for its unparallel ecological role in the natural environment and biodiversity in the forests, of recycling of nutrients and dispersal of genetic material. This iconic wild life species, is the top most tourist attraction too in the wilds of our country. Elephants in captivity enjoy a venerable place in our culture.

Owing to its large size and range, the species faces challenge of survival. Project Elephant and associated institutions need support for their ongoing dedicated work on long term survival of this species and thus for overall conservation of natural environment. Sustainability as the basis of development across all sectors with landscape based planning approach, keeping the impact on other sectors, would provide conservation as obvious outcome. Societal sensitivity for welfare of captive elephants too is needed to be nurtured.



Shri R. K. Srivastava

India is home to more than 60% global population of wild Asian elephants. Hence the survival of Asian elephants is heavily dependent on conservation of elephants in India. The Government of India has taken a number of commendable steps in this direction e.g. All India Declaration of 30 Elephant Reserves covering more than 65000 Sq. Kin. area; Identification 108 Elephant Corridors; Synchronized Elephant Population Estimation, 2017, Inclusion of Asian elephants in Appendix I, etc. Population of Asian elephants in India has also reached a comfortable level of 30,000 (approx.). However, many problems still remain such as high incidence of Human Elephant Conflicts, high rates of elephant mortality due to electrocution by electric lines; Elephant Mortality and Injuries due to train hits.

I would like to make few suggestions to reduce the impact of Human Elephant Conflicts, for benefit of elephants as well as subsistence level farmers and villagers: (i) Elephant Corridors should be given legal recognition, either by amendment of Wildlife Protection Act, 1972 or by issuing Government notification. (ii) The Ministry, in coordination with the Ministry of Agriculture and Farmers Welfare and State Governments, should make all out efforts for adoption of Pradhan Mantri Fasal Bima Yojana (PMFBY) scheme by farmers. It will greatly reduce impact of crop depredation by wild animals and also reduction of retaliatory killing/ injury to elephants and other endangered wild animals; (iii) Wildlife species, which are not endangered and are habitual crop raiders by nature e.g. Blue Bull, Wild Boar, Rhesus/ Bonnet Monkeys and Porcupine, should be brought under the purview of Section V of the Wildlife Protection Act,1972.

Shri Noyal Thomas

Elephant, the Gajah, is the most venerated wild animal associated with the lives of millions of people in India & is also our National Heritage Animal. Importance of elephants in maintaining the ecological security of the country has resulted its depiction in several Indian manuscripts and treatises and is also considered by many as the reincarnation of Lord Ganesha, the remover of obstacles.

Elephant has been given the highest legal protection as a Schedule I species under the Wildlife Protection Act, 1972 and is also included as an as Appendix I species in CMS in 2020. Inclusion of Indian Elephants as an appendix I species will give impetus to the transboundary conservation of Elephants in India & its neighboring countries. India is supporting more than 29964 Wild Elephants as reported in 2017 and is still increasing due to the strict conservation measures and support of people for its conservation. India has been a pioneer in scientific elephant conservation through its dedicated Project Elephant programme since 1992. This has helped to save the dwindling population of 15000 elephants in the country to a population of about 30000 at present. The focused attention along with the highest legal protection helped the Indian elephants to regain its past glory in the Asian region. It is expected that more concerted effort, financial and legal backing to the conservation measures would certainly ensure the survival of this majestic keystone species of our country.

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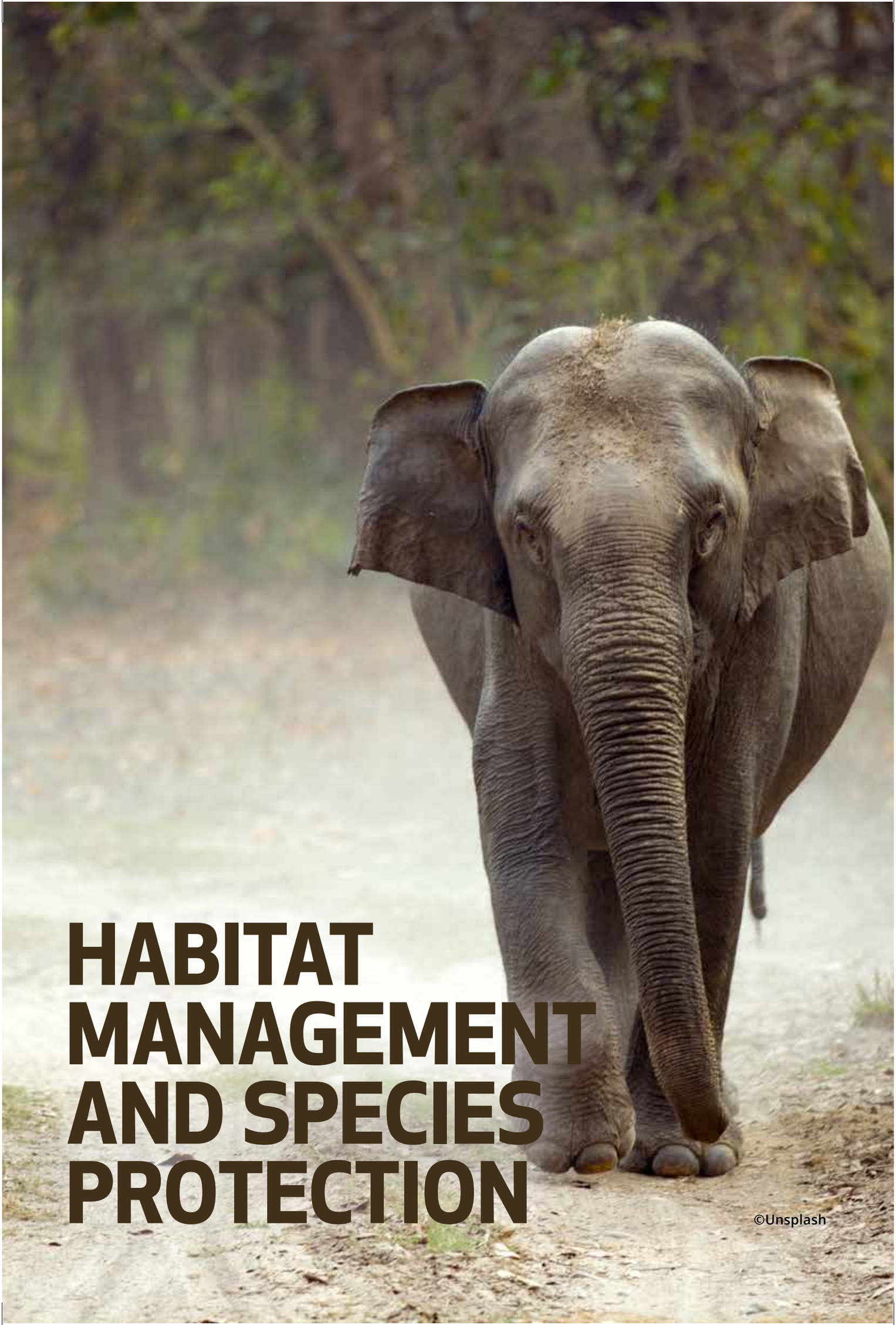

HABITAT MANAGEMENT AND SPECIES PROTECTION

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Conserving Forest Landscapes for Elephants

Shri P. R. Sinha
Former Director WII

Introduction

Elephant is an umbrella species requiring large natural habitats for its sustenance and survival. It is also a charismatic flagship species having cultural and religious sentiments attached to it. It manipulates habitats thereby facilitating availability of welfare factors to large number of species, big and small. No other species has all the three ecological attributes, not even the charismatic tiger. Presence and persistence of a healthy population within an ecosystem is indicative of a healthy and functional and ecosystem. Loss of forested landscapes across Asia is inextricably linked to shrinkage of historical range of elephant distribution. Elephants once roamed from west Asia, Indian subcontinent and in south east Asia over 900 million sq. kms but now its distribution is restricted to around 4,86,000 sq.kms only. In terms of population size, it has reduced to 50% over the last three generations (IUCN Red List 2020). Its status as per the IUCN red list continues to be classified as Endangered.

Challenges in Conserving Landscapes

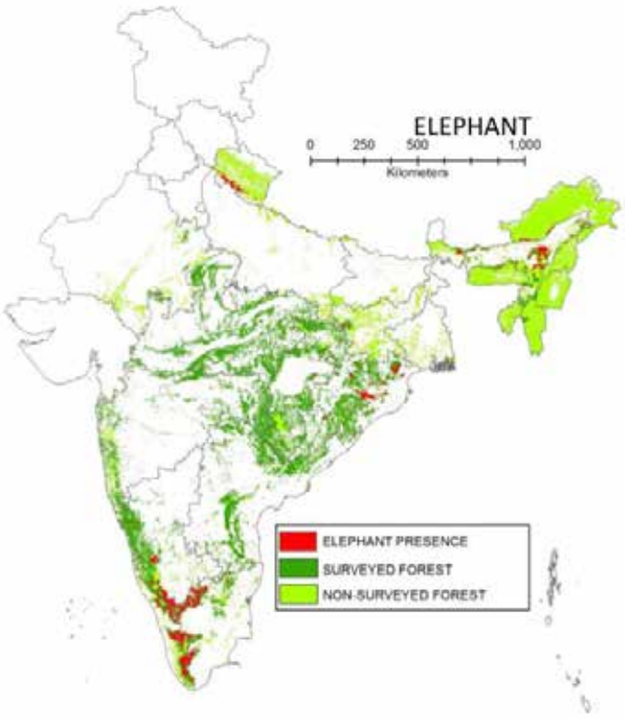
India holds about 60% of the estimated global population. As per the Report entitled Tiger, Co -Predator & Prey (WII 2018), the Western Ghat landscape comprising the states of Karnataka, Kerala and Tamil Nadu hold largest distribution of Asiatic elephants in the world with its occupancy spread over 27,670 sq. kms in this region. This landscape also holds highest number of tigers. NE landscape and the central, eastern and northern region comprising of lower Himalayas and Shivaliks hold rest of the population of this species. Interestingly, the report also noted sporadic presence of elephants from Sindhudurg and Kolhapur districts of Maharashtra in past ten years. It is also moving to eastern Madhya Pradesh, Sanjay Dhubri Tiger Reserve and adjoining areas of Kanha TR. Elephants also moved to Chhattisgarh about twenty-five years back and have become residents of the states. Though they move over large areas for foraging but colonizing new areas is indicative of deterioration of habitats, human disturbance and other negative factors operating in the area from where they are moving out.

Population decline of large mammals is indicative of degradation and fragmentation of habitats. Challenges in conserving large carnivores or a mega herbivorous like elephant emanates from these two underlying causes. The other major challenge faced by managers namely, Human Elephant Conflict, is result of these two factors. It is a common experience that preventing crop raiding by elephants around good habitats is easier than around areas having degraded habitats. We, therefore, have no option other than to conserve whatever is habitat is now left and try to restore its quality by active management interventions.

The way forward

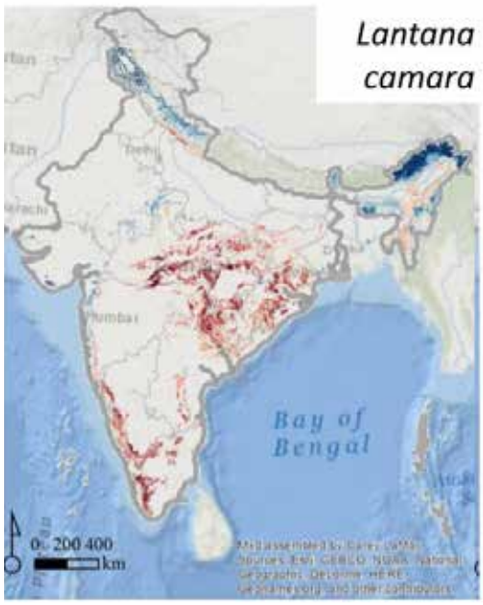
The Task Force Report on Elephant entitled “Gajah 2010”, identified ten landscape units for conserving elephants. Of these ten units, it prioritized five landscape units for initiating integrated and comprehensive strategy for conservation. These are Bramhagiri-

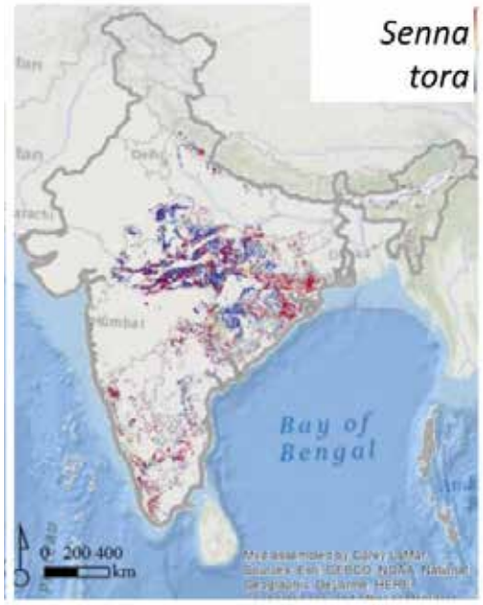
Nilgiri -Eastern Ghat landscape, East-Central Landscape, North-Western Landscape, Kameng -Sonitpur landscape and the Kaziranga -Karbi Anglong -Itanki landscape. Based on the data available with the Task Force at that point of time, it also suggested securing corridors around these landscapes. It also gave detailed recommendations on avoidance and mitigation of infrastructure and development projects in elephant landscapes. However, it did not prescribe framework for restoration of degraded landscapes within these areas. Now that we have very good data on habitat attributes with Wildlife Institute of India (WII) on human disturbance, weed and other invasive species within our forested landscapes, we are better equipped to undertake restoration of degraded habitats due to invasive and other negative factors operating in the area. WII collects data at beat level from forest in all six landscape complexes across India. It also has occupancy data on elephant distribution in all these landscapes. All these data sets are in GIS domain. It will be desirable to work closely with National Tiger Conservation Authority (NTCA) and WII and map layers of weed infestation, fragmentation and other human disturbance factors and overlay it with the current Elephant Reserve boundaries. We should also put the boundary of Tiger Reserves as another layer. Based on the available information as per the Task Force Report on elephant (Gajah 2010) and the maps available with WII, Southern landscape should be given the top most priority for habitat improvement works. The recommended suggestions for improvement of the Southern landscape are:

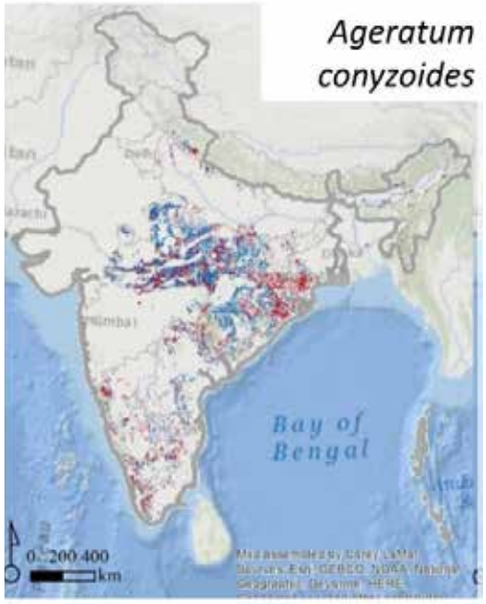


• Southern Landscape (Western Ghats) not only holds largest congregation of elephants but also tiger and other co predators. It has some of the finest TRs in the region with good institutional framework in place. However, this area is heavily infested with invasive species like Lantana. Many ecologists consider this infestation as good for animals as escape and resting cover and also as food for birds. However, we must not forget that it not a native species. Though ecologists and wildlife experts have no unanimity on strategy for removal of the species, I firmly believe that systematic and sustained removal of this invasive will work. Many methods have been tried particularly under guidance of Prof. C.R. Babu in Corbett TR and by our own foresters in other areas. The principle which one should follow in removing any weed or invasive is that it should not be done over a very large area in one go as it will cause large oscillation thereby impacting the existing complex of fauna occurring there. We should select areas in a chess board pattern. The treated area should be tended for at least three years to allow regeneration of native grasses and forbs. It should not be attempted in areas which have heavy cattle grazing pressure. Periodic monitoring for mid-course correction, if required, should be undertaken. Other areas suggested for this exercise is the Northern landscape of Corbett-Rajaji which is fairly secure from biotic factors. NTCA and Project Elephant Division would have to pool their available resources for undertaking this activity for synergy in output.

• Restoration of corridors is not an easy task. Though we have now very good data on corridors and connectivity area, there is a need to merge the available information in WII database on this aspect with the information available with PED. The conflict zones should also be put in GIS domain as an additional layer. After taking into consideration all relevant factors both in terms of reducing human-elephant conflict particularly death of humans and practicability of undertaking restoration, priority corridors should be identified preferably around areas where habitat restoration work is also underway. This approach would help in evaluating the efficacy of habitat restoration and corridor connectivity in a landscape unit as part of future strategy for human-elephant conflict.







• No PA system can survive in long term unless the buffer areas around it is managed in a way which is compatible with ecology of the area. In a paper published in Nature (2012) entitled "Averting biodiversity collapse in tropical forest Protected Areas", managing buffers around PAs has been emphasized. Many more publications on desirability of buffer around PAs are also available. In fact, the Tiger Co-predator & Prey Report of NTCA &WII (2018) has flagged this issue in its detailed analysis of Tiger Reserves. Out of 50 Tiger Reserves which have been evaluated, 39 Reserves do not have self-sustaining population of tigers due to various negative factors operating around these Reserves. Some of these Tiger Reserves are also elephant bearing areas. We have to reach out to other line departments to ensure that they gradually mainstream biodiversity concerns in their local developmental planning. Though there have been good efforts by MoEF&CC in this regard in past few years in reaching out to other line agencies, these largely relate to agencies undertaking linear development projects. We will have to reach out and sensitize district level functionaries in Agriculture and Rural Development departments to mainstream biodiversity concerns in their project planning and implementation process. Some good initiatives were initiated in the eighties (Eliciting Public Support for Wildlife-Report of committee constituted by NBWL in 1981) in this regard. The Committee interacted with all line departments at the level of Secretary and identified ecologically compatible activities which should be undertaken by each of the line departments around PAs. However, acceptance of this approach did not percolate to functional level of districts. Time is conducive now to push this agenda at various levels.

In conclusion, it is now imperative to take integrated approach in priority elephant occupied landscapes with NTCA and other wild life wings of the Ministry of Environment, Forest & Climate Change for synergy to prevent further fragmentation of natural forested landscapes and reversing its degradation.

First Ever Corridor Walk from Similipal to Satkosia in Odisha

Jitasatru Mohanty, Former CF, Odisha
& Debabrata Swain, Former PCCF & HoFF, Odisha

Introduction:

Odisha is bestowed with vast forest and varied wildlife. There are 114 species of mammals, 29 species of amphibians, 131 species of reptiles including three crocodilian species, and 537 avian species which include 54 endangered species (22 species of mammals, 17 species of reptiles and 15 species of birds). Both tigers and elephants are flagship mammals. There are 19 sanctuaries, two National Parks, two Tiger Reserves, three Elephant Reserves, and one biosphere reserve for exclusive focus on wildlife conservation. Among them, Similpal landscape, a conglomeration of sanctuary, proposed National Park, Tiger Reserve, Elephant Reserve & Biosphere Reserve and another landscape namely Satkosia, a combination of sanctuary, Tiger Reserve & Elephant Reserve are considered to be source population for the majority of tigers and elephants of the state. Odisha is the home to 70% elephant population of the Central East Region landscape comprising of Chhattisgarh, Jharkhand, West Bengal and Odisha.

Cobden-Ramsay in his book on 'Feudatory States of Orissa' stated in 1990 that the extensive and almost unpopulated tracts of the Similipal forest was a sanctuary of elephants. Probably most of the elephants in Odisha visited this magnificent elephant-forest at some time or other in the course of their existence. This statement implies that all elephant lands were contiguous with Similipal forest and elephants freely migrated from one habitat to another. In fact, the predicted forest cover map from 1800 shows a continuous patch of forest from Similipal to Central India.

The degradation and fragmentation of parent habitat causing food scarcity and hindered inter habitat movement due to various manmade obstruction in connecting corridors are compelling elephants for invading human habitation frequently to make good the deficit. It led to ever-rising crop damage and also casualties of both human and elephant due to retaliatory action resulting severe Human-Elephant Conflict in Odisha. Improvement of habitats with smooth inter linking is call of the hour. Though there are 14 notified corridors in the state, their functional efficacy in connecting the habitats is awfully dismal. The Similipal-Satkosia mega corridor passing through eight districts in the north-central part of Odisha connects the Similipal Tiger Reserve (STR) of Mayurbhanj district (21°35'35.22"N & 86°17'40.34"E) with Satkosia TR of Angul District (20°30'25.74"N & 84°51'58.39"E). The movement of wildlife between Similipal and Satkosia TRs is facilitated by wildlife sanctuaries and Reserve Forests (RFs) connected by a chain of corridors: Similipal-Hadgarh, Baula-Kuldiha, Kanheijena-Anantpur, Anantpur-Aswakhola, Aswakhola- Sunajhari, Nuagaon-Barauni, and Tal-Kholgarh. There are about 2,000 elephants in Odisha. Similipal accounts for about 500 of these (Fig1); whereas there are about 200 elephants in Satkosia TR (Fig 2). Between Similipal and Satkosia, about 600 elephants are seen. Hence a comprehensive assessment of the routes of elephant and tiger movement from Similipal to Satkosia is not only a priority but also a felt need in the present situation.

Fig 1 Elephants in upper Barha Kamuda inside Similipal landscape

Fig 2. Elephants of Mahanadi Reserve inside Satkosia landscape

Accordingly Save Elephant Foundation Trust, a non-governmental organisation working exclusively for protection and conservation of elephants conducted a first ever corridor walk for identifying key issues and exploring solutions to facilitate hassle free passage of wild animals, especially elephants. In addition, motivating people to participate in conflict resolution and conservation of forest and wildlife was another objective.

Methodology:

Two teams (Fig. 3 & 4) comprising of experienced forest officers, wildlife scientist/ researchers, university students and wildlife conservationist/ enthusiasts undertook corridor journey separately in two routes spanning over 11 days from 11th January to 21st January, 2020 covering around 700 km including about 250 km on foot by each team (Map 1). Both have common starting location at Taramara, a tribal village in Similipal complex and also ending point at village Tikarpada inside Satkosia region. Apart from in-depth inspection of corridor (Fig. 5) and adjoining habitats comprising of over 100 forest blocks for first hand assessment, 22 awareness meetings cum interactive sessions (Fig. 6)

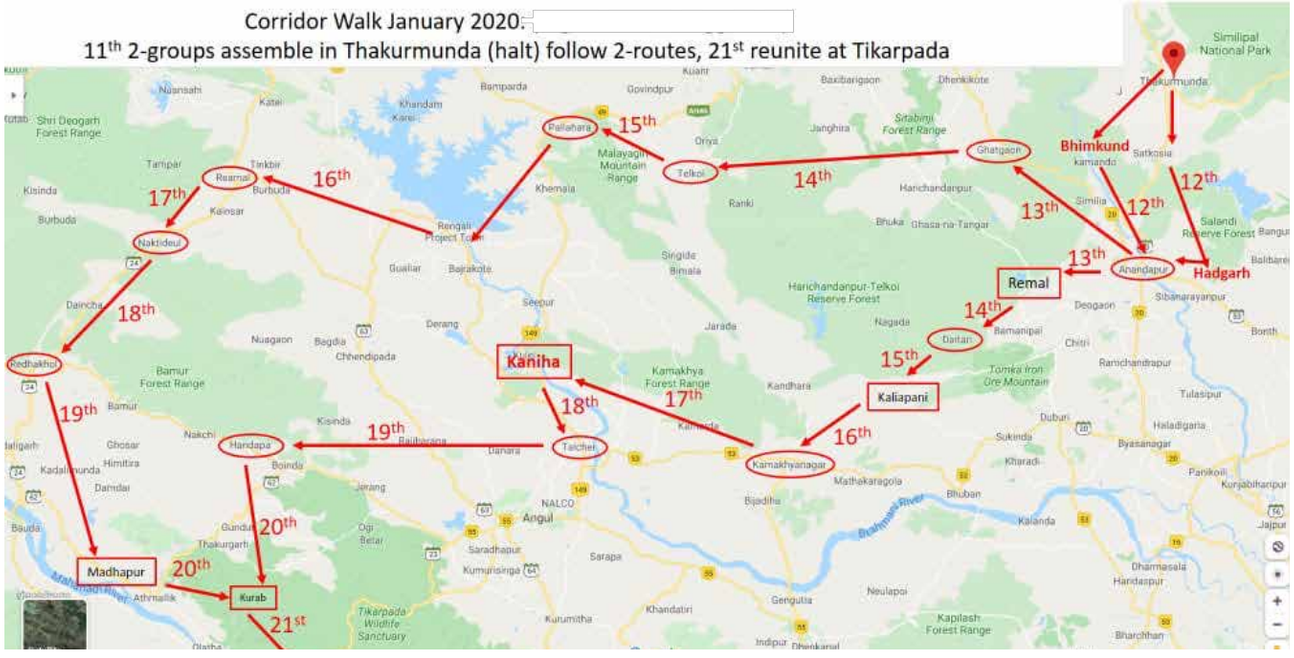
Fig. 3 Team A walking through route 1 of Simlipal-Satkosia

Fig. 4 Team B walking through route 2 of Simlipal-Satkosia

have also been conducted with fringe dwellers to know their psyche and understanding on depredation issues and mitigation measures for dispelling wrong notion of revengeful attitude towards elephant. The walk traversed through seven Districts namely Mayurbhanj, Keonjhar, Deogarh, Jajpur, Dhenkanal, Sambalpur & Angul and 10 Forest Divisions like Karanjia, Keonjhar, Keonjhar (Wildlife), Cuttack, Dhenkanal, Deogarh, Rairakhol, Athmallik, Angul & Satkosia (Wildlife). All the three notified Elephant Reserve of the state i.e., Mayurbhanj, Sambalpur & Mahanadi and proposed Baitarani ER were covered during this corridor walk exercise.

Fig. 5 Walking through Simlipal-Satkosia Corridor

Fig. 6 Meeting with women group of Rebena village, Kheonjhar

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Results:

Vegetation types and flora:

The Similipal-Satkosia corridor is a mosaic of forest, villages, mines (active and closed), and water bodies (streams and reservoirs). The forest is represented by Sal (Shorea robusta) forest, sal-dominated mixed forest (Fig. 7), and mixed forest with or without Sal. The main types are Northern Tropical dry deciduous mixed forest, Moist peninsular low level Sal, Southern tropical dry deciduous forest and Dry peninsular Sal.

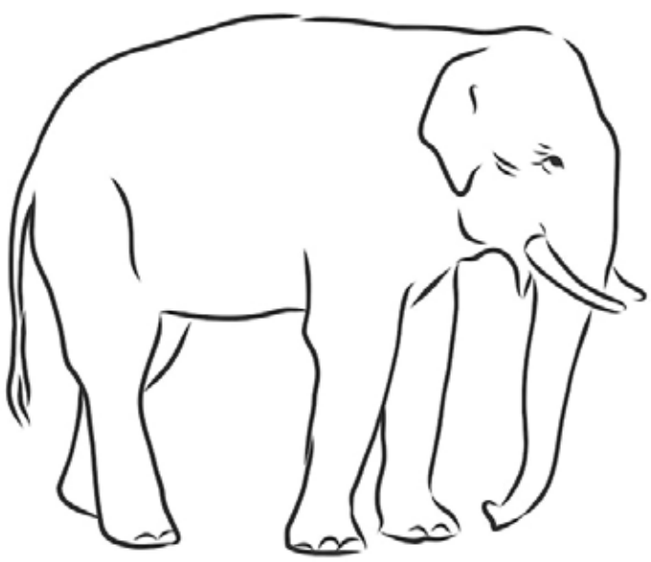
Fig. 7 Sal dominated mixed forest in Simlipal-Satkosia Corridor

Wild fauna:

Direct sighting and sign evidences of digging, pugmarks, hoof marks, scats and faeces of 11 mammals belonging to eight families were observed. A total of 20 species of herpetofauna representing seven amphibians and 13 reptiles (Lizard and snakes) were also found. Avifauna were comprised of 53 species representing 33 families, 55 species of butterflies representing 42 genera and 5 families and 25 species of Spiders from 19 genera and 8 families were also noticed.

Socio-economic Characteristics:

The primary livelihood sources of the people are agriculture, livestock grazing, manual labour, and mining labour. Most people in tribal populations do not have any formal education, and only a few are educated up to the primary level. The majority of the population lives in informal settlements and 'Kuccha' houses. Most of the people have less than an acre of land mostly used for cultivation of rice and vegetables. Shifting cultivation is prevalent in Keonjhar wildlife division and Cuttack forest division particularly around Nagada village. District Administration initiated developmental activities of road construction, electrification and piped water supply at the cost of forest and wilderness of this corridor. Healthcare facility is poor. In nutshell, the forest dwellers are underprivileged and fall in below poverty line category.



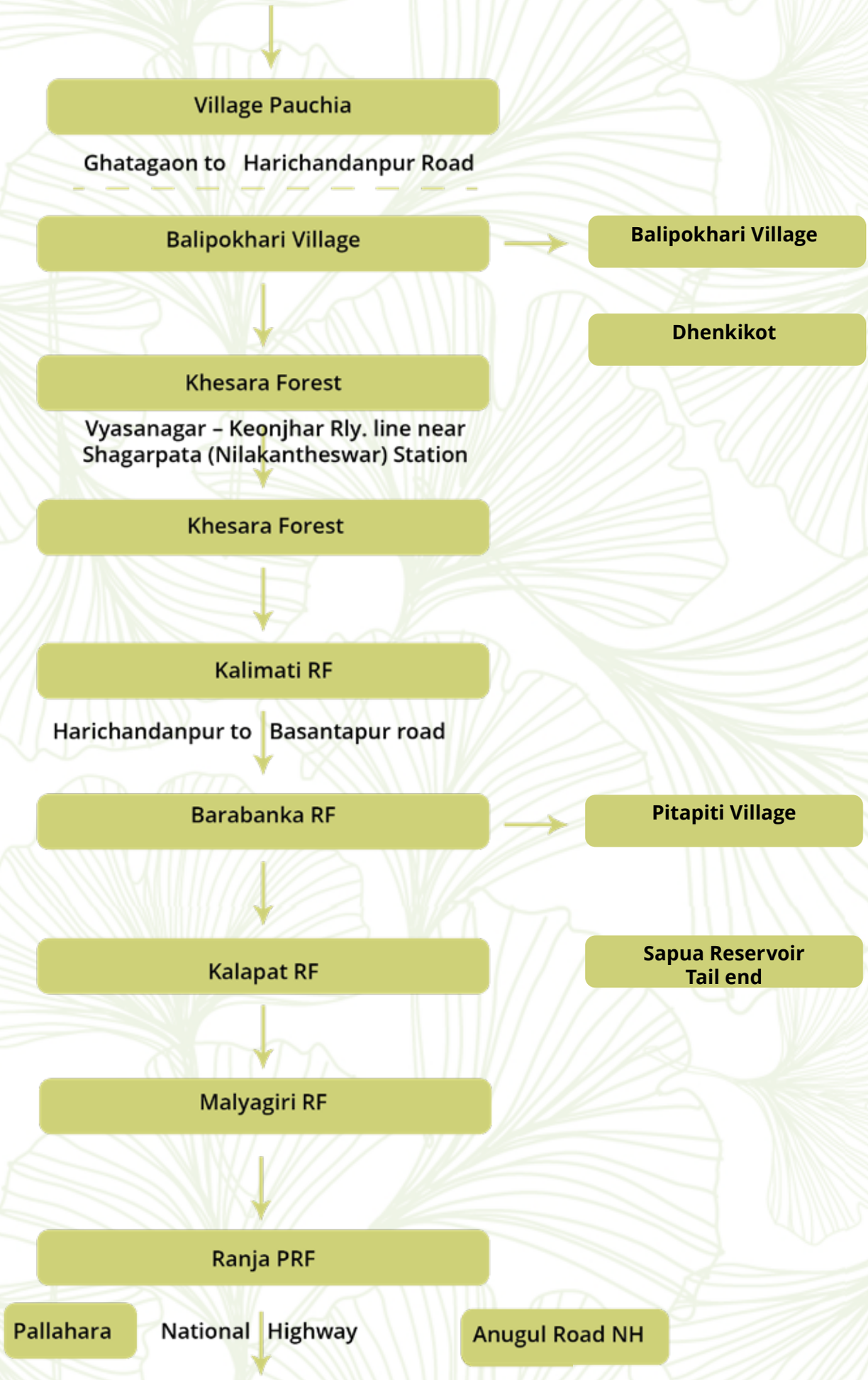
Dependence of local community on corridor:

Similipal-Satkosia corridor is a source of livelihood and sustenance for the local people as they collect fuel wood, fodder, traditional medicinal plants, and non-timber forest produces like Mushrooms from the nearby forest. Wood from the forest serves as the major source of fuel.

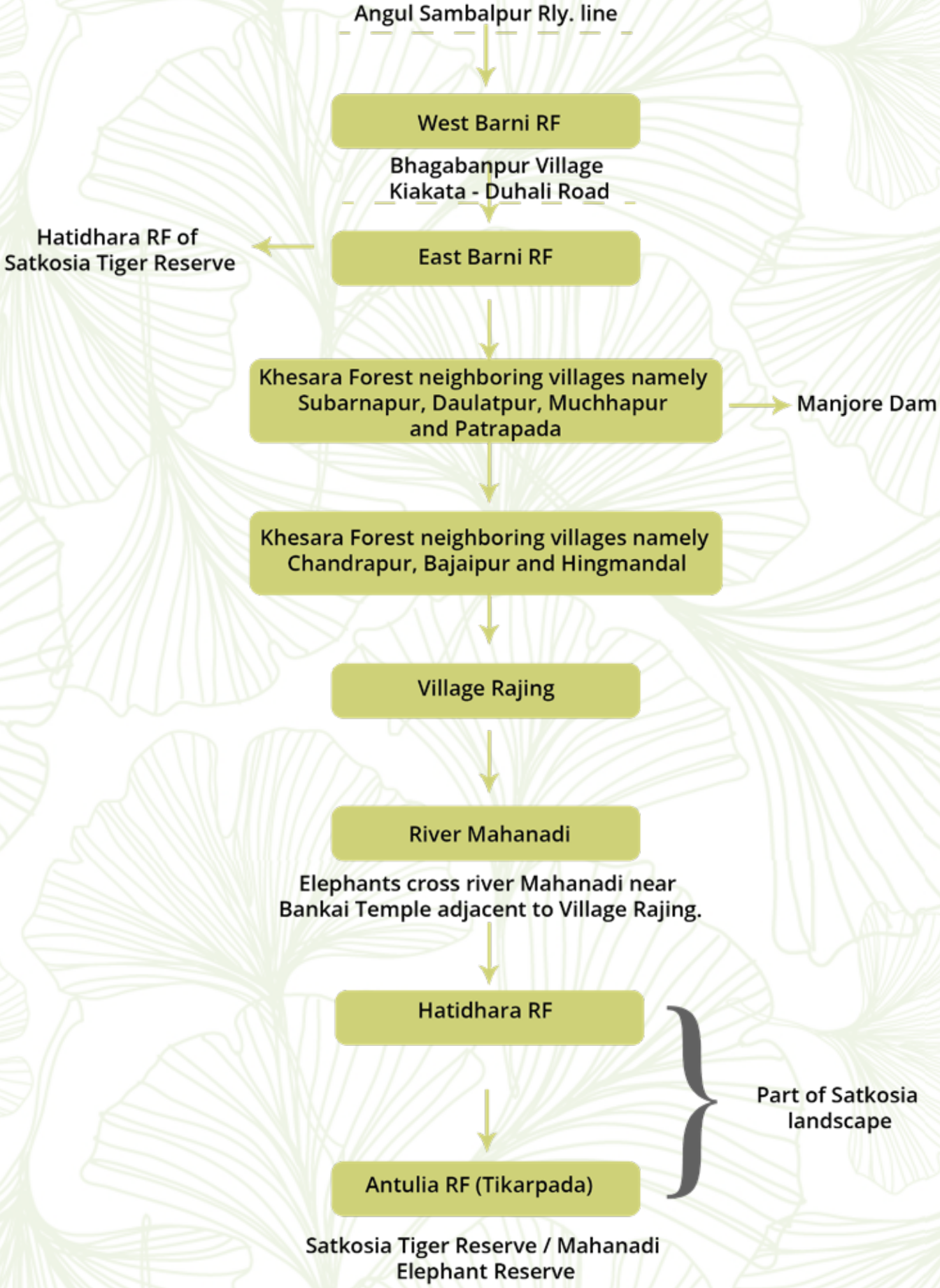
Elephant movement:

Movement of elephants in Similipal-Satkosia corridor has been prepared based on the field data analysis of the two routes and furnished as given below:

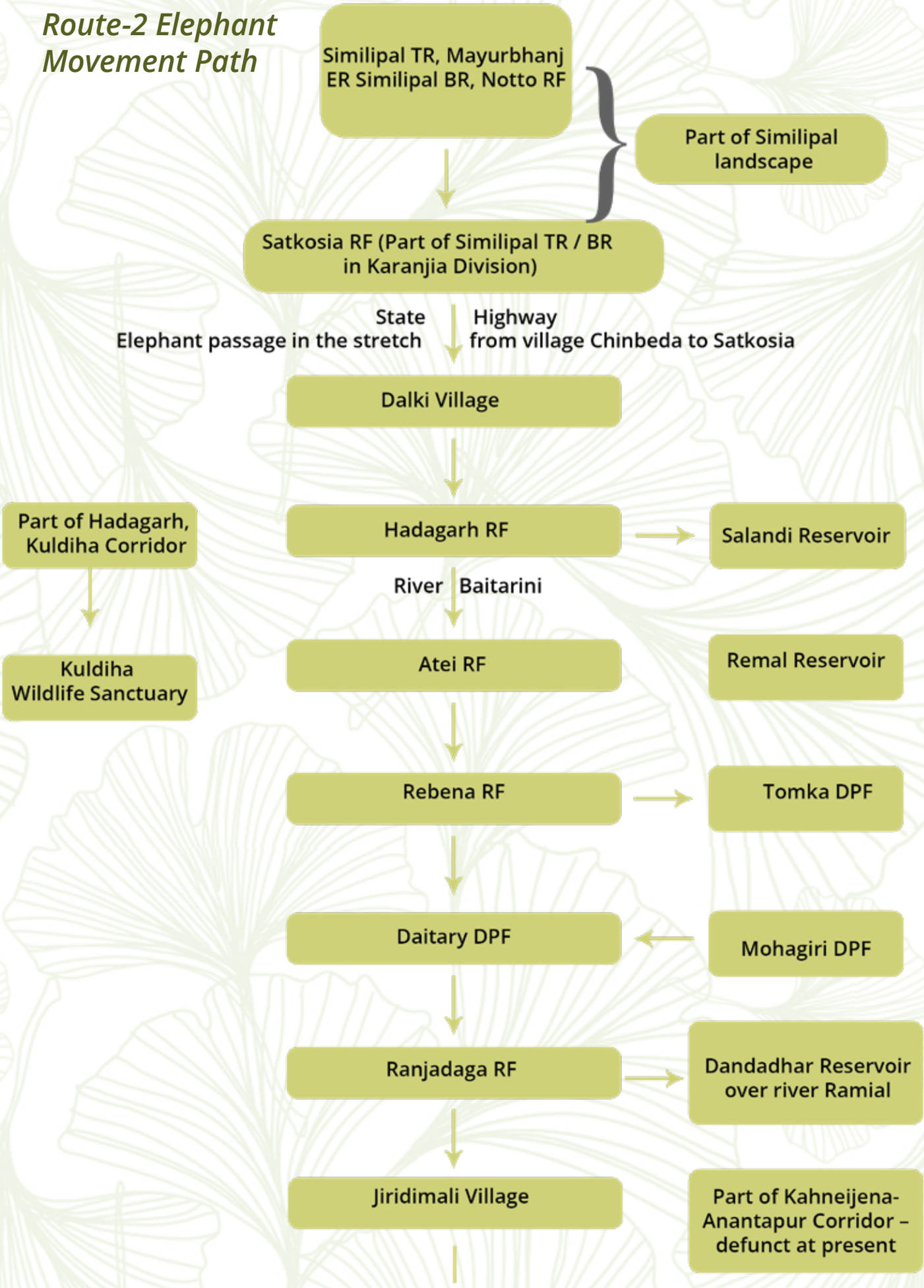
Route-1 Elephant Movement Path


Village Pauchia
Ghatagaon to Harichandanpur Road
Balipokhari Village
Balipokhari Village
Dhenkikot
Khesara Forest
Vyasanagar – Keonjhar Rly. line near
Shagarpata (Nilakantheswar) Station
Khesara Forest
Kalimati RF
Harichandanpur to Basantapur road
Barabanka RF
Pitapiti Village
Kalapat RF
Sapua Reservoir
Tail end
Malyagiri RF
Ranja PRF
Pallahara
National Highway
Anugul Road NH


Golabandha KF / Paburi RF
Village Gandamundala
River Brahmani
Jaipur RF
Village Riamal
Village Hitasara
Landimal RF
Koing Village
Rail RF
Rail Village
Tal RF
Part of Tal – Kholagarh Corridor


Angul Sambalpur Rly. line
West Barni RF
Bhagabanpur Village
Kiakata - Duhali Road
Hatidhara RF of
Satkosia Tiger Reserve
East Barni RF
Khesara Forest neighboring villages namely
Subarnapur, Daulatpur, Muchhapur
and Patrapada
Manjore Dam
Khesara Forest neighboring villages namely
Chandrapur, Bajaipur and Hingmandal
Village Rajing
River Mahanadi
Elephants cross river Mahanadi near
Bankai Temple adjacent to Village Rajing.
Hatidhara RF
Part of Satkosia
landscape
Antulia RF (Tikarpada)
Satkosia Tiger Reserve / Mahanadi
Elephant Reserve

Route-2 Elephant Movement Path



Anantapur RF

Ranibeda RF

River Baitarini

Rodanga RF

Madhabamunda Revenue Forest

Budhikiari Revenue Forest

Dolia RF

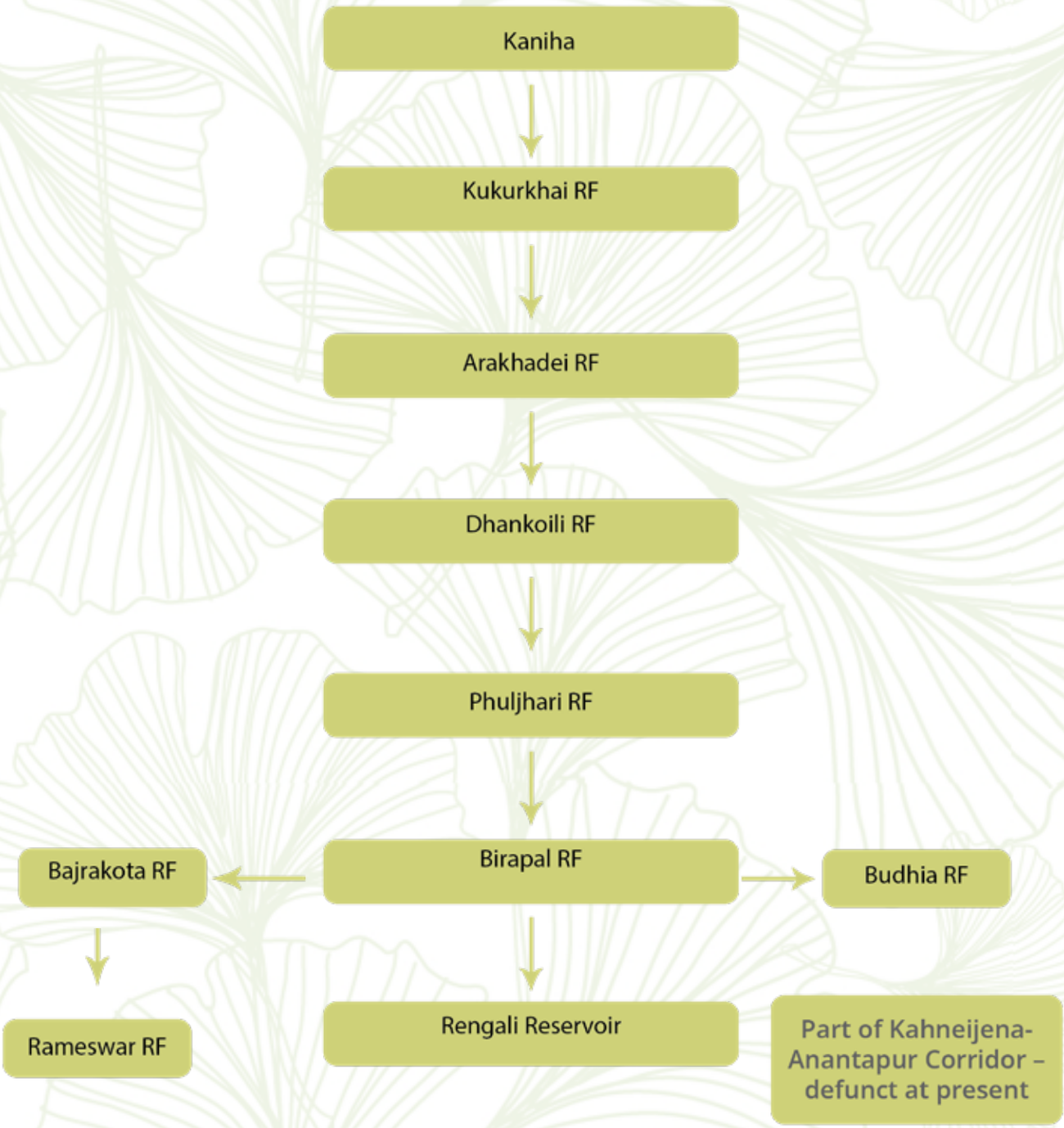
Mahabiroad Revenue Forest

Elephants moves scatterly to Bulaghar RF, Khalpal RF, Pitiri and intermingly areas namely Ekagharia, Pathuria & Pitiri

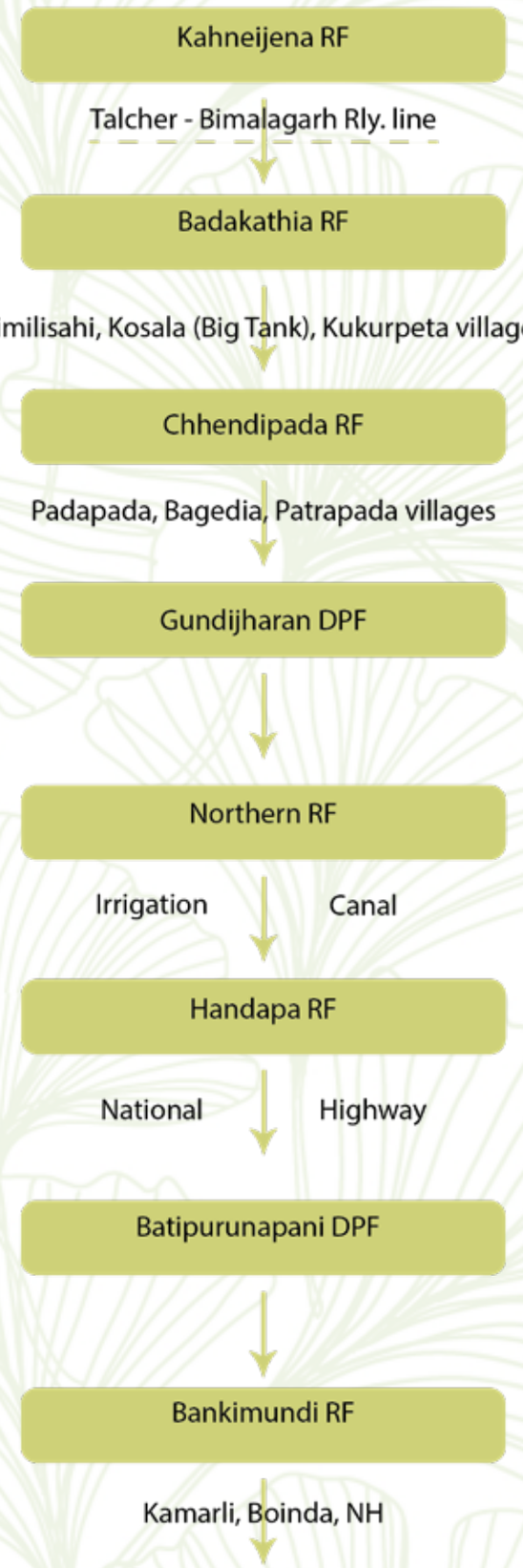
Kanhia - Talcher problematic area due to Rengali Dam, Irrigation, Canal, Highway, Rly. track, Coal mines, Thermal Power Station and Township

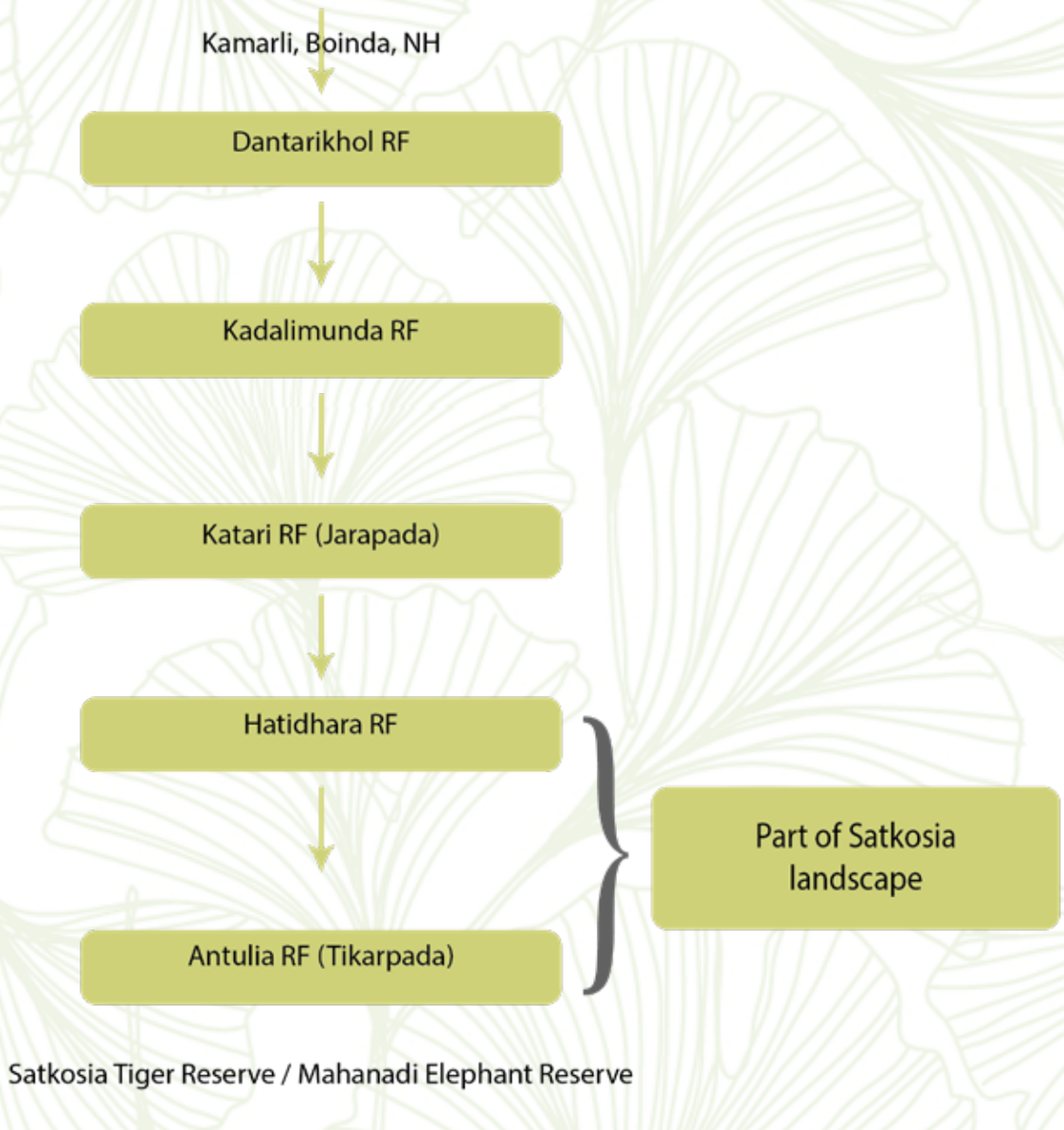
Though there is no systematic movement from this problematic belt but Elephant broadly moved in two direction as under

Movement path from Kaniha to Rengali Reservoir

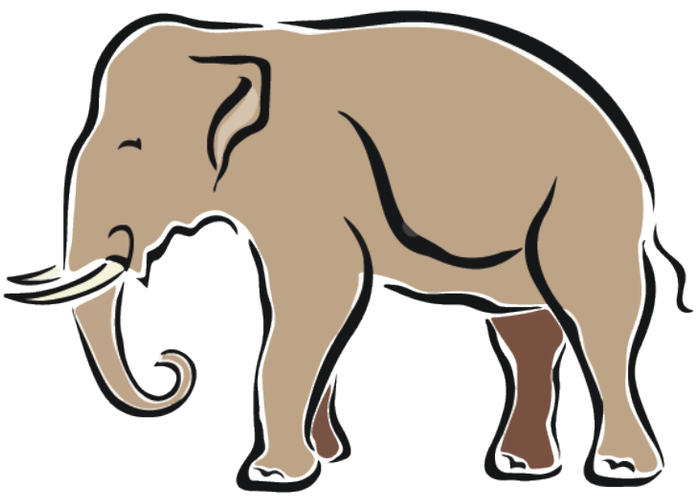


Movement path from Kaneijena RF to Mahanadi Elephant Reserve





Tiger movement: No concrete evidence of movement in this connecting tract was found



Barriers in corridor:

The corridor continuity has been broken at several places due to land use change and also obstructed by various manmade structures such as highways (Fig. 8), railway lines (Fig. 9), power transmission line, dams, reservoirs, barrages, irrigation canals (Fig. 10), mines (Fig. 11), industries, and townships built over time. Some important ones have been enumerated in the table given below:

Sl. No.	Name of the Forest Division	Location	Type of obstruction / Barriers	Threats	Remedial suggestion
1	2	3	4	5	6
1	Karanjia	SH-23 – the stretch From Village Satkosia to Chinbeda	Road with heavy vehicular traffic	Vulnerable to accidental death during surface crossing	To provide underpass
2	Keonjhar	River Baitarini near village Dagarsila	Construction of Barrage	Traditional point of river crossing disturbed	Close monitoring to facilitate and streamline the crossing at the new point down stream
3	Keonjhar	NH-20, the stretch at 2 Km from Ghatagaon towards Anandapur near village Balijodi	Inadequate, faulty and ill maintained underpass	Elephants compelled to resort to surface passing leading to accidental death	Rectification of underpass and its maintenance as per WII guidelines
4	Keonjhar	Ghatagaon – Harischandrapur Road near village Pauchia	Road lack of over / underpass	surface passing vulnerable to road accident	Underpass to be provided as per WII guidelines
5	Keonjhar	Rly. line stretch from village Sagarhpata to Nusuriposi (Nilakantheswar Rly. line)	No underpass	Surface passing vulnerable to train accident	Underpass to be provided as per WII guidelines
6	Deogarh	Pallalahara to Angul portion of NH-23 near Ranja PRF & Pita RF	Side metal fencing in NH & proposed Talcher-Bimalagarh Rly. line	Vulnerable to road / rail accident	Under / over pass as per WII guidelines
7	Rairakhol	Tal – Kholagarh Corridor	A metal road running parallel along corridor various construction work like Godown, Dumping yard, Angul-Sambalpur Rly. line & NH-55 at close proximity	Vulnerable to road / rail accident	Under / over pass as per WII guidelines

8	Athamallik	Kiakata to Duhali Road passing between East Berni & West Berni RF near village Bhagwanpur	The metal road without underpass likely to pose problem for frequent movement of Elephants between the forest on both sides.	Vulnerability to road accident is anticipated for future	Under / over pass as per WII guidelines
9	Keonjhar (WL) & Cuttack	Rabena RF / Daitary DPF	Daitary iron ore lines & conveyor belt	Obstruction to movement & disturbance due to noise	Relocation of conveyer belt to canopy level and no operation during night
10	Dhenkanal	Khalpal RF (Tail end)	Road block at the end	Obstruction due to lack of passage	Provision of passage to be made
11	Angul	Pitiri chhak (Ekagharia)	Railway track and road	Lack of proper / passage	Provision for smooth passage to be made as per WII guidelines
12	Angul	Badakothia RF	Road / Railway line	Lack of proper / passage	Provision for smooth passage to be made as per WII guidelines
13	Athamallik	Handapa locality	Widening of NH-55	Lack of proper / passage	Provision for smooth passage to be made as per WII guidelines
14	Angul	Angul to Jarpada	Railway line and NH-55	Lack of proper / passage	Provision for smooth passage to be made as per WII guidelines
15	Angul	Arakhadei RF	NH	Lack of proper / passage	Provision for smooth passage to be made as per WII guidelines
16	Angul	Chhendipada RF	NH	Lack of proper / passage	Provision for smooth passage to be made as per WII guidelines
17	Dhenkanal	Kulei	Irrigation canal	Narrow passing area	Rectification of passage as per WII guidelines
18	Athamallik	Boinda	Railway Station road	Lack of proper passage facility	Provision for passage as per WII guidelines

Conflict hotspots:

At some places, elephant herds are stranded for months together in absence of safe passage outlet and creating havoc in the area. Mahaviroad area of Dhenkanal District and Talcher-Kaniha-Chhendipada belt of Angul District are two glaring examples. Over 80 elephants have been land-locked because of canals and railway lines in the east and State highway 63 (Angul-Chhendipada-Deogarh) and coal mines in between. It is required to provide safe passage for these animals to Athmallik Division (Northern RF and Handapa RF) in the west and to Dhenkanal division (Anantapur RF) in the east. A corridor of at least one km width from Anantapur RF to Northern/Handapa RF, passing through Bulajhar RF, Kanheijena RF, Badkathia RF and Chhendipada RF has to be carved out with the help of local forest officials and wildlife biologist to make Similipal-Satkosia functional. This way only about 100 km2 of Talcher coalfield, out of total 1800 km2, will be required, which is not a big deal.

Improving the corridor:

Smooth, secure and seasonal inter habitat/ home range movement is a bare necessity and the corridor is in dire need of crop enrichment of forests particularly Santoshpur, Atei, Telkoi, Malyagiri, Rebena, Tomka, Daitary, Ranjagarh, Anantapur, Kanheijena, Bulajhar, Jiridamali, Baruni, Northen, Handapa, Hatidhara & Antulia etc through silvicultural operation and planting of elephant palatable species with special emphasis on salia bamboo (Dendrocalamus strictus) and prevention of fire, shifting cultivation, illicit felling & mining etc. Round the year water availability is imperative through adequate viable source. The remedial measures recommended for barriers furnished earlier is to be implemented scrupulously. Above all, constitution of village voluntary group called Hathi-Sathi is a must for an effective and sustainable solution.

Fig. 9: Talcher- Sambalpur Railway line passing through satkosia-similipal corridor

Fig. 10 Rengali irrigation canal in Similipal-Satkosia corridor

Fig. 12: 12.38km long conveyor belt of Daitari iron ore mine in Similipal-Satkosia corridor

Conclusion:

Similipal-Satkosia corridor is the lifeline for Odisha's wildlife. The hassle free connectivity will ensure genetic flow between these two mega habitats to prevent long term negative impact of inbreeding and genetic isolation culminating in species extinction. It will reduce human-wildlife conflict to minimum and also restore ecological processes in the landscape.

Towards a Secured Elephant Landscape

Securing the Thirunelli- Kudrakote Elephant Corridor, Kerala

Sandeep Kr Tiwari, Vivek Menon, Upasana Ganguly, K Ramkumar, Ramith M
Wildlife Trust of India

Introduction

Strategies for conservation of elephants in India should aim at wildlife areas beyond protected areas and adopt a landscape approach. India has about 110,000 Km2 of elephant habitat but a large proportion of the current range of elephants lies outside the protected areas. Only 28% of the 32 existing and proposed Elephant Reserves are under Protected Area. The growing human population and developmental activities has placed a great strain on the habitat of the elephant with people and elephants struggling to share the same space. Encounters have become increasingly frequent, and increasingly violent with over 450-500 human deaths every year due to elephants and 100 elephants are killed as a result of confrontations. To prevent this situation from escalating further and for long-term conservation of the species, it is important to adopt a landscape approach and work towards securing the corridors traditionally used by elephants to ensure their free movement across the landscape. The Elephant Task Force 2010 also strongly recommended the landscape level conservation and that the corridors be legally protected and secured.

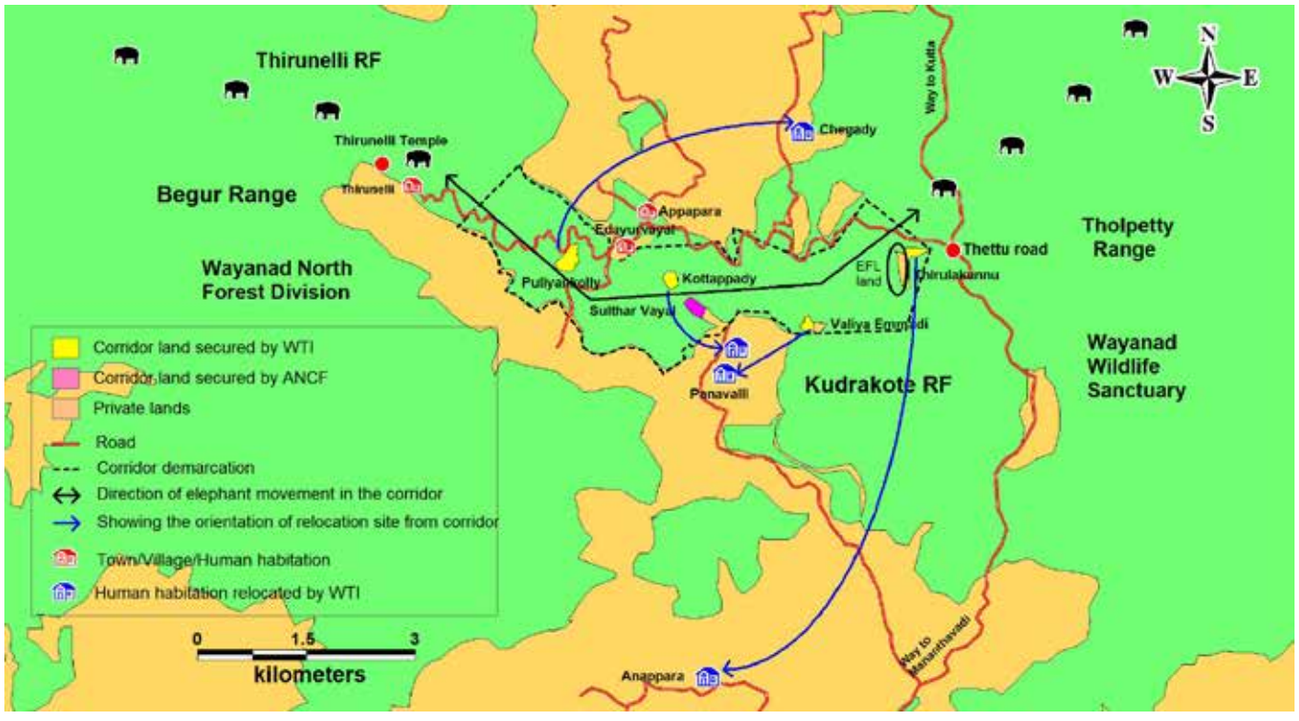
The Thirunelli-Kudrakote corridor in the Brahmagiri-Nilgiri Eastern Ghats landscape is located at the border of Karnataka and Kerala. The corridor connects the Brahmagiri Wildlife Sanctuary of Karnataka with Wayanad Wildlife Sanctuary of Kerala through the forests of the Wayanad North Forest Division further leading to Nagarahole National Park and Bandipur National Park. It is one of the 28 elephant corridors identified in South India that are essential for the movement of the large pachyderms between protected areas. The Brahmagiri-Nilgiri-Eastern Ghats sub-population is estimated to host over 6500 elephants.

Process of securing the corridor

Recognising the importance of the Thirunelli-Kudrakote corridor, the Wildlife Trust of India embarked upon the project of securing this corridor in the year 2005-06 in collaboration with the Kerala Forest Department and local communities and financial support from the Elephant Family, IUCN Netherlands and World Land Trust.

The wildlife movement through the corridor was hindered by human settlement (five villages with 37 families) within the corridor that considerably reduced the effective width of the corridor and increased human-elephant conflict. Apart from securing the corridor, the project also aimed to


തിരുനെല്ലി – കുദ്രക്കോട് ആനത്താര
TIRUNELLI-KUDRAKOTE ELEPHANT CORRIDOR
ആനകളുടെ സ്വതന്ത്ര വിഹാരത്തെ
തടസ്സപ്പെടുത്താതിരിക്കുക
Elephants Have Right of Way
Do Not Obstruct
DRIVE SLOW


Thirunelli RF
Thirunelli Temple
Thirunelli
Begur Range
Wayanad North
Forest Division
Appapara
Edayurvayal
Pullyarikolly
Kottappady
Sulthar Vayal
Chegady
Way to Kutta
Thettu road
EFL
land
Thirulakannu
Tholpetty
Range
Valiya Eruvadi
Panavalli
Kudrakote RF
Wayanad
Wildlife
Sanctuary
Anappara
Way to Manarthavadi
N
W
E
S
Corridor land secured by WTI
Corridor land secured by ANCF
Private lands
Road
Corridor demarcation
Direction of elephant movement in the corridor
Showing the orientation of relocation site from corridor
Town/Village/Human habitation
Human habitation relocated by WTI
0
1.5
3
kilometers

reduce the high human-wildlife conflict which was inevitable in the corridor given that this is a frequently used area by wildlife and human beings alike. The key strategy for securing the corridor was to voluntarily acquire land owned by the villagers either by payment of the agreed value (in the case of non-tribal or non-Below Poverty Line (BPL) family) or by providing suitable alternate land and resettlement package (for BPL families or tribals). Another key aspect of the project design was in assisting the relocated families to strengthen their livelihoods and ensuring that government benefits reach the families.

One of the main approach for securing of the corridor was constant consultations with villagers on issues affecting their lives (human-wildlife conflict, lack of educating of children, lack of facilities such as electricity, clean water, road connectivity, etc.) and how could we work towards improving those aspects. The possibility of relocating to an alternate place as a means to minimise conflict and secure the corridor emerged from the villagers and the process was initiated only after everyone in that community understood the issues and agreed to voluntarily relocate. The project also ensured that all laws related to relocation of people was consulted and adhered to including the Land Acquisition Act, 1894. Since the majority of land in this corridor belonged to a tribal community, there was a restriction on selling land directly – instead it had to be in exchange for alternative plots of land. Relevant permissions were obtained from the office of the District Collector of Wayanad district along with a written consent of the villagers who had agreed to relocate.

The final decision to go ahead with a specific relocation package and plan was taken strictly on the basis of 'Prior Informed Consent' of the families concerned. A needs assessment survey was completed using a participatory process to determine the needs of the community/ area, based on the principle that communities should ideally be relocated as a whole, and social ties should not be affected by the process of relocation. This is to ensure that after relocation, their social and cultural identities are safeguarded. The needs were then prioritised through a participatory process to identify the schemes available to meet specific social and/ or economic needs, the costs and impacts associated with these strategies, and to identify the optimum strategy based on the financial resources available. Based on the above needs, the relocation package was prepared, which in most cases followed a 'land for land' strategy. In cases where the land holding was too small, a reasonable minimum extent of land was provided for each family.

A secured landscape for wildlife and people

The families were provided with land for housing in an area not far from the forest with the added benefit of access to facilities like schools, healthcare systems, transport links, and better livelihood opportunities. Each family was provided with an equal area of dry land for housing and wet land for agriculture activities that they owned, as well as a house with a toilet, common wells, electricity and solar power fence at the relocation site. Care was taken to ensure that the agricultural land provided to the villagers had good irrigation facilities. A total of 25.3 acres of land were purchased from 37 families in four corridor villages (Thirulakunnu, Valiya Emmadi, Kottapady and Puliyankolly) by Wildlife Trust of India (WTI), although they physically occupied over 50 acres of land. In addition to this, partner NGO, Asian Nature Conservation Foundation (ANCF), had purchased 12 acres of land from the Sulthar Vayal village (Menon et al., 2020). The villagers were relocated across different time periods- Thirulakunnu was relocated in 2006, Valiya Emmadi in 2009, Kottapady in 2010 and Puliyankolly in 2011.

Human-wildlife conflict was a major problem when the families lived inside the corridor. Post-relocation, the HEC has reduced greatly with over 90% of the relocated families agreeing that the new location had almost no attacks on the villagers or their property by wildlife, except for stray incidents of depredation by wild boar and elephants.

The secured land has been handed over to the Kerala Forest Department that has been accorded legal protection as part of the Wayanad wildlife sanctuary and Wayanad North Forest Division in a gazette notification issued by the Kerala Forest Department in 2015.
The corridor is being monitored to understand the forest condition, anthropogenic pressures and the impact of securing the corridor on wild animal movement. Information was collected regarding extent of corridor usage by elephants pre and post securement, vegetation types and biotic threats like cattle grazing, felling, lopping or any other infrastructure presence. The team also continuously monitoring the communities to assess their socio-economic status before and after relocation, to understand the impact of relocation on their lives and to take corrective measures if need be, as well as to channelize various government schemes to benefit the villagers.

The average elephant dung encounter rate in secured corridor lands from January 2008 to March 2018 was found to be 21.79 (standard error of ±1.57), and in corridor forests it was 20.67 (SE ±2.49). The dung encounter rate was also analysed across sites and seasons. Elephant dung encounter rate in secured corridor land and corridor forest is almost similar that clearly indicates that the secured corridor lands are regularly used by elephants and has become part the corridor forest over the years. Studies in Kalakad - Mundanthurai Tiger Reserve in the

Western Ghats have shown an encounter rate of 2.01 dung piles/km in a landscape containing evergreen, dry deciduous and mixed deciduous vegetation patches. Similar studies in mixed deciduous scrub forest have recorded a dung encounter rate of 15.5 piles/km. A total of 19 mammals were reported from the secured area of the corridor including tiger, elephant, gaur, bonnet macaque, spotted deer, sambar deer, mouse deer, Indian grey mongoose, ruddy mongoose, Indian hare, small Indian civet, wild boar, etc.

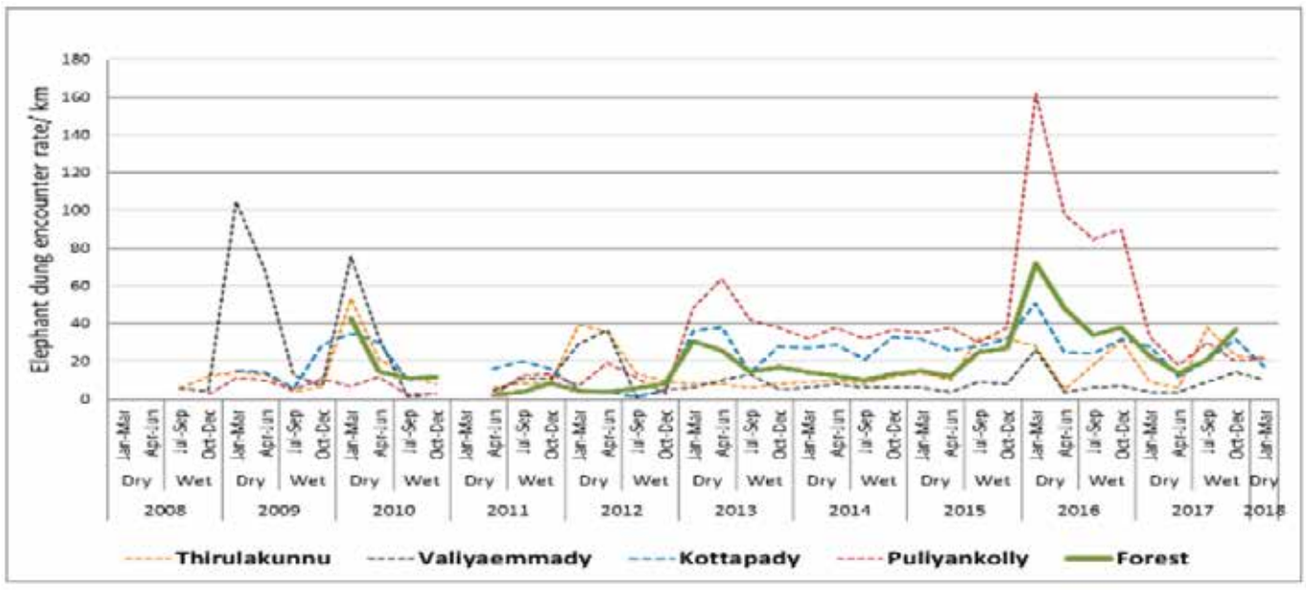


Fig 1: Elephant dung encounter rate in corridor lands and forests

A major concern in the secured corridor is the proposed National Highway from Kozhikode to Mysuru (alternate route due to night traffic ban in Bandipur) via Perambra – Thottilpalam – Mananthavady – Panavalli – Appapara –Kutta – Kanoor – Belale – Hunsur). This is being proposed as an alternative route due to the night traffic ban in Bandipur Tiger Reserve that will pass through the centre of the corridor in Panavalli- Appapara section. The proposed road and related activities along the highway will be a major hindrance to wildlife movement and defeat the very purpose of securing the corridor. Alternate route from outside the corridor should be explored for the highway.

The relocation of villagers from a remote region inside corridor to a more accessible location has significantly improved the life of the beneficiaries as they now have better access to state services, healthcare and market facilities. The families were provided with land for housing in an area not far from the forest with the added benefit of facilities like schools, healthcare systems, transport links, and access to better livelihood opportunities. The project successfully provided concrete houses with tiled roofs for the relocated families with functional toilets and access to water, leading to better hygiene for the relocated families and also brought the beneficiaries closer to various community infrastructures. Most families were involved in agriculture or daily wage labour as their primary source of income prior to relocation. It was estimated that the yearly income averaged Rs 41,040 per household. The annual income improved considerably after relocation as a result of more wage labour opportunities for the relocated families apart from their own agricultural produce. The average annual income increased to Rs 175,080 per annum as the land allocated was considerably closer to town and estates, the families had ample opportunity to also work as labourers in neighbouring agricultural land. The relocation has also helped improve the education of their children due to better access to schools and colleges and electrification of their houses and safe drinking water. Prior to relocation, all the families relied on fuelwood for cooking and post relocation, almost 50% of the families enrolled for an LPG connection. With improved infrastructure and earnings and access to better education and healthcare support, there has been a significant improvement in their lifestyle and has created a win-win situation for both the animals and the local communities. It has also created a successful model of collective approach that could be replicated for securing other corridors in the country.

Securing the Segur Plateau, a Crucial Elephant Corridor

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M.Santhanaraman, Advocate, High Court, Madras

Introduction

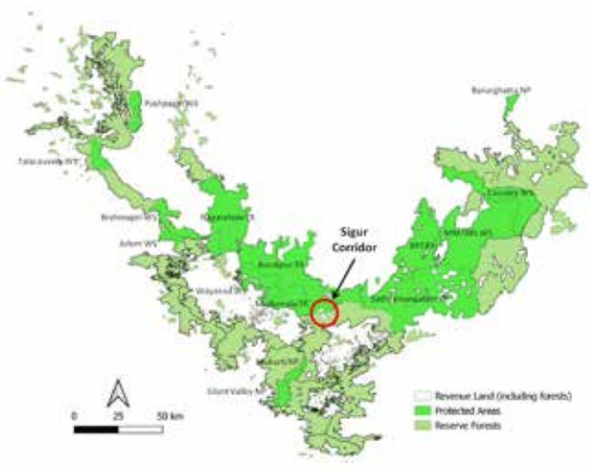
Out of India's total elephant population, as much as 44% is found in Southern region. The Brahmagiri–Nilgiris–Eastern Ghats landscape in South India, spanning over 12000 km2 is home to over 8,000 Asian elephants, this is the single largest population of Asian elephants in a contiguous habitat in the world. No other country, let alone a landscape, supports such a large population, making this landscape truly unique in the world. However, there is the threat of this large landscape fragmenting into smaller habitat patches (and sub-populations). Although several corridors have been identified in this landscape, the Segur and Kallar corridors are two key elephant corridors that connect major populations of elephants in this landscape. The Segur Corridor forms a crucial link between the Protected Area (PA) networks and associated Reserve Forests (RFs) on the eastern side and the western side of Elephant Range 7 (Nilgiris Eastern Ghats) (Fig.1). The Kallar corridor is a fragile link between Elephant Range 7 and Elephant Range 8 (South Nilgiris). This article focuses only on the Segur corridor, and not the Kallar corridor.

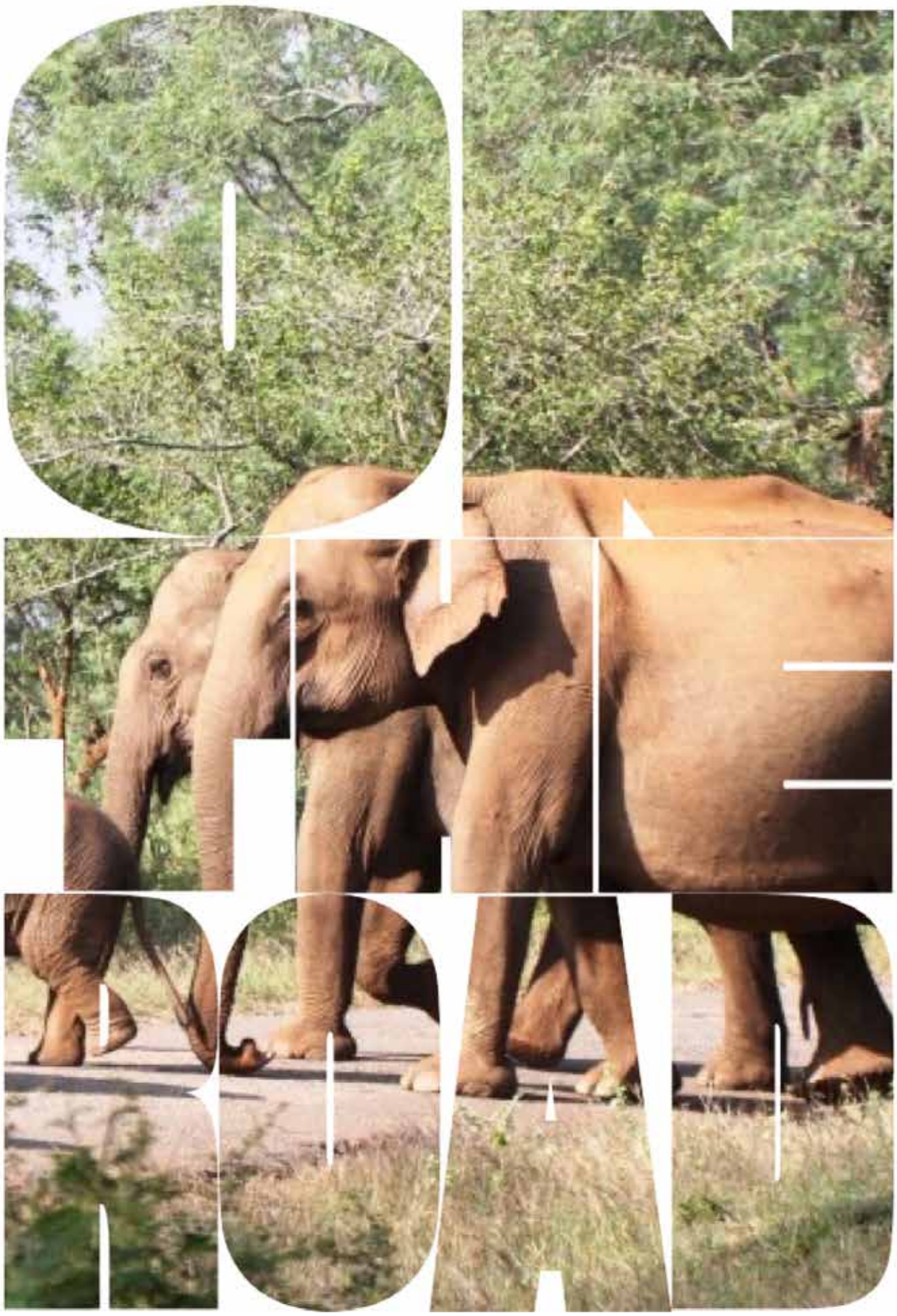
Humans have converted most of the natural habitats for their own use and in the process have rendered those natural spaces into small and isolated patches within a sea of human use areas. Such fragmentation not only reduces habitat size but it also breaks the landscape metapopulation into smaller and genetically less viable populations. Recent studies indicate that the minimum viable population (Nc) should be 1300+ and even as high as 5000 adults to ensure long-term persistence for elephants. Probably the only population that meets these requirements is the Nilgiris-Eastern Ghats elephant population.

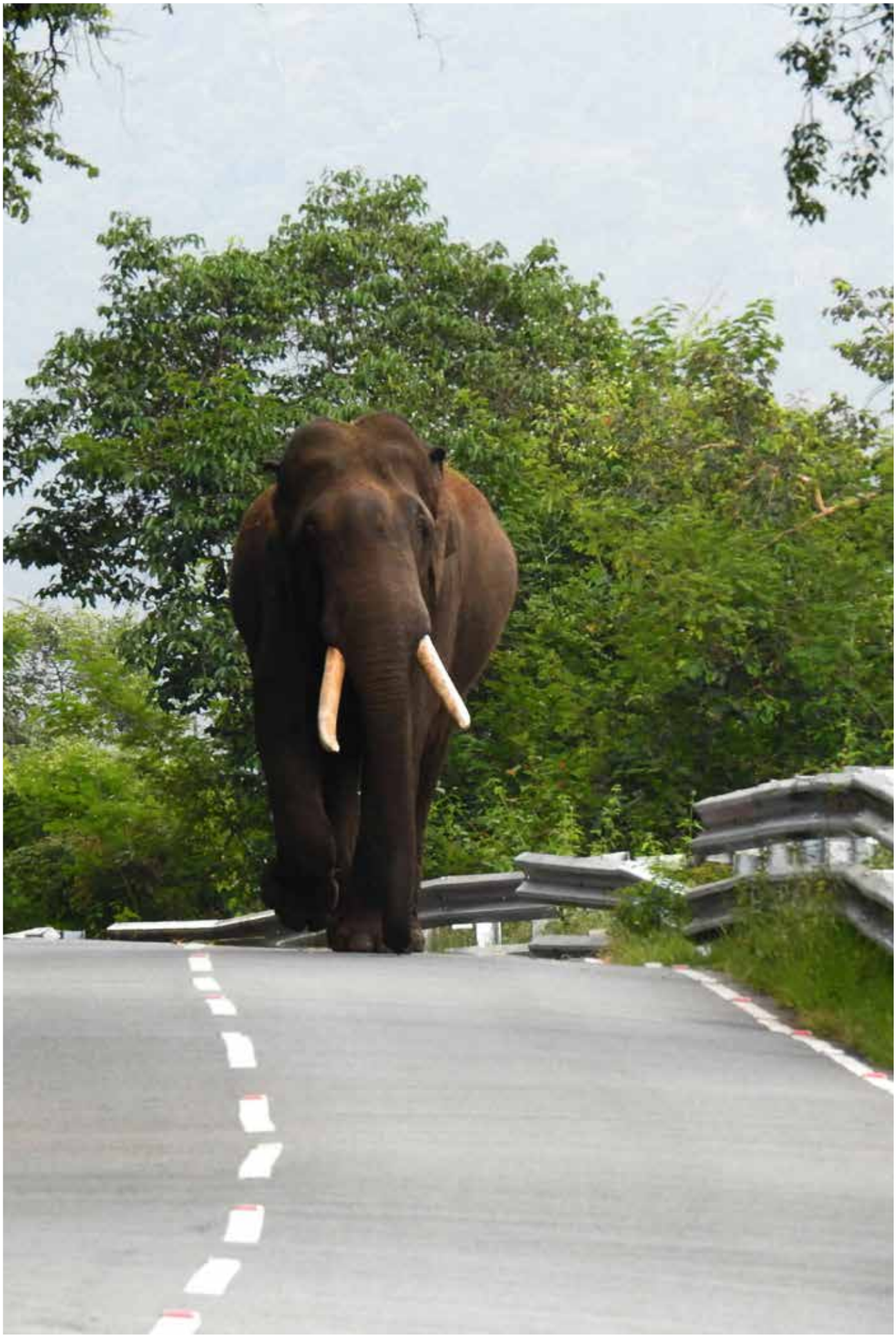
Fragmentation also leads to increased human-elephant conflict when their seasonal movement paths and access to seasonal ranges (resources) are cut off due to breaking of corridors.

Wildlife Corridors are indispensable for wide ranging animals like elephants, whose annual home ranges in excess of 600 km2 have been recorded in studies using radio-collars (Bombay Natural History Society and WWF-India). They are truly a landscape species; individual home ranges (clans and males) have stretched across all three states, covering multiple divisions.

Figure 1. Segur Elephant Corridor in the Brahmagiri-Nilgiri Eastern Ghats landscape




ROAD



Location and description

Location and description

The Segur corridor is located on the eastern boundary of Mudumalai Tiger Reserve and provides connectivity for elephants to move between Mudumalai TR and Nilgiris North Forest Division. This Segur corridor is not just a transit route but it is also a foraging area. Hence, we see seasonal movement through the areas and daily movement within the area for extended periods for foraging and dispersal of young males through this area (Figure 2).

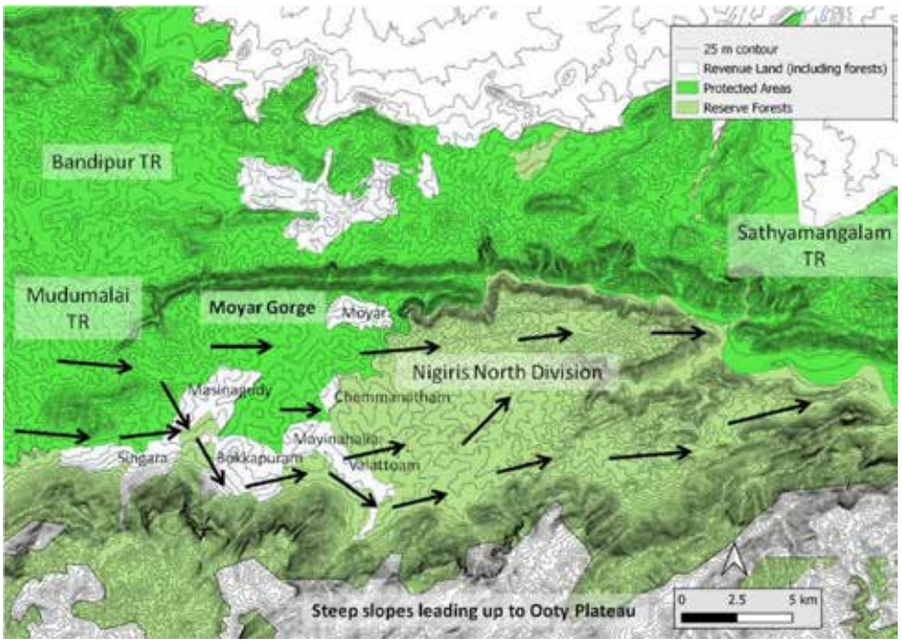


Figure 2: Segur corridor: Arrows show the movement paths of elephants through this corridor (movement is both ways). The area to the north of Moyar Gorge in Bandipur TR is also an east-west corridor for elephants in Bandipur but it mainly very dry thorn forest. Fewer elephants move through here.

To the north of the Segur corridor is the Moyar Gorge which forms the eastern boundary between Mudumalai Tiger Reserve and Bandipur Tiger Reserve. This gorge is deep (300m) and steep and forms nearly 29km long east-west barrier which elephants cannot cross. On its eastern end the Moyar Gorge opens out into a gradually widening valley (Moyar Valley) into which elephants can get down using two main routes. This valley connects to the Sathyamangalam Tiger Reserve on the northeastern side and to Coimbatore Forest Division and Mannarkad Forest Division on the southwestern side (via the Kallar corridor). To the south are the steep slopes leading up to the Ooty Plateau. Elephants by and large cannot negotiate these steep slopes as those turn to sheer cliffs as the elevation increases.

The Segur plateau receives about 600mm to 700mm of rainfall per annum. Being a rain shadow area, the vegetation comprises vast stretches of thorn forests and scrub jungle. This vegetation is also degraded by cattle grazing. However, the foothills and lower slopes of the mountains leading to the Ooty Plateau, have very good vegetation ranging from semi-evergreen to dry deciduous forest, due to better rainfall. Thus the best habitat for elephants is along the foothills and it gets poor as one progresses northwards due to reduced rain and rising anthropogenic pressures. Additionally, due to inter basin transfer of water for hydroelectric power generation, the two perennial rivers Segurhalla and Kedarhalla, have now become seasonal streams limiting water availability on the Segur Plateau. The foothill forests continue to have water in the form of rocky pools and greater moisture that is available there.

Free movement of elephants is hindered due to the north-south alignment of the villages in this area. The Moyar village lies at the edge of the Moyar Gorge and about 4km south is the Masinagudi village which is connected with the Singara Village at the foothills and that has penstock pipes running up to the Ooty Plateau. There is a water canal extending from Masinagudi to Moyar, and the Forest Department has ensured that this linear infrastructure does not become a barrier by not allowing concrete lining of the canal at all points where elephants traditionally cross it. However, the poorer habitat in this area results in only some elephant clans using it. In addition, the villages also stretch along the foothills from Singara to Bokkapuram, Mavinahalla and Vazhaithottam thus posing a challenge to elephants moving or foraging along the preferred foothills area.

History of elephant occurrence

Human population in this area was very sparse, throughout history. The British colonizers tried to establish agricultural communities in the late nineteenth century but failed. Even the labourers who were brought in to build the hydroelectric power plants in the early 1950s did not stay and moved away after the construction. It was only in the 1970s that human population started growing slowly and during 1990-2001 and beyond it increased significantly (Fig. 3). There were two reasons for this, first was the upgrading of the hydroelectric power plant in the early 1990s and the second was the growing tourism industry. Both these ushered in rapid human population growth and development.

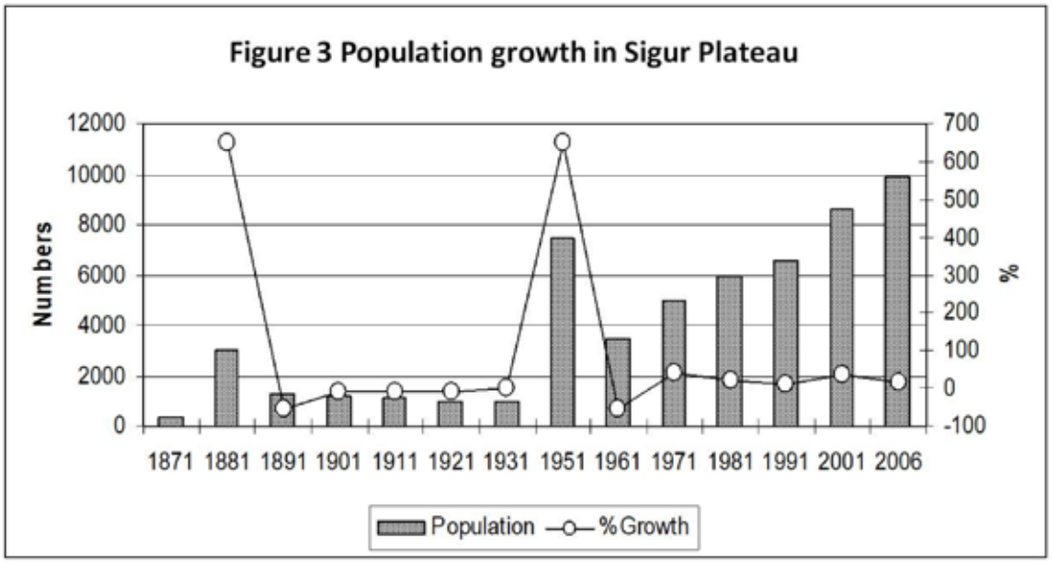


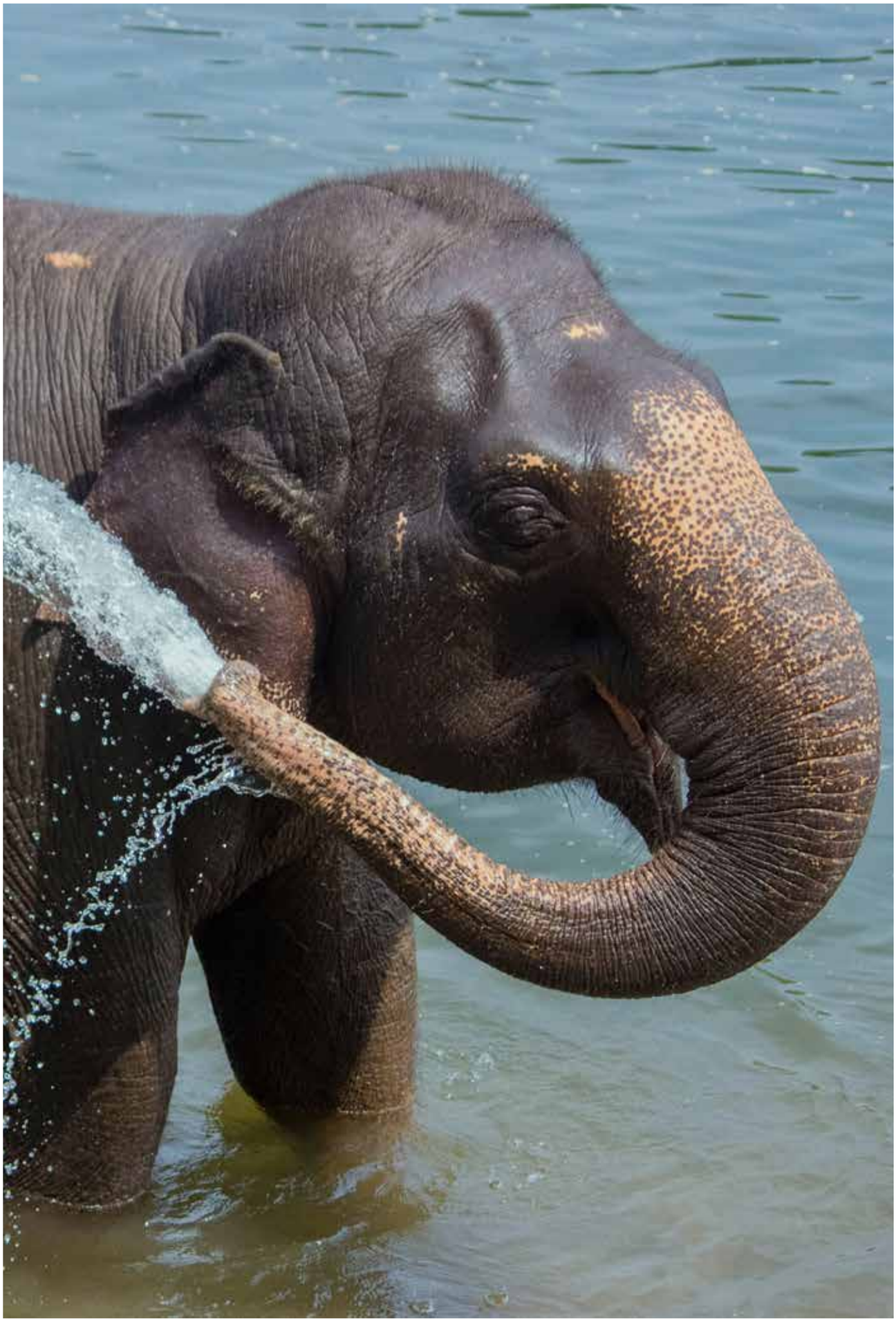
Figure 3. Human population in Segur plateau

Source: RESOURCE USE, CULTURE AND ECOLOGICAL CHANGE: A CASE STUDY OF THE NILGIRI HILLS OF SOUTHERN INDIA, A Thesis Submitted in the Faculty of Science BY R. PRABHAKAR

ERC Davidar conducted the first study in 1970s with the support of the Asian Elephant Specialist Group (AsESG) of the International Union for the Conservation of Nature (IUCN) Species Survival Commission (SSC). Its objective was to investigate the impediments to elephant movement in the Nilgiri Hills, in the Western Ghats of India.The work of securing the revenue lands were taken up by the Nilgiri Wildlife Association, who identified the revenue lands that has been highlighted by ERC Davidar's study.

This was followed up through a study by the Bombay Natural History Society which published a paper on corridors based on ranging of individually identified elephants and a follow up study based on radio-collared elephants which also identified several wildlife corridors.

This was followed with a number of studies carried out by various organizations and individual researchers which highlighted the degradation of the area due to over-grazing and fuel wood removal. S. Sankaramurthy, conducted a study



on behalf of WWF India, in which the revenue lands and patta lands that were essential for the movement of elephants were identified.

Wildlife in the corridor

The corridor with its vegetation ranging from semi-evergreen in the hill slopes to dry thorn forest and scrub has rich biodiversity. The corridor area is also home to carnivores like tigers, leopards, and dholes and omnivores like sloth bears. Most herbivores in the landscape use the corridor area. In addition to elephants, gaur, sambar, chital, barking deer, four-horned antelope and wild pig are seen in the area. As the corridor area is at the junction of major vegetation types, particularly the thorn forest, it plays host of species which are not well represented in the main PA network, like hyena, jackal (now rare) and four-horned antelope. Loss of this corridor will adversely affect most species as factors that impact elephants will also impact other species using this area.

Development and damages to the corridor forests

The plateau was rapidly developing into a quick weekend getaway for people from adjoining urban centers. This boom in tourism resulted in many of the critical areas identified by Davidar and BNHS developing into tourism resorts after 1990. The major problem was the conversion of lands classified under the Tamil Nadu Preservation of Private Forest Act into resorts and holiday homes, and a vast majority of those were with electric fences. Under this Act conversion to non-forest use is not permitted. These developments are blocking free movement of wildlife. A total of 44 private resorts were identified in Segur plateau as having being developed on private forest land. The frequency of vehicular movement has also increased over the years. As a result, the free movement of elephants is affected. The study by ERC Davidar, indicated that various obstructions resulted in the elephants moving up in the hill reaching Sholur. The Forest Department has recorded some cases of elephant deaths due to falling off the steep slopes.

Legal intervention

Secretary of Nilgiris Wildlife and Environment Association had flagged the issue first and published an article about the Corridors of Elephants in Segur and the threats the landscape was facing. Thereafter, a Public interest litigation was filed in Supreme Court by A. Rangarajan in the year 1996 to remove the encroachments in the elephant corridors across the country and Nilgiris in particular.

'Elephant' G. Rajendran, Managing Trustee, In Defence of Environment and Animals, filed a writ petition in Madras High Court in 2008 to keep the corridor free of encroachments and disturbances for free movement of elephants and other animals.

An Expert Committee was constituted in 2009 as directed by the Hon'ble Madras High Court to investigate and produce the report on the Segur corridor, under the chairmanship of Principal Chief Conservator of Forests and Chief Wildlife Warden, Tamil Nadu. The committee carried out a field assessment and gathered information by meeting experts, forest officials serving and retired, tribal community representatives and NGO representatives. The Committee submitted the report in 2009 with clear conclusion and recommendations.

The Hon'ble Court directed to publish the final map of the corridor in newspapers and invite for objections if any, from people living within the corridor. Between 2008 and 2010, a number of petitions were filed by resort owners and arguments and hearing were going on.

Government of Tamil Nadu accepted the report submitted by the Expert Committee and issued a Government Order (GO) declaring the area identified in the expert committee report as an Elephant Corridor and the Madras High Court in the year 2011 delivered its verdict by upholding the validity of the said GO.

Following this, the resort owners appealed in the Supreme Court of India against the said order of Madras High Court. However, the Hon'ble Supreme Court of India passed interim order directing to seal all the illegal resorts and to remove all electric and barbed wire fencing in Segur elephant Corridor. The main case is still pending in Supreme Court.

Documented Positive outcomes

• When in the course of hearing, a dispute arose as to whether the Bokkapuram foothills is a corridor or not as few land / resort owners claimed that the Bokkapuram village is not a corridor. To counter this claim, a relocation report of two Tuskers which were captured and released in Bandipur under the scientific supervision of WWF India was placed on record in the proceedings. The said report recorded the movement of one of these two Tuskers which moved though this area using the path of resident elephants as recorded by the radio collar fixed to that elephant. The animal was found passing through the corridors in Bokkapuram village, thus the argument that Bokkapuram is not a corridor was rejected by Court and its inclusion in Corridor was upheld.

• The Expert Committee also recommended handing over of the revenue lands in the corridor to the Forest Department apart from removal of barriers like electric fencing, banning of baiting animals for sighting by tourists, and to use of only LPG for cooking purposes.

• The Court has passed order stopping further development of resorts and action to be taken against illegal resorts and new constructions.

This work was a culmination of efforts of researchers, academic institutes, Forest Department, Revenue Department, NGOs, legal experts and concerned individuals. It paves the way for such cooperative association, which are certainly needed in such large cases.

The Road ahead:

The case of Segur elephant corridor sets a precedent for securing and conserving elephant corridors across the country. Though much breakthrough has been made towards conserving the ecologically sensitive area for the use of elephants, the corridor is not yet entirely free from impediments and securing it is still a work in progress. There is much more to be done for long-term and sustained conservation of the area.

Conservation efforts in the area have had positive outcomes which include a healthy tiger population in the Nilgiris North Division and the adjoining Mudumalai Tiger Reserve. Securing Segur in the long run will not only help elephants but large carnivores and their prey base as well. As it is seen in the Segur corridor case, most elephant corridors across the country comprise reserve forests, Government revenue lands and private lands. Currently, there is no legislation to protect corridors for elephants. A comprehensive legislation to regulate land use pattern in terms of developmental activities and agricultural practices and bringing the forested revenue lands under the management of forest department in identified corridors would be a long term solution towards securing elephant corridors.

Kabini Elephant Project: A Long-term Programme for Understanding Asian Elephant Behaviour and Ecology

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During all her growing up, Pinkisafa's clan had been unusually small, unlike those of many others around her. When she was three, there was her mother Pinky and her grandmother Peggy, both with very pink trunks. Then there was Pericles, a year and a half older than her, seemingly her brother but really her uncle as he was Peggy's son! Another uncle, the amiable and big-eyed (for an elephant) Moti, some seven years older than her, was around off and on, sometimes with the group consistently, sometimes wandering off and then looping back to the group. There were no sisters or aunts though. She had seen or smelt large clans of some 40 elephants, ambling out of the forest in smaller groups and joining each other to graze on the backwaters of the River Kabini in the dry season. There were fights between clans over the choicest grazing spots. Peggy and Pinky largely stayed away from these fights and the other clans also largely ignored them. As a subadult, Pinkisafa had experienced the occasional fight with other clans, but the others usually had strength in numbers. Asian elephant clans comprise adult females and young ones of both sexes. Subadult males (5-15 years old) disperse from their clans gradually whereas females remain part of the clan. The clan is thus matrilineal – clan members come from the same maternal lineage. Males that have dispersed often move long distances eventually and range in new areas, away from their maternal clan. They can form loose associations with other males or can temporarily associate with other female clans, but are solitary for about half or more of their time. Thus it was that

Pinkisafa alone. Photo: Ankana Sanyal, Kabini Elephant Project.

when Pinkisafa was four, Pericles also began his solitary explorations, investigating other clans. Two years later, Pericles was rarely with the clan, although the older Moti continued to show up occasionally.

The bamboo around the Kabini backwaters flowered in 2011. Bamboo generally show mass flowering and die out after that. Thus, after the glut of grain, there was little forage, especially in the dry season of 2013 following a drought. It was a disastrous few years for the clan. Peggy died on 13th March 2013, probably over 50 years old. A few months later, Pericles stopped visiting, although Moti continued to show up occasionally. Then Pinky died suddenly in mid 2015. After her mother's death, Pinkisafa would occasionally associate with her uncle Moti. Alas, there was a drought again next year – the rains failed in 2016 - and Moti, who was in terribly bad body condition in the following dry season, disappeared, not to be seen again. Thus Pinkisafa, who had been mostly alone since Pinky died, lost the last member, albeit a male, of her clan.

From 2016, Pinkisafa had begun to hang out with another clan that shared the backwaters. This was a clan of about 20 individuals. Female Asian elephants show a fission-fusion society, in which all the individuals of a clan are often not seen together in the form of a single group. Instead, the clan may range in the form of multiple groups (each group is a set of individuals that is seen together at one point in time), females of these different groups joining other groups (of the same clan) to fuse into larger groups, or fissioning away into smaller groups depending on their needs. Thus, Pinkisafa associated with different groups of this clan, usually feeding near the periphery of the group, not completely accepted by the new clan, but often not actively pushed away either. She was occasionally alone, occasionally with a couple of other clans, including the largest in the area, but received more aggression from that clan. Now, five years on, she is more integrated into her new clan, having allomothered a calf also. We look forward to her having her own calf in this new clan!

This single true story throws up multiple lines of questions as well as understanding:

- Elephant societies can be highly dynamic, and specific events can affect individuals.

- Individuals' body condition can change very rapidly because of the daily requirement for large amounts of food, and even individuals that seem healthy some months prior can succumb to drought.

- Female clans show fission-fusion dynamics and long-term data are required to uncover female clans; we have found group sizes to be limited in this population, possibly because of resource availability.

- The competition between female clans for food in high density areas may be increased by artificially created resources such as dams.

- Subadult males disperse from their natal clans and there can be considerable variability in how quickly they disperse, even within the same clan.

- It is possible for females to integrate into new clans under some circumstances, but the process is slow. Short-term studies would have classified Pinkisafa into different clans without discovering the switch between clans.

The Kabini Elephant Project

It was possible to watch the unfolding of Pinkisafa's life because of a long-term monitoring programme set up in Nagarahole and Bandipur National Parks and Tiger Reserves. Started in 2009, the ongoing Kabini Elephant Project has been collecting data on individually identified elephants in these reserves. These reserves have high elephant density, are well-protected, and are part of the larger Nilgiris-Eastern Ghats landscape in southern India, which holds the single largest population of Asian elephants in the world. Elephants are identified based on a combination of ear, tail, back, and tusk characteristics. As ears vary in shape and in the way they fold at the top, and often also have nicks, tears, or holes, they are very useful for identification. Over the years, more than 900 elephants have been sighted, identified,

and named. Some individuals like Pinkisafa have been observed from when they were juveniles or calves.

Various ear shapes and top folds, and some ears with tears or holes in them. Ears are important features used in the identification of individual Asian elephants. Photos: TNC Vidya, Kabini Elephant Project.

The study areas are sampled based on a pre-determined schedule, from early morning till evening, but following a stratified sampling design (with greater frequency of sampling around the backwaters) due to logistics. When elephants are sighted, they are identified and their associations noted down, along with the location. Lactation status of females and musth status of males are also recorded, along with information on body condition or new injuries. Births (along with the mother's identity) and deaths are recorded. Dung samples are collected when possible, from identified individuals that have been observed defecating. A small quantity of the outermost layer of dung is collected, and the samples used to extract DNA in our lab and genotype individuals. This data is used to estimate the genetic relatedness between individual elephants. Similarly, tissue samples from dead individuals are used to genotype them, and to match them with previously sampled live animals if the carcass is not identifiable. Data on behaviour and resource availability are also collected.

This long-term project has uncovered the social structure of female elephants, which was once thought to be identical to that of the African savannah elephant. Now, we know that there are some underlying similarities, but the group sizes are smaller here, resulting in different observed social structures in the two species. Adult male social structure in the Kabini population is also different from that of the African savannah elephant, with rarer all-male groups, and young adult males not showing a preference for associating with old adult males in Kabini. Resource availability and distribution have also been assessed and their effects on competition within and between female clans studied. Population demography, the role of calves in female social organisation, the effect of kinship on male and female societies, and male dispersal and reproductive success are also being examined in this population.

L-R: Pinky, Pinkisafa, Pericles, Peggy, and Moti sighted together in 2009. Photo: TNC Vidya, Kabini Elephant Project.

Pinkisafa and Moti after Pinky's death. Photo: Hansraj Gautam, Kabini Elephant Project.

L-R: Pinky, Pinkisafa, Prince (an visiting subadult male), Pericles, Peggy in 2009. Photo: TNC Vidya, Kabini Elephant Project.

The need for sustaining long-term projects

Long-term programmes of monitoring animals are crucial for obtaining basic, accurate information about populations, as inferences based on the short term may be confounded by changes in the biotic and abiotic environment. This is understandably a greater problem for long-lived species such as elephants. Since elephants are highly social and intelligent, apart from being long-lived, their behaviour and lives can be very different not only depending on age and sex, but also based on individual personality. Thus, management decisions need to be centred around identified animals, keeping in mind the individuality in behavioural decisions, and the fact that protection is unlikely to be uniform across elephant ranges. Therefore, long-term studies of identified individual elephants are essential. Censuses of elephants based on statistically weak or logistically difficult methods have also elicited calls for long-term research in Elephant Reserves in order to obtain reliable data on age-structure and demography, and carry out continuous monitoring of individuals and habitat.

Long-term projects on African elephants date back to the 1960s and 1970s, with the Amboseli Elephant Research Project, Kenya beginning in 1972 and approaching 50 years of monitoring now, the Addo Elephant Research Project (South Africa) beginning in 1976, and the Lake Manyara elephants (Tanzania) monitored from 1966-~2007. There have been many more projects subsequently, for example, the forest elephants of Dzanga Bai (Central African Republic) monitored from 1990 (stopped in 2013 due to the civil war), and the Samburu Elephant Project (Kenya, see Wittemyer et al. 2005) being monitored from 1997. Such long-term datasets have made it possible to understand the social structures of male and female elephants, ecophysiology, ranging patterns, population dynamics and the impact of elephants on habitat, and the effect of management practices on elephants.

As Clutton-Brock and Sheldon (2010) write about the importance of long-term monitoring projects in Science,

“Stick at it for a year or two and, if you are lucky, you will be able to recognize individuals and spot interesting new behavior patterns. But to understand the network of social relationships between individuals, you need to know their ages, kin relations, and relative dominance rank.

Pinkisafa (left) and Pinky (right) in 2014, after Peggy's death. Photo: Keerthipriya P, Kabini Elephant Project.

That will take at least one decade or, more likely, two. However, other important questions will take three or four decades of systematic data collection: how and why groups increase or decline in size; how genetic differences interact with environmental factors to affect breeding success and survival; how population density is regulated. During all this time you will need to withstand the vicissitudes of funding, political disturbances, and the demands of your career and family."

The Kabini Elephant Project is India's only long-term programme of monitoring such a large number of individually identified elephants. It has been funded largely by the Department of Science and Technology, and the Council of Scientific and Industrial Research, Government of India, and supported by the Karnataka Forest Department. Such long-term projects need to look beyond immediate utility for a specific administrative range, and focus on the importance of baseline demographic, behavioural, and ecological information from Protected Areas that can be used to compare with other populations,

Pinkisafa (second from the right) with her new clan. Photo: Ankana Sanyal, Kabini Elephant Project.

including those with more human disturbance. Our scale of demographic data, understanding of social structure, and inferences such as restricted group sizes, or the lower frequency of musth in males, would not have been possible with short datasets. Since the best of patrolling cannot detect all the carcasses in most Indian forests, monitoring of identified individuals is also crucial in inferring deaths, especially of young ones, and using this information in demographic analyses. Monitoring is increasingly also important in understanding ranging patterns.

As Asian elephants inhabit ecologically diverse habitats even within India, it is important to set up such long-term projects in these different habitats, and monitor multiple key populations. Differences and commonalities between these populations will provide an understanding of elephant ecology. Further, the Asian elephant is a keystone species, and long-term monitoring of their life histories and behaviour can also provide insights about the ecosystems they occupy. Such long-term projects are a serious undertaking; they require the combined efforts of all the members of the project, continued permits and support from the State Forest Departments / Ministry of Environment, Forest and Climate Change, cooperation with on-field staff in the study area, and continued funding. But only with multiple such long-term collaborative efforts can we begin to properly understand the ecology and behaviour of this flagship species, and apply that understanding to its conservation and management.

Migratory Movements of Elephants (Elephas maximus) in Elephant Corridor in Grizzled Squirrel Wildlife Sanctuary, Srivilliputhur

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Introduction

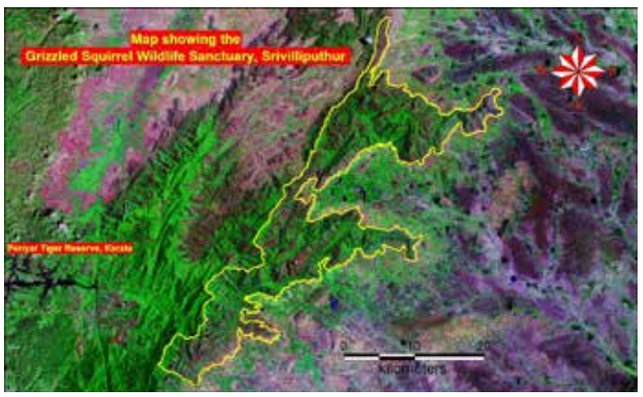
Forest corridors are narrow strips of forests connecting two viable forest patches that provide for the survivorship and movement of wild animals. Corridors facilitate major functions of exchange of genes between populations. In recent years the wildlife corridors have received lot of conservation attention, with the reduction of contiguous habitats into islands.

The usage of forest habitat for developmental activities such as hydroelectric project, mining, agriculture, settlement, fuel wood collection and cattle grazing etc., due to high growth rate of human population has resulted in the fragmentation of habitats. Habitats that are surrounded by natural barriers such as steep mountains, steep valleys etc. are at times very narrow making it difficult for animals to use. Large mammals such as the Asian elephant (Elephas maximus), Gaur (Bos Gaurus) and Tiger (Panther tigris) use the corridors as part of their ranging activity between habitats.

Importance of corridors has been accepted widely for management of wide ranging species, but only a few studies have been carried out on the impact of human interference on corridors in India. Studies on biotic interference on corridors are most important for preserving elephant population because the region which was once very rich in wildlife and vegetation is now badly fragmented and movement of wildlife gets confined to a few pockets. The present study to investigate the present status of corridor and movement of large mammals using the corridor to migrate to adjoining forest area of Grizzled Squirrel Wildlife Sanctuary.

Study Area

The Srivilliputhur Grizzled Squirrel Wildlife Sanctuary lies in the Western Ghats falling in the revenue districts of Virudhunagar and Madurai between North latitude 9o 23' and 9o 48' and East and 77o 26' 77o 46'(Map No. 1). The total extent of the sanctuary is 48891.91 ha. The area was declared as a sanctuary in G.O. Ms. 399 Environment and Forests (FR. II) dated. 26-12-1988 consisting the Reserved Forests of erstwhile Kamarajar Forest Division and Saptur R.F of Madurai Forest Division with the sanctuary Headquarters at Srivilliputtur. The Srivilliputhur Grizzled Squirrel Wildlife Sanctuary is the meeting place of two distinct geographical regions of biodiversity landscape Western Ghats of Tamil Nnadu and Kerala (see map.1).



Map.1 Map of the Grizzled Squirrel Wildlife Sanctuary

Objectives

1. To identify the crucial bottleneck areas in the Grizzled Squirrel Wildlife Sanctuary.
2. To assess movement of elephant using the corridor
3. To evaluate Human-Elephant Conflict on the fringes of the corridors
4. To suggest measures for the better management of the corridors

Methodology

Identification of migratory paths and corridors

The existing migratory paths and corridors in the Grizzled Squirrel Wildlife Sanctuary were identified initially using topo sheets of 1:50,000. The identified migratory paths and corridors were walked by foot in order to confirm the movement of focused wild animal species.

Identification of crucial bottleneck areas in the corridors

The crucial bottleneck areas were identified by direct field foot survey. Other information such as length, width and connectivity to other Forest Division were recorded to find out crucial bottleneck areas in the migratory paths as well as corridors.

Use of corridors by elephants

The intensity of corridor usage by elephant was assessed by both direct and indirect methods. During the survey, sighting of animals encountered directly and indirect evidences such as dung and feeding sign of elephants were recorded through feeding signs, resting site, canopy breaking, debarking, natural saltlicks and dung piles etc. Since the direct sightings were insufficient for scientific interpretation due to the short duration of the observation, indirect evidences were considered and used to identify the movement of elephants in the Division.

Result and Discussion

Movement pattern of elephant was studied across the Forest Division in Grizzled Squirrel Wildlife Sanctuary. The movement routes of elephant using both direct and indirect methods were mapped. A total 80 elephants were sighted across the Division in Rajapalayam range (46.2%) followed by Srivilliputhur (20.0%), Saptur (18.7%) and Watrap (15%) ranges.

Table 1: Direct sightings of elephant in Grizzled Squirrel WLS

S.No.	Name of the Range	No. of elephants sighted
1.	Rajapalayam	37
2.	Srivilliputhur	16
3.	Saptur	15
4.	Watrap	12

Identification of Corridor

Srivilliputhur – Saptur corridor also known as Pilavikkal –Watrap corridor connects Saptur Reserve Forest with Sriviliputhur Reserve Forest in Srivilliputhur Grizzled Giant Squirrel Sanctuary. Elephants move through narrow foot hills forests of steep mountains between Pilavikkal Reservoir and Varushanad Reserved land in Watrap Range. It is bounded on the North by Madurai Forest Division, South-west by Periyar Tiger reserve and North-west by Megamalai Wildlife Sanctuary. The length of the corridor is 3000m and width of the corridor is 300 to 500m

Map 2. Map showing the landscape of Srivilliputhur – Saptur corridor

Seasonal movement of elephants in the Sanctuary was recorded during December and January. Elephants from adjoining Periyar Tiger Reserve move towards Srivilliputhur through Deviyar beat of Rajapalayam Range. Another important migratory route for elephants is Kottamalai beat of Watrap Range, elephants from adjoining Megamalai WLS.

Biotic pressure such as livestock grazing and woodcutting in the forest by adjoining villages namely Venobhava Nagar, Indira Nagar and Kizhavan koil has affected the habitat quality and diurnal movement of elephants in the corridor. Besides, tourist visiting Kovilar Dam is a major disturbance to the habitat. Vehicular traffic act as a barrier to wildlife movement and causes injury and mortality to wildlife. This has led to the degradation/ fragmentation of the corridors resulting in loss of connectivity between corridors.

Habitat deterioration is also caused due to high density of livestock in Sathyamangalm Forest Division. High intensity of wood cutting on the hill slopes in Kallar Vedar Colony corridor has threatened the forest connectivity between Kallar Reserve Forest and Vedar colony area. People depend on hill slopes for cutting bamboo where it is dense resulting in loss of fodder species for elephants which drives the elephants to nearby villages for crop raiding. Therefore, controlling fodder collection and cattle grazing in this area is very important.

Management recommendations

- Anthropogenic Pressures (cattle Grazing, woodcutting) should be reduced in the Sanctuary.
- Rationalization of revenue lands adjoining Sanctuary will help link the habitat.
- Water availability should be ensured by construction of water holes/ percolation ponds etc. in the elephant migratory areas.
- Awareness campaign should be conducted for local and forest dependent villagers to restrict livestock grazing/browsing inside the corridors.
- Habitat improvement by the way of planting of more fodder species such as Bamboos, Dichrostachys cinerea, Aagle marmelos, Zizyphus mauritiana and Albizia amara etc will help to improve the habitat and fodder for elephants.

An overview of Elephant Mortality in Tamil Nadu Part of the Nilgiri Elephant Reserve, Southern India

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Introduction

Project Elephant instituted and funded by the Government of India since 1992, aims to conserve elephant populations, their habitats and overall biodiversity in eleven designated elephant reserves across the country. Natality and mortality rates are important constitutions in describing demography of a population. Mortality of most elephant populations can be divided into three phases, early calf mortality, constant adult mortality, and old age mortality. Apart from shooting elephants either for ivory, meat, or for crop protection, few quantitative reports exist of the cause of elephant deaths in the wild.

The Nilgiris-Eastern Ghats Elephant Range or Nilgiri Elephant Range (NER) is the largest range with 15,338 Sq.km in South India covering various forest types from montane evergreen forest, moist deciduous, dry deciduous to dry thorn forest and grasslands. The elephant population in the Nilgiri Eastern Ghats Elephant Range was estimated at 7416, 4904, 4987, and 6449 during 2010, 2007, 2005 and 2002 elephant census respectively.

Generally, the natality and mortality records of a species provide valuable insight to take policy level decisions for species conservation. It would be very difficult to study natality of elephants unless otherwise the project has long duration. Therefore, mortality data can be calculated over a few decades from the available postmortem reports and the same can be scientifically analysed in order to know the species mortality rate with respect to age, sex and site specific reasons to prepare a state level conservation action plan for elephants which is highly need of the hour to save an endangered terrestrial giant from extinction. Although the mortality of all wild animals is being documented by respective Forest Divisions, sanctuaries, Tiger Reserves and National Parks, there appears to be no such consolidated work has been documented.

Keeping these aspects in view the present study was initiated to investigate various causes of elephant mortalities that would affect on wild elephants spatially and temporally in Nilgiri Elephant Reserve of Tamil Nadu

About Nilgiri Elephant Reserve

Elephant post mortem reports were collected in Nilgiri ER from 6 years to 28 years as per the availability of the records. Of the eight administrative Forest Divisions coming under Nilgiri ER, Hosur Forest Division (1501 Sq.km) is a largest Forest Division followed by Sathyamangalam Tiger Reserve (1455 Sq.km), Dharmapuri Forest Division (837 Sq.km), Erode Forest Division (821 Sq.km), Nilgiri North Forest Division (701 Sq.km), Gudalur Forest Division (484.4 Sq.km), Mudumalai Tiger Reserve (321 Sq.km) and Nilgiri South Forest Division (311 Sq.km). Out of 6433 Sq.km area of the Nilgiri Elephant Reserve, elephant presence is 3560 Sq.km (55%) (Fig. 1). Sathyamangalam Tiger Reserve has large elephant presence area (1312 Sq.km) followed by Hosur Forest Division (646 Sq.km), Erode Forest Division (447 Sq.km), Mudumalai Tiger Reserve (321 Sq.km), Dharmapuri Forest Division (314 Sq.km) and Nilgiri North Forest Division (300 Sq.km). Gudalur and Nilgiri South Forest Divisions have 116 Sq.km and 101 Sq.km elephant presence areas respectively in the NER (Table 1).

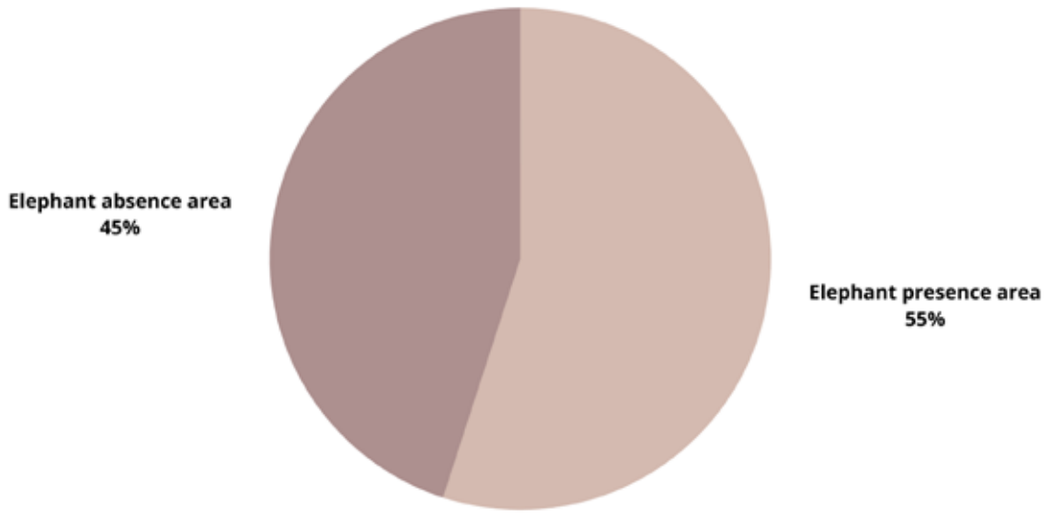


Figure 1. Percentage of elephant presence and absence area in Nilgiri ER

Elephant mortality recorded in various forest divisions in Nilgiri ER

In Nilgiri ER, more number of elephant deaths were recorded in Sathyamangalam Tiger Reserve (n=396 and 36%) from 1999 to 2019 (21 years) followed by Mudumalai Tiger Reserve (n=147 and 16%) from 1993 to 2019 (18 years), Nilgiri North Forest Division (n=92 and 8%) from 1998 to 2018 (21 years), Dharmapuri Forest Divisions (n=86 and 7%) from 1992 to 2019 (28 years), Hosur Forest Division (n=73 and 8%) from 2003 to 2019 (17 years), Gudalur Forest Division (n=84 and 6%) from 1993 to 2019 (27 years) and Erode Forest Division (n=56 and 18%) from 2014 to 2019 (6 years). A lowest number of elephant deaths were reported in the Nilgiri South Forest Division (n=6 and 1%) over a period of 10 years (2010-2019).

Average elephant mortalities recorded per year in various forest divisions of NER

Out of 940 elephant deaths in Nilgiri ER, Sathyamangalam Tiger Reserve attributed highest number of elephant mortality per year i.e. 18.86 (elephants/year) and minimum of 5 elephants/year to the maximum of 38 elephants/year. This was followed by Erode Forest Division where average elephant death was 9.33 elephants/year with a minimum of 7 elephants/year and the maximum of 14 elephants/year, Mudumalai Tiger Reserve with an average of 8.17 elephants/year, minimum of 2 elephants/year and the maximum of 17 elephants/year and Gudalur Forest Division where an average elephant death was 3.11 elephants/year with a minimum of 1 elephant/year and the maximum of 10 elephants/year. On the contrary, lowest elephant death (0.75 elephants/year) was recorded in the Nilgiri South Forest Division with a minimum of 1 elephant/year and the maximum of 2 elephants/year (Table 1).

S No	Name of the FDs in NER	Duration of elephant mortality data collected	Total years of data collected	Total elephant mortality recorded	Elephant mortality per year (elephants/year)	Minimum and Maximum elephant deaths/year
1	Mudumalai TR	2002-2019	18	147	8.17	2 to17
2	Gudalur FD	1993-2019	27	84	3.11	1 to 10
3	Nilgiri North FD	1998-2018	21	92	4.38	1 to 19
4	Nilgiri South FD	2010-2019	10	6	0.75	1 to 2
5	Sathyamangalam TR	1999-2019	21	396	18.86	5 to 38
6	Erode FD	2014-2019	6	56	9.33	7 to 11
7	Dharmapuri FD	1992-2019	28	86	3.44	1 to 9
8	Hosur FD	2003-2019	17	73	4.29	1 to 13

Table 1. An overview of elephant mortality recorded in Nilgiri ER

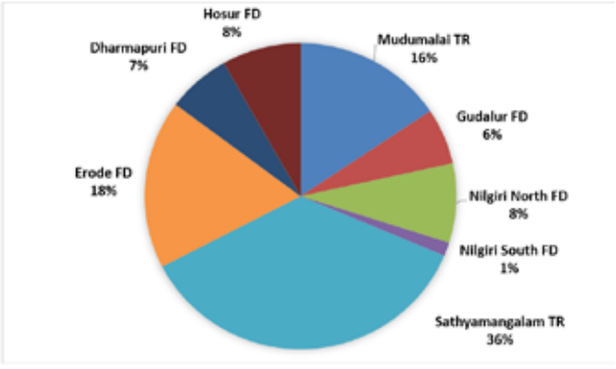


Figure 2. Percentage of elephant mortality recorded in various Forest Divisions of Nilgiri ER

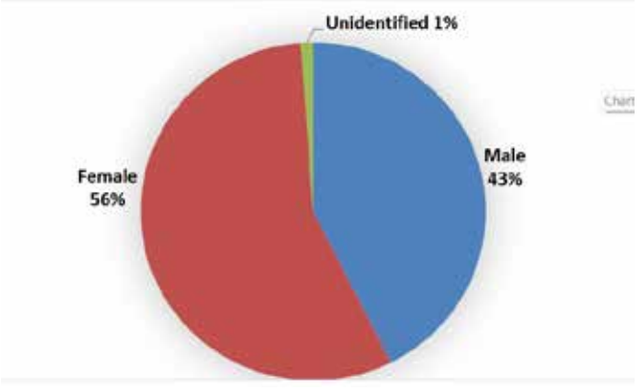


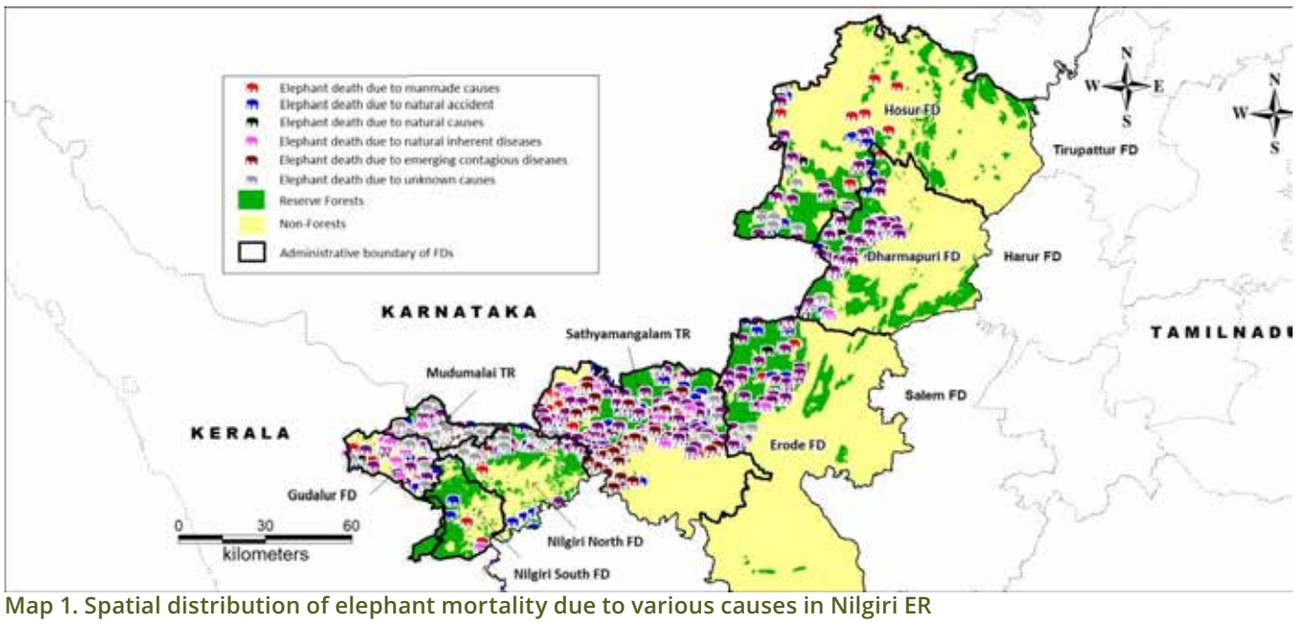
Figure 3. Sex category of elephant mortalities in Nilgiri ER

Elephant mortality due to various causes in Nilgiris Elephant Reserve

The causes of elephant death were broadly categorized as natural death, natural accidental death, natural inherent disease, emerging contagious disease, man-made causes. Among the causes, natural inherent diseases (n=404) was highly responsible for more number of elephant deaths followed by natural accidental deaths (n=218), man-made causes (n=139), natural deaths (n=56), emerging contagious diseases (n=38) in NER (Table 2). In addition, 69 elephant deaths were reported as unfit for postmortem and 16 cases postmortem reports were not available in NER.

S. No	Name of the FD/TR	Natural Death (ND)	Natural Accidental Death (NA)	Natural Inherent Disease (NID)	Emerging Contagious Disease (ECD)	Man-made Death (MMD)	No Post mortem Report (NPM)	Unfit for Post mortem (UF)	Total
1	Mudumalai TR	12	42	50	3	4	8	28	147
2	Gudalur FD	6	14	27		31	1	5	84
3	Nilgiri North FD	5	28	24	2	18		15	92
4	Nilgiri South FD		2	1		3			6
5	Sathyamangalam TR	21	86	186	33	61	2	7	396
6	Erode FD	3	12	35		3		3	56
7	Dharmapuri FD	6	20	51		2	4	3	86
8	Hosur FD	3	14	30		17	1	8	73
		56	218	404	38	139	16	69	940

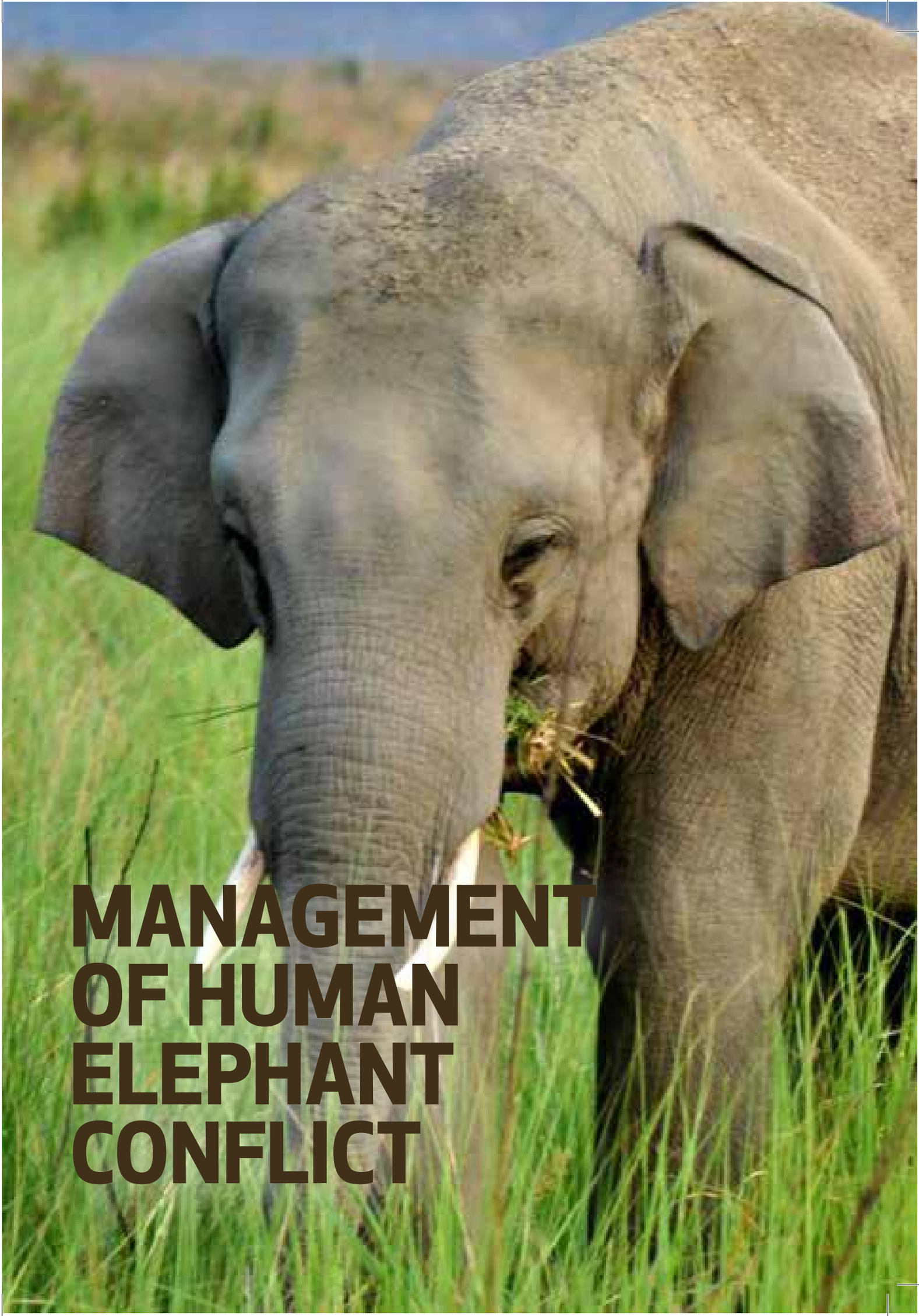
Table 2. Elephant mortality due to various causes in Nilgiri ER



Map 1. Spatial distribution of elephant mortality due to various causes in Nilgiri ER

Conclusion

The present study found where ever the elephant population is high the mortality also reported proportionately. The present study also envisaged that out of 940 cases, 177 elephant deaths were caused due to emerging contagious diseases and manmade causes. However, no information could be deduced due to lack of post mortem reports in 85 cases. But it is important to look into the mortalities of elephants in the wild more closely for better management of elephant conservation in future.



MANAGEMENT OF HUMAN ELEPHANT CONFLICT

Rewilding the 'Wild Rivaldo': New Lessons Learnt in Human –Elephant Conflict Management

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Introduction

The first assignment that fell in my hand as I took over as the new Chief Wildlife Warden of Tamil Nadu on July 6th, 2021 tended to be one of the most daunting ones, perhaps. Tough, not because it was the first task, but because it could be a real risky one. 'Rivaldo', a 38–40-year-old tusker, Asian elephant (Elephas maximus) weighing an estimated 4.5-5 metric tonnes, was captured on May 5th, 2021 under a March 2021 order of the state Chief Wildlife Warden, under section 11 (1) (a) of the Wildlife Protection Act 1972, and was then confined to a kraal (enclosure) especially constructed for housing it in an RF near the Vazhaithottam village forest check post inside the buffer zone of the Mudumalai Tiger Reserve (MTR) (Fig.1). The elephant was kept in captivity for treatment and training to ultimately live in permanent housing at Thepakadu Elephant Camp in MTR as a trained camp elephant. A Special Committee was also set up with the officials of MTR and the vets from Coimbatore and Thepakadu, MTR, to monitor the elephant's treatment and training in its confinement. Apparently, the order of capturing and bringing 'Rivaldo' into captivity was triggered off under pressures from the local public. The pressures were accentuated by the local administration as well as the local politicians who feared that habitual visits by 'Rivaldo' to the village houses in Vazhaithottam and nearby villages could lead to further conflicts resulting in loss of lives and damages to properties. 'Rivaldo' (Fig. 2) was habituated to visiting houses and getting fed with home cooked food and fruits in Vazhaithottam village and elsewhere.

In an isolated incident it had damaged properties when it was unsuccessful in receiving the food. Among the incidences of elephant-human conflicts in Mudumalai from 2018 to April 2021, six humans had been reported dead and no incidences were ascribed to 'Rivaldo', not even an injury. To the contrary, Desai et al. 2016 (unpublished report) had reported 'Rivaldo' to be a gentle animal with no known aggressive behaviour. I took note of a petition that was filed in Madras High Court during March, 2021 by an activist and the Honourable High Court too had raised concern and advised in its interim order for an expeditious return of the wild animal to its natural habitats. The events led to engaged public debate and media reports in subsequent months- environmental activists and non-governmental organisation argued against the capture of 'Rivaldo' and its confinement. Science was never discussed.

(Photo source: Mudumalai Tiger Reserve)
Fig. 1. Specially constructed kraal for housing and training the captured male tusker 'Rivaldo' during May-June 2021 in Vazhaithottam village in Mudumalai tiger reserve's buffer zone.

2. *Changing the course*

On 10-11 July 2021, I visited 'Rivaldo' presently under confinement in a kraal in MTR, to assess its situation, study the kraal, its surroundings, the animal's health conditions and held intensive discussions with the vets and representatives from the 'Rivaldo' Committee constituted by the FD, MTR, ecologists, and members of the civil society groups. The order had taken the following grounds:

A

the finger of trunk along with a part of lower 1/3rd portion was missing due to an old injury which interfered with the normal body functioning, particularly browsing and grazing.

B

the external opening of the trunk was much narrow restricting the inflow and outflow of air during respiration.

C

the vision of right eye was severely impaired.

D

because of constricted opening of the trunk, it couldn't be sedated or forcefully restrained.

E

there was hint of a suggestion to treat the animal for its conditions in c and d.

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Fig.2. 'Rivaldo' a 38- 40-year-old tusker weighing 4.5-5 tonnes captured in May 2021 and confined to a kraal near Vazhaithottam village forest check post in the buffer zone of Mudumalai TR in Tamil Nadu.

In a first, I made the following quick observations:

i. Keeping a matured, healthy and hefty adult tusker in a rather small kraal and training could be torturous and defeating the science of elephant ecology.

ii. The permanent disabilities of 'Rivaldo', such as, opacity in its right eye, and amputated trunk at the tip might have occurred long back and was not treatable anymore. The elephant has learnt to live with these disabilities as many other elephants do with similar or other physical disabilities (Desai et al. 2016: unpublished report). 'Rivaldo' appeared an intelligent and docile animal.

iii. There was no solitary instance of 'Rivaldo' attacking humans or indulging in crop raid.

iv. The process of kraaling and training an adult elephant into captivity could be torturous, inhumane and ecologically damaging.

v. The elephant was in the last month of its musth (a biological in a male elephant) period. During its non-musth period it generally roamed around foot hills of Kallaty Ghats, Vazhaithottam, Chedapatti, Mavinhalla in the erstwhile Nilgiris North Forest Division. This tusker came into musth regularly during second week of May every year.

vi. Argument that the elephant was prone to getting poached because of its movements near human settlements didn't find weight as there were at least 5 other tuskers whose home ranges were around the same landscape.

vii. In the age group of 'Rivaldo' (i.e., 35-40 years) minimal number of tuskers is reported in the Nilgiris landscapes, hence retaining a tusker of this age group in the wild population could be significant for genetic dispersion.

viii. The Asian elephant in Tamil Nadu has shown signs of population decline to an alarming level (e.g. a decline of about 25% in the years 2000s-2010s).

ix. Compared to the costs that would be incurred in capturing, training and maintaining this elephant in captivity, managing it in the wild would be far less expensive and conservation friendly.

x. Professional and scientific management of elephant-human conflicts will desist sentimental approach to managing conflicts and therefore could pave the way for science-based protocols in conflict management.

Critical evaluation weighed in favour of rehabilitating 'Rivaldo' in the wild rather than continuing in the captivity. Although the question that would most likely haunt me in subsequent days was- what would happen if after the release in the wild, 'Rivaldo' went back to the villages, came in conflict with the humans, and in the worst scenario trampled a person? The risk was evident and heavy at odds. I decided to take on the challenge instinctively, however, based on an approach that was to be in tune with the scientific management of the Asian elephants. I apprised the Government of my decision and requested an endorsement, and finally obtained it on July 14th, 2021. There was, however, a need to develop a Standard Operating Procedure (SOP) for the release of the elephant based once again on scientific principles and best practices.

3. New Operating Procedures

By mid July 2021, 'Rivaldo' had lived in the kraal for the past 75 days, which would have been very stressful for the animal. Prior to this the animal was habituated to feeding by the humans in the villages. Keeping these in view I set out with developing a new set of Operating Procedures that would lay out the course of actions for the release and rehabilitation of 'Rivaldo'. The operation was to be an "experimental release" as we looked at this as an opportunity that could behold for us a new regime in the elephant-human conflict management. Probabilities of a successful rehabilitation in the wild or the reversal of the conflicts had the assumed ratio of 50:50. Therefore, the focus in the new Operating Procedures was maintained at the aspects of locating the home range, reversion of modified food habits, dealing with the issue of the reported constricted trunk and its impaired eye sights, modes of a smooth transportation that caused lesser stress, and a mitigation plan if at all the elephant found its way back to the village where it was fed routinely and reverently, and most importantly if it ended in reversed conflicts. Therefore, the next significant steps were formation of several teams to address the above issues of concern and further.

4. Strategic Action Plans

I constituted specific teams to take up the assigned tasks, e.g., a team of qualified vets for continuous health monitoring- pre and post release on daily basis, a team comprising of qualified ecologists and scientists for determining the release site, a team of vets and ecologists for transforming the food habit of the elephant from the current assisted feed to the natural feed that it would have access to after it was released in the wild, a team for setting up the GPS and wireless based monitoring network with installation and activation of base stations, a team for field level monitoring and anti-depredation activities that comprised of field trackers, anti-poaching watchers, frontline field officials and the members of the civil society, and finally a community work team composed of ecologists, members of civil society, and NGOs which were particularly assigned with conducting sensitization programmes for conflict management.

For each of the teams we selected the domain experts in elephant ecology and health management, e.g., ecologists from Indian Institute of Science, Bangalore, Wildlife Institute of India, Dehradun, World Wildlife Fund for Nature, and the Wild Trust India, New Delhi. We included highly experienced vets who had considerable experience of working with elephants in protected areas of Tamil Nadu and at

the national levels. We considered that assessing the health conditions and their monitoring in pre-release and post-release phases was going to be of critical importance. Besides, we also consulted vets and officials from Uttarakhand and Odisha who had similar experiences.

i. Selection of release site

After formation of the above teams and conducting few initial rounds of discussions with each of them, the next critical step was selection of the most suitable sites where the elephant would be released and rehabilitated. Recommendation was made by several ecologists for an initial soft release (i.e., inside a boma) and fenced with solar fencing (Neupane et al. 2018). Our field surveys were dropped as the boma release didn't meet up with the parameters of the long-term objective of complete and natural rehabilitation. I selected eight critical parameters for the selection of the sites where suitability was the highest and that was indexed:

a) Distance from the villages where 'Rivaldo' was known to depredate and get fed

b) Availability of natural fodder that 'Rivaldo' liked to forage the most

c) Height of the trees for the foraging access

d) Availability of plentiful sources of running and clean water

e) Distance from the kraal where the elephant was housed at present

f) Home range overlap of other known tuskers and clans from the selected sites

g) Aspects and ruggedness of the sites

h) Linkage with the current home range of the elephant

(Photo source: Mudumalai Tiger Reserve)
Fig.3. Selection of release site by the team led by the state Chief Wildlife Warden based on eight variables along with the use of drones and other devices.

Based on the above parameters we selected two most suitable sites respectively, at Abhayranyam in Kargudi range and Chikkallah (Fig. 3) in Mudumalai range of MTR core. After a rigorous field assessment led by me, the site at Chikkallah, which was a total distance of about 24 km from the present temporary camp at Vazhaithottam, made the higher score in above selected parameters to qualify for the final site of release.

ii. Communications

Monitoring of the elephant after release and tracking its movement patterns using wireless GPS systems, wireless walkie talkies and maintaining effective communication with all the monitoring teams was essential but typically challenging.

A) Setting up wireless network

The next critical step involved setting up a digital wireless repeater station at Thepakadu range base station and couple of field stations for relaying the communications. Until that time MTR had no wireless network and digital walkie talkies and at best had analogous systems that were not in use. In addition, we procured the elephant transporter lorries from Coimbatore, Hosur and Sathyamangalam Tiger Reserve and made several trial runs using camp elephants of matching weights of 'Rivaldo'. Field forest officials trained in drone-based monitoring were requisitioned from Coimbatore and Nilgiris divisions along with their drones. In order to make a DNA repository I introduced DNA sample collection protocol based on CCMB guidelines and we collected different samples from 'Rivaldo' for DNA fingerprinting. All-important health parameters of 'Rivaldo' such as blood pressure, temperature, blood sugar levels, liver function, kidney function and essential micronutrients were checked on daily basis until the day of release. Urine and stools tests were also conducted periodically. From July 18th a new food plan was commenced under the supervision of the vets with aim to increase the proportion of natural and wild food comprised of tree leaves and stems and gradually reducing the handmade food such as ragi, rice, jaggery and fruits.

B) Radio collaring

For signals from 'Rivaldo's movements we chose a satellite radio collar (e.g., Vertex plus elephant collar) made by Vectronics Aerospace Worldwide. The system consisted of an array of sensors-mortality sensor, accelerometer, thermometer, light sensor and a GPS. These were connected to a small processor, which controlled the data collected by the collar and monitored by the manager. The processor could be programmed to take the reading as required by the manager of the collar. According to the period chosen the collar would take readings from all the sensors and at a chosen time would send the data to a satellite modem, which conveyed the data to an iridium satellite, which in turn would send the data to a ground station. As per our setting, the collar would record all the sensor readings including the GPS every 15 minutes and then send this data to the satellite every hour. The GPS data were plotted on their website and the elephant could be located using Google maps within an hour. All the data could be downloaded any time and the movements of animal could be analysed for the time period of interest. 'Rivaldo' was radio collared on July 29th by the radio collar team led by the WWF field investigators. Test recordings were conducted.

C) Drones

Two teams each comprising of three trained forest personnel with the drones were deployed for recoding the operations.

D) Health monitoring

Since the elephant was restrained inside the kraal and partially trained by the mahouts, detailed clinical examination was not possible. The team of vets collected biological samples such as skin scrapings to study ecto-macro-parasites, whole blood, blood smear and serum to study blood and serological parameters, trunk wash to screen the sample against EEHV (Endotheliotrophic Elephant Herpes Virus) and tuberculosis and dung sample to screen against the ova of endoparaites. The findings and laboratory tests were tabulated and updated regularly until the time of the release. Based on the parameters, vet team cleared the release on 1st August, 2021. After loading the transporter, animal was sedated with 300mg of xylazine (Intramuscular). During the transport, animal showed deepened sedation and leaning on the side of the truck and respiration was shallow. Twenty mg of Yohimbine

HCl was administered in the ear vein directly to get partial reversal from the sedation. Full reversal from the sedation was achieved by administering another 20gm of Yohimbine HCl in the vein at the time of release. In addition, the vets also administered supporting medication comprising of inj Eenrofloxacin- 2.5mg/kg body weight I/M, inj Tribivet (Vitamin B1, B6 and B12) - 30 ml, and inj Dexamethasone – 50ml I/M. No health complications were recorded in the animal during the journey and the offloading of the animal.

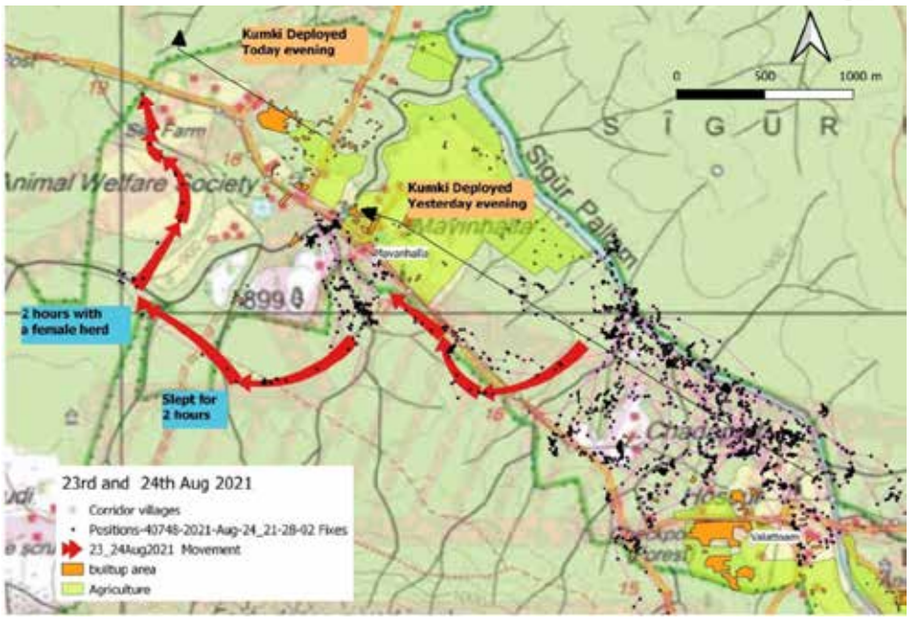

Fig. 5. Kumkis were deployed to block the identified leakage points. Human chains and other local measures such as the chilly robes were used during August-September 2021.

4. *Release and post release monitoring*

We released 'Rivaldo' with meticulous planning and preparation of about 20 days in the selected site on the night of 1-2 August 2021 under my direct command. However, much earlier than the expectation, within 24 hours of the release it returned to Masinagudi, near the community houses in Mavinallah close to the kraal where it was housed. We immediately geared up the protection mechanisms as planned and deployed two teams of about 30 personnel to track the elephant and surround the village to prevent any new conflicts.

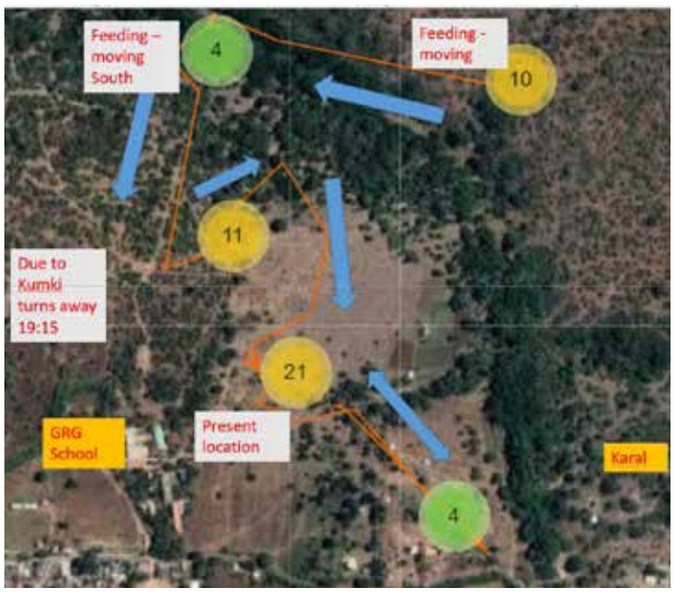

Fig. 4. 'Rivaldo' kept trying to move around the village near the kraal site and was prevented by the deployed kumkis and other local measures such as the chilly robes during August 2021.

We deployed drones with thermal sensors and sniffer dogs around the villages. The house-owners were warned not to offer any food to the animal or attract it in any manner that was the practice here earlier. We used the tom toms to publicise on our measures and warn the people of the likelihood of negative interactions and asked them to stay indoors during the night hours. We moved three kumki elephants (trained camp elephants) from Theppakadu elephant camp and stationed them to block the movement of 'Rivaldo' that led into the villages and to drive it back into the forests whenever encountered. In subsequent days, we also used chilly robes (Sébastien et al. 2015) around the villages and cleared all garbage points and asked the villagers not to throw any food wastes outside on the streets. In collaboration with the local panchayats, we cleared left over garbage and introduced garbage management systems (Fig.4, Fig.5).

After a fortnight since the release, 'Rivaldo' was observed moving along with few other tuskers and elephant herd in the wild (Fig.6). It was noticed playing and interacting with other elephants. It slept mostly in day hours, mid of the day close to the human habitation and roamed around in the forest areas close to the human habitations. We continuously monitored the elephant using satellite linked repeater stations, wireless digital walkie talkies, and the radio collar. The early warning system that built up around the villages worked successfully. 'Rivaldo' started moving away from the villages into the Mavinallah and Sigur forests.

(Photo source: D. Boominathan, WWF India)
Fig.6. 'Rivaldo' was found in company with other tuskers and showed no signs of regression during August -September 2021.

We recorded that 'Rivaldo's home range in natural habitat in August 2021 formed about 7.11 sq. km, which had increased to about 10.12 sq. km during September-October 2021. This was expected to increase further after the north east monsoon set in during October-December months (Fig. 7, Fig. 8).

Discussions and conclusion

During September - March 2021 elephant depredations in Gudalur, Coimbatore and Hosur forest divisions in Tamil Nadu were managed effectively using the protocols that were used for 'Rivaldo' and in its post release monitoring and management. During this phase no wild elephant which was involved in conflicts with the humans had been captured and brought to the camp for confinement. In fact, during September 2021- March 2022 intense elephant movements and depredations were witnessed in Gudalur regions, but were managed effectively without any major incidents or damage to properties. Since the beginning of the release and rehabilitation of 'Rivaldo', doubts were raised about its success as 'Rivaldo' had spent more than 90 days at the time of the release and was reported having compromised health conditions leaving it unfit to independently feed on natural food and thus survive on its own. Almost a year later, 'Rivaldo' has been fully rehabilitated in the wild in its own home range. We noted that during May 2022 'Rivaldo' had crossed the Moyar region in MTR core and moved towards north west towards Bandipore in Karnataka when the

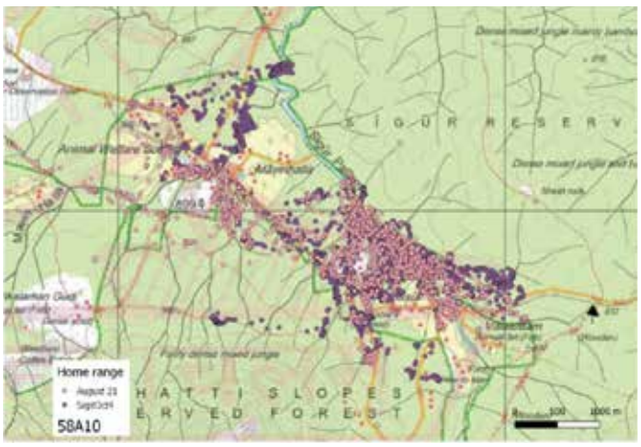

Fig. 7. Movement pattern of 'Rivaldo' since August 2021-September 2021 in Sigur plateau of Mudumalai tiger reserve and landscape (Analytics source: Mohanraj).

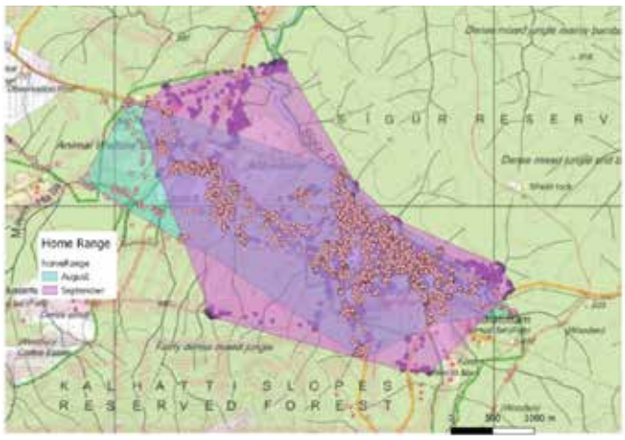

Fig. 8. Computed home range based on 'Rivaldo's' daily movement pattern since August 2021 until March 2022 in Sigur plateau of Mudumalai tiger reserve and landscape (Analytics source: Mohanraj).

elephant went into the musth period (Fig. 9). It was using its normal home range known and recorded by the scientists since early 2000-2010s. We observed that 'Rivaldo's' behaviour had attained complete normalcy and there wasn't any instinct to restrict itself to the vicinity of the human settlements. However, the need to study its behaviour to understand how its habituation became normal could be considered. This understanding would be helpful in applying these protocols to few other camp elephants for rewilding them as well. Just at the time I have completed this article, the High Court of Madras passed the final judgment upholding the efforts of release and rehabilitation of 'Rivaldo' and dismissing all petitions objecting to the release. The judgement has tagged judicial support to a scientifically designed protocol and can raise confidence levels in future decisions.

The elephant has shown the intent to survive in wild without human dependence and disturbance. The field monitoring teams continue to monitor 'Rivaldo' on a day-to-day basis (Fig. 10). The field officials and the trackers have developed profound interests in following and recording Rivaldo's behavioral pattern and the local ecologists in conducting spatial ecological analysis from the data they get from them and from the radio collar. A new protocol of field monitoring and systemic approaches were probably the best outcomes of 'Rivaldo's episode and is now in practice in managing the problem elephants in the Nilgiris, Coimbatore and Hosur landscapes. The year 2021-22 has witnessed significantly fewer deaths of humans due to the conflict and fewer deaths of elephants in elephant ranges in Tamil Nadu. Science has succeeded and assisted in minimizing the ecological losses. The challenge would be to keep it that way and improvise further.

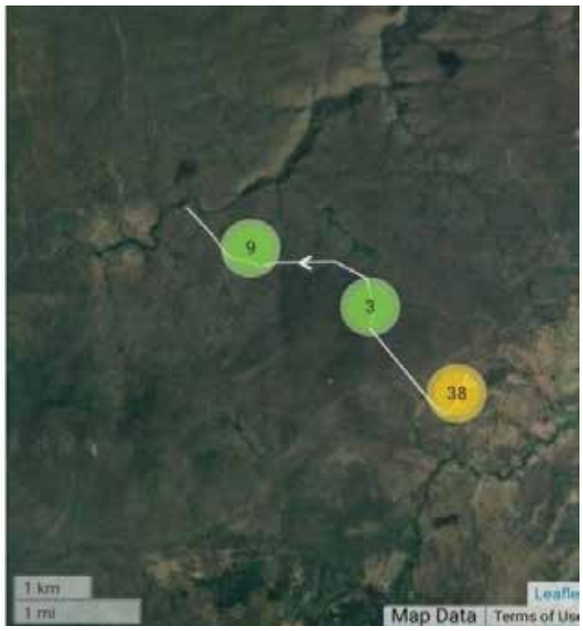

Fig. 9. 'Rivaldo' was observed to have moved out of its non-musth home range of the Sigur plateau moving north west and crossing Moyar in MTR core during May 2022.

(Photo source: Mudumalai Tiger Reserve, the Nilgiris.)
Fig. 10. 'Rivaldo' moves freely post release in its home range in Sigur plateau in the Nilgiris in 2021-22

Ex-gratia, Insurance & Other Financial Instruments for Addressing Human-Elephant Conflict

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Introduction

People living in elephant range areas are accustomed to elephant presence in area but many a times, marginal farmers living near forest areas, can ill afford large-scale damage caused by elephants. Due to dispersal and colonization of elephants in new areas, people are less tolerant of the damage caused in conflict.

Human-Elephant Conflict (HEC) refers to the negative interaction between people and elephants causing adverse impact on the people and their resources due to human death and injury, crop damage, loss of property, apart from affecting their emotional well-being including related impact on the elephants or their habitats.

Developing solutions for HEC is an urgent conservation priority. This threat to coexistence between humans and animals is particularly serious in developing countries like India, where population growth significantly impacts traditional wildlife habitats.

Approaches to conflict resolution include schemes to financially offset affected individuals for their loss. The schemes need to ensure cost-effective verification, fair and timely payments, incentives for damage prevention and financial sustainability.

Annual HEC Conflict and ex-Gratia relief in India

S.N	Elephant Conflict States	Elephant Population (2017)	Nos of Human Deaths	Ex-gratia for Human Death (Rs. in lakhs)	Ex-gratia for Crop/ Property damage (Rs. in lakhs)
1	Andhra Pradesh	65	2	10	53.08
2	Arunachal Pradesh	1614	1*	1.00*	20.90*
3	Assam	5719	91	167.4	222
4	Chhattisgarh	247	67	241.75	1425.86
5	Jharkhand	679	59	110.18	428.92
6	Karnataka	6049	49	235	709.65
7	Kerala	3054	22	61	286.58
8	Maharashtra	6	3*	15.00*	45.48
9	Meghalaya	1754	9*	11.35*	227.45*
10	Nagaland	446	1	1.00*	7.86*
11	Odisha	1976	65	251.33	1178.25
12	Tamil Nadu	2761	43	119.25	237.01

13	Tripura	102	2	2.00*	0.91*
14	Uttar Pradesh	232	3	15	10.98
15	Uttarakhand	1839	4	9.3	10.71
16	West Bengal	682	84	162.5	225.05
	Total		**505**	**1413.06**	**5090.69**
	* Data of previous year taken				

Table: HEC in India and Ex-gratia paid during 2016-2017 (Source: MoEF&CC)

From the table, it is evident that of the major HEC states, conflicting situation is alarming in the North-Eastern and East-Central Regions (Assam, West Bengal, Odisha, Jharkhand and Chattisgarh) and critical in Southern Region (Karnataka, Tamil Nadu & Kerala). In 2016-17, nearly 500 deaths were reported and total of Rs. 65 crores was paid as ex-gratia.

Human Wildlife Conflict & Financial Mitigation

Global incidents of Human-Wildlife Conflict (HWC) are rising despite various reduction techniques adopted.

• Preventative actions include hunting, translocations and barriers as fences/ trenches.

• Reactive actions are associated with financial mitigation in form of compensation & insurance-based schemes.

Compensation schemes reimburse individuals for a loss without their financial input and are usually Govt. funded (Ex-gratia payment).

Insurance-based schemes work like an insurance product by requiring a premium to be paid in order to receive payment for a pre-defined loss under a certain set of conditions. They may be linked to some private sector insurance entity.

Reducing Human-Wildlife Conflict (HWC) is key to coexistence between humans and animals and countries have implemented reactive measures including financially offsetting the costs of crop raiding and livestock predation. Some HWC schemes provide Government-funded compensation to affected individuals whilst other schemes focus on private sector (insurance-based payments).

The purpose of financial mitigation is to increase local tolerance for wild species by offsetting the costs of damage in a fair and equitable manner, reducing retaliatory killings. There are questions surrounding the effectiveness of financial mitigation in HWC resolution, and its success depends on the context.

Concerns about financial mitigation include its ability to adequately compensate for damages, increased bureaucracy for local communities, and the prioritisation of wild species over human populations.

Ex-Gratia Payment

Ex-gratia payment is made to an individual by an organization, government, or insurer for damages or claims, but it does not require the admittance of liability by the party making the payment. The current compensation policy is riddled with ambiguities, gaps in processing and inefficiencies and requires necessary monitoring and redressal.

MoEF&CC norms for ex-gratia relief under centrally sponsored schemes is as under:

Nature of damage	Amount of Ex-gratia Relief
Death or permanent incapacitation	Rs 5.00 lakhs
Grievous injury	Rs 2.00 lakhs
Minor injury	Upto Rs 25,000 per person
Loss of property / crops	As per State Govt norms

Loss of Property/ Crop due to elephant depredation

Crop Damage: Raiding of banana field and damage to the coconut trees by the elephant

Property Damage: Damage to the honey boxes and houses by the elephants

Mitigatory measures: Prevention of crop depredation by erecting forces

Insurance Cover

Insurance schemes were not able to increase tolerance of a species because the damage suffered by livestock owners was barely covered by payments. Another issue is that initiatives are often implemented with no input from the locals they are intended to help, resulting in mistrust and low opt-in rates. Also, moral hazard, where an individual does not take actions to protect their property, exposing a scheme to a greater loss, as well as fraudulent activity can be problematic for financial sustainability.

There are also lessons to be learned from insurance for agricultural losses from weather-related events as microinsurance becomes more developed in Asian countries. The effectiveness of insurance for HEC is context specific, but there are four challenges to success of such schemes:

1. Cost–effective insurance administration

2. Timely and fair insurance payments

3. Incentives for damage prevention

4. Financial sustainability of premium payments
Some initiatives have failed to increase tolerance yet others have been able to reduce animosity towards wildlife.

Cost-effective insurance administration includes low-cost premium collection and verification of claims, the costs of which can be reduced by comprehensive data and index-based insurance. Timely and fair payments can be supported by accurate data, actuarial analysis and technology with claimants kept updated through mobile SMS. Linking payments to damage prevention is needed to address moral hazard, where an insured individual exposes a scheme to a greater risk due to a lack of care. Financial sustainability of premium payments is perhaps the biggest challenge and limits the involvement of commercial insurance companies.

Financial sustainability of insurance schemes for HEC depends on the level of administrative costs being charged and penetration of insurance markets as a result of consumer awareness campaigns. It requires partnerships with other sectors and players to make premiums more affordable and co-financing from the beneficiaries of wildlife, such as tourists (eg. insurance fund in Pakistan financed through

ecotourism). It can also be enhanced by making them mandatory or bundling insurance services with other products.
Community insurance schemes are often the most successful schemes at overcoming the fourfold challenges that insurance markets face for HEC.

Offsetting Conflict Costs

The perceptions and attitudes of people who inhabit conflict prone areas are crucial to the management of human-elephant conflicts and offsetting economic losses plays a major role in building positive attitudes toward wildlife and fostering tolerance toward elephants.

The lack of standardized assessment guidelines and compensation approaches creates opportunities for conflict and exploitation. Compensation schemes often target the market price for victims' crops and livestock losses without recognition of opportunity costs of conflict mitigation and transaction costs of getting compensation, or the hidden costs of declined psychosocial and social well-being.

In elephant range countries, compensatory programs face criticism due to insufficient compensation, logistical challenges, ineffective governance, lack of transparency, reduced local understanding and fraudulent claims.

Community insurance scheme in Namibia

In community-based conservation programmes the benefits generated from wildlife-based activities such as tourism and hunting may be used to offset the costs of conflict. Community insurance uses revenues generated from wildlife to balance the losses of individuals within a conservancy. Payments are only made to registered conservancy members. This system has much tighter controls than compensation scheme. Most importantly, all conservancy members pay into the system and therefore have a stake in it.

Willingness to pay for Asian elephant conservation in Sri Lanka

Every year, approximately 150 elephants and 50-70 humans die because of conflict in Sri Lanka with Rs 1121 million per annum of property and

crop damage. Ceylinco Insurance presented a scheme, based on CSR and willingness to pay to reduce conflict by adding a small amount to premium payments of life/ vehicle policy holders.

A number of factors were required to ensure that the Ceylinco insurance scheme was feasible. These included creating an adequate number of willing investors, the existence of a market to absorb funds, willingness among farmers to participate and the scheme's ability to garner support from the local government. Nearly 89% of urban dwellers were willing to pay Rs 2012 million/ annum which was far more than the annual damage due to elephants; besides, to establish ownership of the scheme, farmers were expected to pay a nominal annual fee of Rs 650. Payment benefits of Rs 2 lakhs for deaths & Rs 0.20 lakhs for crop damage were envisaged in the scheme. The scheme was designed to function in partnership with either local government or the department of wildlife conservation and a commission of 10% was set aside for government agencies or organizations. While the ecological science was sound and the scheme feasible, it was not implemented due to management failure. However, the proposed concept is an excellent example of how linkages may be drawn between species conservation, corporate engagement and community benefits.

Management of HEC through Community based Tourism

PAs around the world generate over $600 billion per year in revenues, but only 2% is spent on protection (IUCN, 2015). Funds could be generated from tourism and invested in local communities who suffer wildlife conflict to reduce animosity. Community based tourism around PAs should be encouraged to provide a portion of proceeds to set up a fund supporting the local community for losses due to HEC.

Compensation Vs Insurance

Compensation schemes in Asian elephant range countries are mainly divided into two types:
i. Direct support which occurs when people receive payment for injury, loss of life, property and/or crop damage as a result of HEC

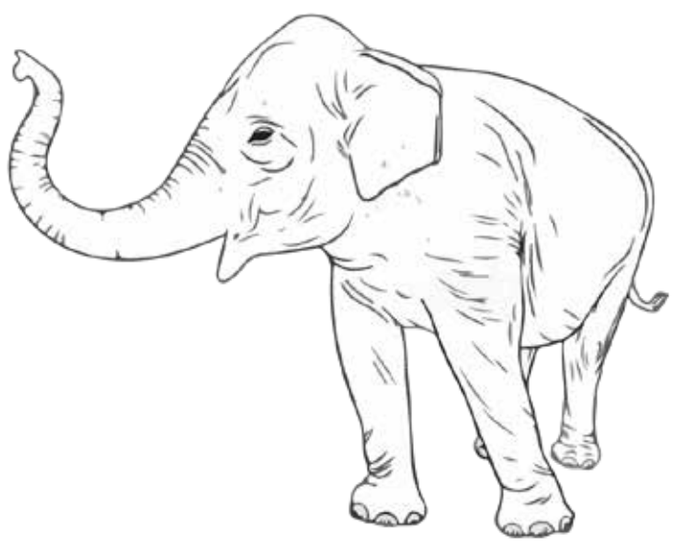
ii. Indirect support that may be in the form of developing alternate incomes, improving existing incomes, or improving livelihoods to provide indemnity for losses due to HEC and encourage better community participation in elephant conservation.

Compensation is complex and not always effective; individuals and/or communities often do not file claims for compensation due to numerous obstacles, i.e., lack of awareness of the scheme, time consuming, logistically complicated, gender-based restrictions, and unclear property ownership. As a major HEC mitigation tool, compensation should be viewed as a short-term approach; eventually compensation should be replaced by other strategies and used only to support severely affected people so that they can overcome crisis situations.

Insurance is a mechanism where a premium is paid by an individual, a household, and /or a community in exchange for reparation for loss (e.g., injury, loss of life, property, or crops) from HEC under previously agreed conditions of protection and payment.

There is generally a third party involved that assesses the amount of the premium based on a set of variables such as crop type, willingness to guard, crop protection mechanism, etc. An insurance payment is usually proportionate to the risk of the insured activity. Insurance schemes to address loss due to HEC may help reduce public animosity towards elephants as insured farmers may feel they have a better chance of receiving reparation for losses.

Insurance may be less likely than compensation to lead to abuse of system as insurance schemes are more transparent. Assessor staff could be well trained and neutral to best determine the validity of the claim. Insurance operated by private companies may reduce pressure on Govts to solve HEC problems and Govts may be able to use compensation funds to address other HEC management issues.



Disadvantages of HEC Compensation and Insurance Schemes

Includes –

1. Unintended effect of increasing HEC losses as payments to farmers to cover losses may result in less crop protection.
2. Expensive and complex to administer as there is generally a need to cover large areas, identify and properly train assessors, educate farmers, and manage finances.
3. Insufficient funds to cover all complaints.
4. Can be abused by false or inflated claims of loss; by crops being planted in areas more likely to be damaged; by assessments of HEC incidents that are not neutral.
5. Poor administrative processes / exploitation can deprive people from receiving reasonable and timely compensation; payments to only some victims may cause disputes amongst communities.
6. Compensation may use funds that would have been better directed at other HEC management issues.
7. Insurance schemes need to keep pace with changing times; an insurance premium may need to increase after a single claim.
8. Biggest challenge to farmers for insurance schemes is the premium cost and decision to use resources that may be better spent on other aspects of HEC mitigation.

Country	Compensation	Insurance
Bangladesh	Compensation scheme exists for crop loss, injury, human life loss.	No insurance scheme currently exists
Bhutan	No cash compensation for crop loss; farmers given seeds. Small cash condolence payment given for injury or loss of human life.	Recent crop insurance scheme initiated with seed money from the government; a farmers' committee runs the scheme.
Cambodia	No compensation scheme exists.	No insurance scheme exists.
China	Compensation scheme exists for crop loss, injury, human life loss.	Recently initiated crop insurance scheme managed by an Ins. Co
India	Compensation scheme exists for crop loss, injury, loss of human life, referred as "ex-gratia relief"	State Govts have attempted insurance schemes but were unsuccessful.
Indonesia	Compensation scheme exists for loss of human life but not for loss of crops	Govt. pays premium for 100 people every year (loss of life). Crop insurance scheme tried in Sumatra, did not succeed
Lao PDR	No compensation scheme. Voluntary contributions come from communities for loss of life.	No insurance scheme currently exists.
Malaysia	Limited compensation for injury or loss of life, not for crop. No compensation in Borneo.	No insurance scheme currently exists.
Myanmar	Compensation exists for crop loss, not for human injury / loss	No insurance scheme currently exists.
Nepal	Compensation exists for injury, loss of human life, damage to property. Not for crop loss.	No insurance scheme exists, but community-based mechanisms are being piloted in some areas.
Sri Lanka	Compensation exists for crop loss, injury, loss of human life.	Attempt to offer insurance to farmers was unsuccessful.
Thailand	No formal compensation scheme exists; at local level, support for loss due to "natural disaster".	No insurance scheme currently exists.
Vietnam	No compensation scheme currently exists.	No insurance scheme currently exists.

Conclusion

For this purpose, dialogue with insurance sector may provide ways to pursue this option for management of situations arising out of human elephant conflict. Insurance can be considered besides existing ex-gratia payment for damage to property, standing crops, death and injuries to human being and livestock. Modalities may vary for such programme from place to place based on assessment of risk by the Insurance companies. Feasibility may also be explored at the state level.

Besides, **alternate sources of income** may be considered in cases where households and/or communities continuously suffer relatively high levels of income loss due to HEC. Methods of **improving income from existing sources** may also be considered in such cases. Assistance is provided to recover the loss due to HEC and/or to help develop positive attitudes towards the conservation of elephants and their habitats.

Mitigation of Man-Elephant Interface: Odisha Endeavour

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Quite often, in the morning hours, when one glances through the local newspaper, while sipping tea, one comes across the bizarre reporting of elephant deaths in the state. In some cases, elephant skeletons are dug out and recovered, pointing fingers towards its illegal killing and surreptitious disposal by burying; in other cases, they are shot dead by local poachers by muzzle guns, causing multiple injury and somewhere poisoning water holes, which the elephants frequent for drinking water. Other incidents include deliberate retaliatory killing of elephants by electrocution to take revenge of crop or house damage. Vice versa is also equally alarming. The number of human beings killed during the period 2016-17 to 2021-22 (5 years) is 512, in an average of 100 per year. Besides also, there are reporting of cases of human injury, cattle kill, crop and house damage due to straying out of elephant/ elephant herds from their habitats to fringe villages in search of food, fodder and water; or in the process of moving to another suitable habitat as the natural corridors have either been broken or completely destroyed because of various development and mining activities.

Man-elephant interface is an age old phenomena. This has been reflected in the rock carvings of Khandagiri, Udayagiri caves and also in the 13th century AD, Konark (Sun temple) rock-cats of the state. But in the last decade, the conflicts have been on the rise. The age old human elephant conflict has shifted in the recent past from use of space (landscape) to resources like property and life. Management and conservation of this mega-herbivore to minimize conflict and to reduce casuality of both man and elephant has posed a great challenge to state forest administration.

Forest and Protected Areas of Odisha

The state of Odisha, covers an area of 1,55,707 km2, which is 4.74% of India's land mass. The state

is physically divided into 30 civil districts and is home to 4,19,74,218 people (Census, 2011), with population density of 270 per km2. Forest cover in the state is 52,156 sq.km which is 33.50 percent of the state's geographical area (ISFR-2021 of Forest Survey of India). The forest cover of the state registered an increase of 537 km2 over 2019 FSI report. The State forest administration is divided into 37 territorial divisions and 14 wild life divisions. There are 19 wild life sanctuaries (Protected Area), one Biosphere Reserve and one proposed Biosphere Reserve. Besides, there are two notified Tiger Reserves, Similipal and Satkosia and one proposed Sunabeda Tiger Reserve. Also, there are 3 notified, overlapping Elephant Reserves namely Mayurbhanj, Mahanadi and Sambalpur Elephant Reserve. Odisha is also home to 62 scheduled Tribe Communities that is round 22 percent of states population. The atlas released in Bhubaneswar by Union Tribal Affairs Minister, Sri Arjun Munda on February 27, 2020 marked 27,818.30 km2 over which Community Forest Resources (CFR) rights and Individual Forest Rights (IFR) can be recognised over 7,921.36 sq.km leading to further shrinkage of animal space.

Tiger and elephants are two keystone species of the state. Though, in the meantime, the tiger population of the state has dwindled to lowest ever number of 28 in the last two All India Tiger Census Report, the elephant population has been shown at 1976, as per the latest state level census done 5 years back in 2017. The Asian elephants (Elephas maximus) of Odisha account for 6.5 to 7.0% of India's elephant population. However, in Central Eastern landscape, more than 65% of elephant population are found in Odisha. The problem of crop depredation and loss of life in forest fringe villages due to elephant attack in severe in the eastern regions of India, i.e.; South West Bengal, Odisha and Jharakhand. Out of 30 civil districts of the state, elephant foot print is noticed in 26 districts. Similarly, 37 out of 51 forest divisions have recorded elephant presence. In Odisha, besides accidental killing of elephants due to rail, road accident and electrocution; retaliatory killing is the main motive behind unnatural elephant death. But recently, in last two to three years, poaching of elephants for ivory and other body parts have risen considerably.

The population explosion and shrinkage of forest habitat as well as its fragmentation have brought wildlife and humans together which generates these conflicts. This is exhibited in worst form, where livelihood of people directly depends on small timber, bamboo as well as host of non-timber forest produce, agricultural activities and other land uses in the buffer zones. During my tenure as P.C.C.F (Wildlife) of the state, we had commissioned a study on 'Elephant-Human Conflict' in Odisha, where 10 forest divisions with maximum occurrence of conflict were selected as Project study area (Project Elephant-Human Conflict Report on Odisha – C.K. Sar & D.K. Lahiri Choudhuri, 2009). They are Baripada and Karanjia divisions comprising Similipal Tiger Reserve, Athagarh, Angul, Athamallik, Keonjhar, Rairakhol, Sambalpur, Dhenkanal, Boudha, Nayagarh and Ghumusar north. For better understanding of the distribution of Odisha's elephants, the state has been divided broadly into two zones; i.e. North and South of river Mahanadi. The river Mahanadi flows from West to East dividing the state into almost two equal halves. But normally, it is noticed that elephant depredation and man-animal conflict is more in northern side of the river. As such a divisions including Similipal Tiger Reserve (STR) are situated north of Mahanadi river and only 3 are south of Mahanadi. The total number of villages situated in the periphery of forests of these divisions are 2,717 and number of villages situated within the forest area are 916, which provide ample space for man-animal interface.

In the following two tables, the number of elephant deaths due to unnatural causes as well as natural causes and loss of human life and property

in the state due to elephant attack have been shown for last five years, i.e. from 2016-17 to 2020-21.

Table-1

Death of Elephants for Various Reasons in Odisha (2016-17 to 2020-21)

Year	Human Kill	Human Injury	Cattle Kill	House Damage		Crop damage in Acres	
				Part	Full	No. of Cases	Area
2016-17	66	29	20	536	185	35342	9619.05
2017-18	105	51	30	814	464	40585	10390.54
2018-19	85	63	50	847	683	37782	10513.29
2019-20	117	67	16	1337	1269	49605	15264.13
2020-21	139	86	9	1127	1047	48631	14375.16

Source: Wildlife Odisha – 2021

Table-2

Loss of Human life and property due to elephant depredation (2016-17 to 2020-21)

Year	Human Poaching	Human Poisoning	Electrocution		Accident		accidents. Infighting etc.	Reason Unknown	Natural Cause	Total
			Accident	Deliberate	Rail	Road				
2016-17	2	0	3	3	0	0	15	7	46	76
2017-18	2	1	5	4	2	0	24	8	32	78
2018-19	2	0	15	9	7	0	20	5	35	93
2019-20	2	0	0	7	1	4	22	1	45	82
2020-21	3	0	1	7	4	0	15	9	38	77
Total	**11**	**1**	**24**	**30**	**14**	**4**	**96**	**30**	**166**	**406**

Source: Wildlife Odisha – 2021

From Table-1, it could be interpreted that the death of elephant in the state during last 5 years due to both natural and unnatural causes stand at 406, out of which killing by human being through poaching, poisoning, retaliate or deliberate electrocution and due to other causes such as accidental electrocution, rail and road accident, infighting in the group etc. are 42 and 138 respectively. On the other hand, Table-2 clearly indicates the number of human kill by elephants during last 5 years and encounter causing human injury account for 512 and 296 numbers respectively. This means more than 100 people got killed per year; which is quite alarming. The maximum human death occurring in Dhenkanal, Rourkela, Koenjhar, Angul, Sundergarh, Athagarh and Athamallik forest divisions. Recently, it is observed that in several cases, the death toll of this magnificent animal is being suppressed by stealthy burying of the carcass.

Recognizing the complex contours of the elephant conservation scenario, the Project Elephant was launched by Government of India in the year 1992; with the prime objective to ensure long term conservation of viable population of Asian elephants and its natural habitats in India. One of the immediate goals of the project is to promote measures for mitigation of human elephant conflict and moderating pressures of human and livestock activities in crucial elephant habitats, besides strengthening measures for protection of wild elephants from poachers and unnatural

causes of death. In a sequel to adoption of Project Elephant in the state, 3 elephant reserves (ER) such as Mayurbhanj ER (7043.74 sq.km); Mahanadi ER (1038.30 sq.km) and Sambalpur ER (426.91 sq.km) were created and notified in 2001 and 2002 respectively. Subsequently, during 2007-08, two more elephant reserves namely Baitarani ER and South Odisha ER were proposed but could not be notified due to various reasons. All these 3 Elephant Reserves Are located north of river Mahanadi, and within these 3 Elephant Reserves around 969 or nearly half of Odisha's elephant population are found. It is also not pragmatic to accommodate all wild elephants by securing their habitat as elephant reserves. Leaving aside the other 4% of population found in other sanctuaries beyond Elephant Reserve, rest are frequenting in unprotected areas. This latter category of elephants outside Protected Areas needs effective management to reduce man-animal conflict in the state.

Measures Adopted

Physical Barrier: Prevention and mitigation are two basic approaches for managing human-elephant conflict. Measures that can prevent or minimize the risk of conflicts arising between people and animals include the extreme one of completely removing either the people or the animals from each other which is not a viable proposition. However, they could be separated by use of physical barriers around crop fields and human habitations, that may be an effective method of minimizing human-wild life conflicts. In Odisha, three types of physical barriers are promoted, i.e. Stone wall, Solar fencing and Trench fencing. During 2020-21, a popular scheme in the name 'Jana Surakshya', 'Gaja Surakshya' has been initiated through public private partnership mode of financial support for installation of solar fencing around crop fields.

Bee Hive Fencing

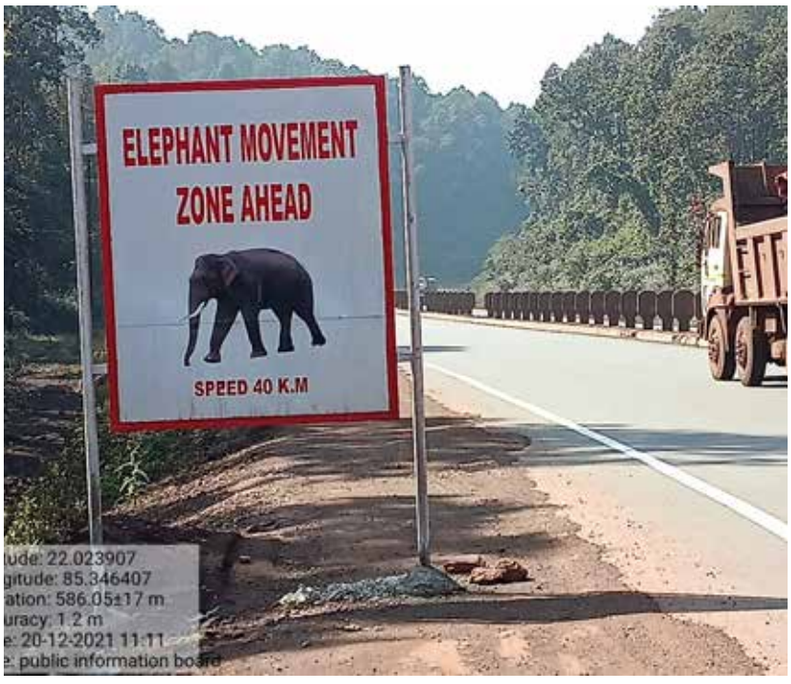
Putting the Bee hives or Honey Bee boxes on the galvanized fences around the crop field on putting them in the regular travel path of elephants to enter the orchards and farms, is a new method carried out on experimental basis in Keonjhar Wildlife division of Odisha. While crossing the bee fencing, honey bee will start stinging elephants in their tender parts. This will dissuade them to enter the nearby area, orchards, crop fields and they will change their movement route.

Bulk SMS System

A bulk SMS system is experimentally rolled out in Keonjhar and Angul Divisions. This will help giving early warning to locals. IIT, Bhubaneswar has also been asked to develop some early warning system.

Wildlife App for Sharing Information

The Wildlife App has been developed by the Wildlife Organisation of the state. This App will help to track the elephants straying near human habitation to prevent any untoward situation. The information received is being mapped for deployment of appropriate mitigation measures.



24 X 7 Elephant Tracking

Nearly 200 elephant tracking squads have been formed in the state, to track the movement of each and every elephant herd. The tracking team specially keep track of lone animal, who has strayed away or driven out from the main group, since they are more dangerous.

State Level Task Force

In recent past major increasing threat to the mega animal is from road and railway accident and electrocution. Inter-departmental co-ordination meetings and planning is done regularly at each level of administrative functionaries. However, to take a holistic view of the problem and to reduce the man-animal conflict, Government of Odisha has constituted a State level task force during October 2020, under the chairmanship of PCCF (WL).

Siren and Censor

In collaboration with a NGO, the state government is experimentally putting a solar operated 'Siren and Censor' system in Dhenkanal division, at places, where elephants frequently cross national highway or state highway. The siren will be heard upto 1/2 km on either side, when elephants cross Highways.

Railway Underpass

The honourable Union Railway Minister during his recent visit to the state, had agreed for construction of few Railway under passes in vulnerable railway tracks to prevent accidental death of elephants.

Establishment of Crime Cell at State Headquarter

A crime cell has been constituted at Wild life head quarter for monitoring proper and timely investigation of wild life cases.

Special Vehicle 'Gaja'

Specialised vehicle 'Gaja' with all the modern amenities to tackle the man-animal conflict situation has been introduced in Keonjhar and Dhenkanal divisions of state.

Creation of Database of Poachers

The state wildlife wing is identifying hotspots, where poaching of elephant is frequent for ivory trade. A comprehensive database of local 'shikaris' is to be prepared in consultation with the local administration and police. The previous practice of employing 'secret informants' is also to be revived, who will have direct mobile access to state wildlife head quarter.

Restoration of Elephant Corridors

In 2011, Govt. of Odisha identified 14 corridors presumably used by elephants to move between different habitats. Presently, the functional existence and ecological feasibility of most of them are at stake due to various mining and development operations. Either, they are to be restored on new corridors are to be identified as per the study report of R. Sukumar, 2018.

Prompt Payment of Compassionate Grant

Compassionate payment is one of the most important mitigational measures in the field of animal depredation. Recently state wildlife wing crafted a digital platform 'ANUKAMPA APP' for disposal of application and to ensure quick payment of the victims.

Awareness Activities

A rather different approach is adopted by the state wildlife wing by changing attitudes of people towards wild life through education. The author has written a booklet in Odia titled, 'Haati Pain Haat Tie', which compiles Do's and Don'ts. This book serves as a useful tool in village level awareness campaign. The survival of the elephant depends more or taking its cause to the people and involving their participation in planning and management process. Another non-government organisation 'Save Elephant Foundation' is working in the state in this direction with an objective of zero casuality of both. The state sponsored Gajabandhu Scheme also envisages employment of local youth of vulnerable villages in both tracking and anti-poaching squad. Gajabandhu will be selected by VSS or EDC of the affected village. Besides, taking local people of forest fringe villages into confidence, a three-pronged strategy is being adopted by state government to address man-animal conflict issue. They are site specific wild life management plan, reprisal of conflict through deployment of anti-depredation squads and prompt payment of compassionate grant to the victims.

Human-Wildlife Conflict Mitigation Strategies – A Review

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Introduction

One of the major challenges in wildlife management is the Human-wildlife interaction, which is normally phrased as Human Wildlife Conflict (HWC). This conflict can be considered inevitable in all communities where human and wildlife coexist and share the same habitat competing for the meagre resources. In some places, a few sections of the people consider the conflict situation as of recent origin. However, the historical records indicate that this has always been there in different forms. Human wildlife interaction occurs in all the places where humans have occupied areas within the wildlife habitats or areas adjacent to the wildlife areas leading to changes in the land use pattern. Whenever and wherever this interaction results in negative impacts on social, economic or cultural life of humans or on the needs of wildlife this interaction turns to conflict leading to dissatisfaction more often among the people.

A number of reasons have been attributed to the situation. These reasons always depend on the perception of the affected people. The conservation community more often stress on the loss/fragmentation of habitat forcing the wildlife to stray out of the wilderness. Most often the conservation community finds fault with the affected people themselves pointing out the historical reasons of encroachment or occupying the wildlife habitat for cultivation. Of late, the fragmentation of habitat and isolation of wildlife populations have been cited as reasons for conflict. These groups often call for immediate action to establish the lost connectivity or biological corridor. On the other hand, the affected community feels that the increase in wildlife population is the major reason for conflict and according to them, the number has gone beyond the "carrying capacity" of the area. The most popular comments by the common man is related to the habitat status. They argue that the conflict is the product of the degradation of the wildlife habitat leading to scarcity of food and water in the wild. They also find fault with the custodians of the wilderness, the forest department for the present situation as there had been conversion of natural forests into plantations leading to degradation. Probably all these are correct to some extent. At the same time, the fact remains that the reasons for conflict are site specific and cannot be generalised.

Of late, the conflict has become graver as intrusion of people into wildlife habitat has increased and subsequently land use pattern got changed. Along with such a change, there occurred attitudinal change among those dwelling in the fringes of forest and habitations circumscribed by the forest. The in-migrated cultivators no more accept crop raids by wildlife when compared to the past few decades. This is mainly because the in-migrant population is galvanized into 'developmentalism'. Developmentalism is a belief that 'development' will resolve or mitigate all the problems that emerge within the material and social processes that take place in a society. Developmentalism advertently and inadvertently assumes that state (in this context the Forest and Wildlife Department) is the agent of development process and the 'people' are the recipients/ beneficiaries of such governmental initiatives materialised using state and 'project' funds. It is quite often assumed that whether development projects take place outside the forest or within the forest or at the fringes of the two, ultimate responsibility for the success and failures of such

projects rests with the government institutions. Within developmentalist attitude, the conflict between human life and wildlife is bound to take place. Only solution is mitigation of the conflict. For this, both the state and society (communities) have to converge as an entity and alter perspectives towards wildlife and human existence in the forest and its fringes. Parallel to this, conservation of the forest should be made more effective. In short, the binary distinction between wilderness and non-wilderness has to be waned.

It is in this context the concept of 'people's participation' becomes relevant and effective. A distinction is suggested between human-wildlife conflict and agroeconomic-wildlife conflict. This distinction is pertinent mainly because crop-raids are more prevalent and predominant. What attracts wildlife, especially elephants and other mammals, to the human habitat is the kind of cropping pattern. The cropping pattern is such that it invariably invites wildlife to the human habitat and causes destruction of crops for subsistence and marketable surplus of agricultural produces. Conflict arises from economic losses to agriculture, including loss of cattle through predation and destruction of crops. The recurring visitations of the wildlife to the habitats create somatic preoccupations irrespective of the area that the people have been owning. In general, visitations of wildlife—recurring, sporadic or not— create psychosomatic disorders among the cultivators who follow agronomic practices which encourage cropping pattern such that it attracts visitations of wildlife. Cultivated area may also be located on the elephant's habituated movement path. Psychosomatic disorders are more pronounced among the in-migrated people rather than the tribes who have been living within the forest or at its fringes. Therefore, the term 'human' cannot be conceived as homogenous, rather it has to be viewed as heterogeneous while considering conflict situations due to wildlife. The complex consisting of eco-psycho-socio-economic factors warrants mitigation measures of different types especially physical barriers. Such a complex situation has been in vogue for a long time, therefore any action towards mitigation has to take into account of long term consequences of wildlife and human mobility.

Fig1 The traditional fence against wild boar

The Mitigation Measures

Crop-raiding variables are strongly environmentally spatial rather than numerical; factors such as habitat, day time refuges for elephants, water distribution, human settlement patterns, physical defences, or cultural and agricultural practices may be locally important determinants of HWC levels. However, most of the conflict mitigations measures in the country are copied from elsewhere, mostly from Africa.

Traditional methods is mostly guarding from machans (raised platforms mostly on trees) and scaring using sound making devices. This is reported to be the most effective. A few of the farmers had claimed no damage in their field since they engaged watchers to guard the cultivation areas during night. But lack of man power for such works and abandoning of community guarding has been raised as a problem by a few. Saree fences are used in some parts of the country to prevent easy entry of animals into the cultivation areas. Fences with locally available bamboos and other materials are being used to act as a thick fence making the animal entry difficult. This has been reported to be very effective against wild boar.

The traditional methods also include the sound scaring mechanisms like blasting of crackers and the replay of recorded tiger roar. Unfortunately, animals get used to the sound. Presence of fire used to deter the animals, even elephants. Of

Fig2 Trench and the solar fence in Wayanad, Kerala

Fig 3 A properly installed and well maintained Solar Power Fence

late, the reports from the farmers indicate that this is no more effective. Dried fish hung on the border claims to have some impact on monkeys. But this was countered by others, who failed. Soaps were used as deterrent in some parts of Kerala especially against sambar deer. But there is no such measures practiced now. Though not traditional, the affected people have gone for their own inventions as a solution to the conflict situations. In one of the places in Wayanad Wildlife Sanctuary, the cultivation is protected by using thin steel wire fences on which used plastic water bottles are hung. The farmers claim that these would deter the animals mostly because of the sound.

Translocation of problem animal:

Capture and translocation of problem animal had been suggested on many occasions. Experience in Hassan in Karnataka and elsewhere suggest that the translocation does not always help. The released one returns to the site of capture or recreate the same problem at their release site. There is also the possibility that a proportion of the translocated animals dies either due to the stress of capture, endangers a resident population through introduction of disease or increase competition for territory or food. Removal of the animals from the 'problem component' does not reduce the number of raiders, because other recruits in the 'occasional raider' subpopulation merely replace them. However, there had been reports that the capture of the dominant one from the bachelor herd of elephants has considerably reduced the problem at least for a brief period.

There had been protests among the tribal community in Attapady in Kerala when the attempts were made to capture the problem tusker and rename it in captivity. The monkeys translocated from problem areas have become a menace in the released area, according to the reports from some places in Kerala. As far as the large carnivores are concerned, capture and maintenance in captivity has become a real problem for the wildlife managers.

Elephant Proof Trenches:

This was one of the most popular mitigation method probably due to the employment generation. However, with the replacement of man power with machines, the amount to be spent for annual maintenance and heavy rainfall in most of the elephant areas have led to a rethinking of this method. Moreover, being a highly adaptive animal, elephants overcome such barriers. An unpublished report based on observations by the Soil Conservation Officer in Wayanad, Kerala indicate that the trenches disturb the first order streams in the area and rain water is artificially diverted leading to scarcity in the marshy areas of Wayanad. So there is also an unestimated environmental cost involved while going for trenches. In most of the areas, the trenches remain as a permanent scar with not much effect in mitigating the problem. Needless to say, it is not at all cost effective. We have the example of trenches strengthened by solar power fences all along indicating the ineffectiveness of the trench.

Solar Power Fence:

Solar power fencing is a technologically effective and cost effective elephant deterrent provided it is installed and maintained properly. Clearing vegetation near the fence on a regular basis and using strong supporting poles can definitely help. The maintenance deficiencies are almost always caused by weak institutional arrangements (to do with contracts, wages, work schedules,

Fig 4 The Hanging wires of Solar Power Fence

Fig5 Rail (Armstrong) fence

Fig 6 Trench and the solar fence in Wayanad, Kerala

disputes) rather than by any technological shortcomings. The very effective solar power fences installed by private property owners is a good example. The author has come across a fence around a tribal settlement in Kerala, which has been working for the last ten years. It is because of the maintenance done by the beneficiaries. The participation of beneficiaries is very crucial in the success of the mitigation measures. The modified solar power fence, the hanging fence is found to be successful against elephants.

Chilly related, Grease and hot Pepper oil: This has been reported to be successful in Africa and attempted in several places in the country. Using chilly with grease smeared on rope and tying along the border did not work in high rainfall areas. Chilli smell alone may not be fully effective and some simple supplementary efforts are still needed. It has been suggested that 5m wide clearing of any thick vegetation surrounding crop fields helps with elephant detection. Sounding device hung on the chilli fence can alert sleeping farmers to an elephant contacting the string barrier. Farmers should maintain good vigilance during crop maturity (eg. taking turns to man watchtowers).

Unpalatable crops as buffer: Growing unpalatable crops (decoy crops) as a buffer to farm lands is mainly directed to provide alternate revenues to farmers in the high human-elephant conflict zones (coffee, lemon, chilly) Use of these crops as buffers is restricted by the type of soil, rainfall, topography, availability of water, and market prices. Change of crop pattern from traditional livelihood farming to alternate crops by farmers does not seem to be practical and unacceptable to cultivators in many areas. Pilot studies on effects of alternate crops such as capsicum, lemon, with introduction of Citrus spp as elephant deterrents along with other economically viable crops are in experimental stages. According to Ashwin Bhat, working in Hassan in Karnataka, chilly was planted in the buffer. Elephants damaged the plants by trampling.

Beehives as deterrent: Following the success stories in Kenya, beehive fence attracted the enthusiastic conservationists in some parts of Asia. This was also because of the income expected from the honey and was affordable to small-scale farmers. However, this method failed in Indonesia and Sri Lanka and the results of bee research so far do not match the hype.

Photo: Aswin Bhat

Fig 6 Elephants trample the chilly crops planted in the buffer in Hassan

There was an attempt in Wayanad, Kerala under the leadership of ATMA. The elephants dismantled the whole thing. There was a reportedly successful attempt in the borders of Peechi-Vazhani Wildlife Sanctuary. However, the beehive fence was supported by solar power fence. So the success has to consider this factor also. One has to be cautious while implementing beehive fence in areas where sloth bears are present. This may attract bears thereby adding to the problem.

Radio-collaring elephants and early warning: A section of the scientific community claims that problematic animal could be captured and radio collared for monitoring the movement. This requires identifying and collaring individual problem animal, receiving GPS locations via satellite or GSM technology, mapping the location on GIS maps, and informing the particular farmers who are at risk. The cost is very high. This would definitely generate information on temporal and spatial patterns of crop raiding, possible contributory factors, effectiveness of preventive methods etc. Moreover, if elephants are not resident, only seasonal visitors, theoretically it is possible to monitor the movements of individual crop raiders through GPS satellite radio collars and warn villagers of their presence. It is not applicable in areas with significant number of animals.

Kayyala and Elephant Proof Walls: This is one of the latest trends. The implementation cost is very high (140 lakhs/km) and moreover, the building materials have to be at the cost of environment elsewhere. According to one report, about 9000 cubic feet granite stone is required for construction of 100 m wall. This was implemented in some places in Kerala and in most, it was a failure.

Fig 7 Crash Guard Rope Fence

Steel structures with spikes: Spikes fixed on concrete structures has been tried in a number of places in Coorg and Kerala. The elephants take the risk of breaking open such barrier. This has to be considered as one of the worst conflict mitigation measure as this would lead to injury to the elephants while attempting to break open.

Early warning electronic systems: Early warning system has been reported to be very effective in Valpara of Tamil Nadu. This has also been functional in Wayanad Wildlife Sanctuary. Though claimed to be effective, this could be treated only as a method complementing others. There had been attempts for SMS alert system and forming a WhatsApp Group to alert the people on the elephant presence.

Crash Guard Rope Fence: This is a new mitigation measure designed by Shri B. N. Nagaraj, Asst. Conservator of Forests in Kerala Forests and Wildlife Department with input from an Engineering Expert from IIT and Wildlife Biologist and a Veterinarian. The method is comparatively cheaper than walls and other steel barriers and is reported to be very successful and people from other parts of the state had visited the site first implemented. Now, the method is being attempted in other places also.

Rail Fence: Originally known as Armstrong fence named after its developer Graham Armstrong, Park Manager of the Addo Elephant Reserve used it as a barrier during 1950s. These fences are built with steel railway tracks grouted deep in the ground. Between the two railway tracks, thick wooden poles are also dug into the ground. They are then bound by five strands of very thick steel cables horizontally along the poles.

The traditional fence against wild boar

Then there is a short electric fence covering the entire stretch of the fence. South Africa discontinued this method due to high cost. The fence with rails is one of the recent suggestions in the country. Though there had been claims on the success of this method, reliable sources from the area cites incidents, where elephants got stuck between two rails. The method is very expensive though useful in marshy areas where all other methods fail.

Voluntary Relocation of people in the enclosures: The people in the forest enclosures have expressed their willingness to move out and the Forest Department has successfully translocated a few of them by providing compensation through a package. This is definitely the best option and the vacant area gets added to the wilderness free of human disturbance. The Wayanad in Kerala is a good example though a lot more enclosures await implementation.

The Rapid Response Teams and payment of ex-gratia could be treated only as interim measures though it pacifies the agitated affected community.

Though a lot has been talked about stakeholder participation, only very few success stories are in place. It is opined that the mitigation measures have to be site specific, cost effective and socially acceptable. Unfortunately, more often these principles are not taken into consideration while going for mitigation measures. Moreover, attempts are not made to involve the beneficiaries in maintenance.

It would be worth to consider the following new approaches to the conflict mitigation. The modern natural resource management is viewed as “social value management” or “social conflict management”. The success lies in integrating social science and human dimensions into the overall planning. It is also important that the Managers be explicitly trained to understand and deal with complex social-political-economic environments.

Elephant Human Interaction: Mitigation Measures

Praveen Chandra Tyagi
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Human elephant interaction has emerged as one of the most challenging issues for elephant management and conservation. This conflict occurs throughout the elephant reserves in India, causing damage to crops and property, injury/loss of human life and injury to animals and retaliatory killings by affected people.

India holds by far the largest number of wild Asian elephants, estimated at about 27312 (Synchronized Elephant Population Estimation, India. Project Elephant Directorate 2017), this is nearly 60% of the population of the species. Elephas maximus is placed in Schedule I and Part I of Indian Wildlife Protection Act (1972) conferring it the highest level of protection. Elephants have been declared as National Heritage Animal by the Government in 2010.

Human-elephant interaction is largely driven by competition for space between humans and elephants. The unique ecological characteristic of the elephants relating to the spatial requirements and foraging make them more vulnerable to land use changes brought about by people. Their large body size (physical abilities), their longevity (populations in conflict can persist for decades or even centuries), they being extreme habitat generalists (high adaptability to land use changes), and ability to learn and adapt from their interactions with humans makes them a uniquely challenging species to manage and one that can become prone to high and long lasting conflict with humans.

The National HWC mitigation strategy and action plan focuses on mutual co-existence between human and elephants, but the field situation, the biology and feeding ecology of elephants coupled with the fragmentation, shrinkage and deterioration of their habitat has made this co-existence almost impossible.

The strategic intervention for mitigation of conflict is to device methods to reduce/minimize interaction between humans and elephants. The farmers want to keep elephants away from their cultivation and often request the forest Department to drive them back to the forest or help them to do so and this is done by use of deterrents.

The most common option is to spatially separate elephants and human use areas by use of barriers. Though different types of deterrents/ barriers viz. physical, acoustic and sensory have been used in conjunction with the use of new technologies the animals have breached them due to low maintenance of barriers and the intelligence of elephants to overcome them.

The drivers of the interaction are many and the task for the wildlife managers is firstly to prevent this interaction by advocating land use planning in the fringe forest areas specially the human dominated landscapes, secondly change the cropping patterns to less attractive crops and encouraging tree farming and thirdly to drive them away and if it fails construct barriers and use deterrents to spatially limit the movement of elephants in this area. The extreme option is to capture and translocate these elephants deep in the forest. Several instances of elephants returning to the same hotspots by their homing instincts have compounded the problem.

The relocation strategy often fails, hence requires adaptation by behavioral experiments, use of negative conditioning and aversion techniques which may not have been tried

before by considering hard release methods, constructing large holding facility of at least 500 ha to ecologically and behaviorally stabilize the individuals for considerable period and then release them deep into forest areas. The carrying capacity of these holding facility may have to be determined and members of herd should be kept together to prevent aggressiveness and conflict.

Elephants are highly intelligent animals. They soon learn about mitigation measures and become habituated to them or learn to circumvent them. Therefore, many measures gradually become ineffective. There is need to constantly innovate and adapt existing mitigation measures.

Elephants which have entered human use area and dispersed over long distance and have been driven back to the forest should be monitored based on individual identification techniques. The captured and released animal should be monitored using radio collars to know their movement and conflict activities post release.

Elephants are known to be expanding their range to non-elephant districts of Northern Andhra Pradesh, Chhattisgarh, Bihar, MP, Maharashtra and Goa. These population in new areas are creating major conflict issues as their number is increasing every year and require robust strategy for conflict mitigation by creating suitable barriers and in extreme cases capture and translocate the straying elephants before it exacerbates to unmanageable proportion.

The landscape level management of elephant population requires mapping of the occupancy data in the large habitat, collection and collation of data which has not been done for any of the elephant reserves. The data should include social, economic and biological components of the forest area occupied by elephants, land cover uses, threat analysis and interaction with humans across the landscape. The data will reveal the key core habitat, corridors and high interaction areas across the vegetation matrix in the landscape. Further this data can be used to prepare landscape level to divisional level strategic plan for elephant conservation.

The participatory management for mitigation of human elephant interaction by involving village communities in elephant conflict areas requires sustained efforts and should be integrated with the village level institutions created under the Eco-development and JFM programs of the state Governments. The formation of response team to manage conflict close to human habitation and agricultural fields require sustained efforts by the existing committees (eco-development committee and Village Forest committee). The selection of personnel, capacity building, equipments and incentives to the response teams are the areas which require immediate attention.

The State Forest Department for a long time were engaging with the Project Elephants for assistance in setting up Elephant mahouts and Kumki elephants training schools and now with human elephant interaction increasing in several states this is all the more important. Several states have developed training material and conduct programs; however, this needs to be streamlined.

The setting of rescue centers for captive

elephants has gained momentum with several states now having this facility. This needs to be jointly monitored by Project Elephant, Moef & CC and the Central Zoo Authority at least once a year for the initial period till the management is institutionalized. The forest department retaining wild elephants which cannot be released in the wild, already have facilities but several states where the conflict has now surfaced needs to create these facilities before capture of animals in conflict.

The health care of elephants in the Forest elephant camps, the captive facility and wilderness are very important aspects of elephant management. In the wilderness the emerging diseases and the impact of these diseases for long-term elephant conservation, assessing the presence of infectious and non-infectious diseases and their dynamics in the elephant population, and identifying risk factors and possible solutions to mitigate the potential impact of these diseases requires special attention. The training of the veterinarians providing health care of the elephants should be a regular feature with support from Project Elephant, Central Zoo authority and Research organizations.

The methods used for Population estimation of elephants in the All India Coordinated Elephant census in 2017 uses block counts which provide biased estimates due to limitations of the methods.

The most reliable method is the use of visual detections along line transects to estimate population density under a distance sampling framework, a quantitatively robust technique which essentially comprises of laying walking transects and repeating them several times for more accuracy. Data can be collected on elephant location, number and age-sex classes through direct elephant sightings, using rangefinders, compass and if required global positioning systems. For analysis Distance software can be used for calculating cluster density of elephant herds, mean cluster size and elephant density.

Another reliable method is the capture–recapture methods involving photograph to monitor elephant populations. The fact that individual adult elephants can be identified based on their morphological features (e.g., ear lobe shape, tusk orientation, tail length), and can thus be sampled photographically, has particularly enabled the use of capture–recapture models for elephants. Conventionally, the use of capture–recapture models to estimate animal density has faced two key constraints: (a) spatially defining an effective sampled area corresponding to the estimated population sizeN; and (b) heterogeneity in capture probabilities induced by variation in exposure of different individuals to sampling. There are methods to overcome these constraints i.e. Spatially-explicit capture–recapture (SCR) models. This method requires technical support for computation and also sound planning for laying camera traps and consistent monitoring by field researchers. It is advisable that Project Tiger and Elephant join hands and conduct the All India exercise for population estimation of Tiger and Elephants simultaneously pooling manpower and resources.

The dispersal of elephants from Odisha to Chhattisgarh and from Karnataka to Hosur and Dharmapuri in Tamilnadu are the examples where small dispersing populations were noticed 15-20 years back have now become large population ranging from 100-200 animals which occupy agricultural landscape for long time and needs mitigation measures. The people in these areas have to live with the elephants as driving the elephants into the forest and relocation is not possible. The mitigation measures are limited to Early warning system to prevent chance encounter. The use of new technologies viz drones, UAV, surveillance and monitoring smart android applications and intelligent elephant movement and alert systems are most useful to managing these populations in human dominated landscape.

The elephant movement in the landscape has been disrupted due to new infrastructure or expansion of existing infrastructure (Rail/road network, mining, industries, and expansion of agriculture etc) acting as drivers of conflict. Coordination with various developmental agencies to identify and recommend mitigation options for any such proposed or planned development, supported by policies and legislation, even re-evaluating existing infrastructure and development projects, including land use changes and corridors in and around the elephant habitat to identify and retrofit mitigation measures are required.

Translocation of Problematic Elephant – "CHOTA BHEEM"

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As Wildlife Managers, we all strive for conservation of a species than individual animals. This is also the rationale for permitting hunting of wild animals in certain cases under Section-11 and Grant of permit for special purposes like Scientific Management including Translocation to an alternative suitable habitat under Section-12 of Wildlife Protection Act, 1972.

Hassan Territorial Division of Karnataka has peculiar problems of Human-Elephant Conflict (HEC) due to presence of 45-70 elephants in human-dominated agricultural landscapes, across 4 tehsils of the district. Land use and Land Cover Change is the major contributing factor due to increasing land value, by converting natural woodlot areas into agricultural landscapes. This problem is further complicated due to presence of small fragmented forests that does not act as viable habitats of retreat, forcing the elephants to become permanent residents of agriculture landscapes. Considering the complexity and gravity of the problem, in 2013-14 the Hon'ble High Court of Karnataka ordered for capture of 22 elephants of the Division and sending to captivity.

The measures taken up by Karnataka Forest Department to mitigate the HC are as follows:

1) Radio collaring of matriarchs to track the herd movement,

2) Deploying rapid response team and anti-depredation camp for ground tracking and driving of the elephants,

3) Use of mobile public address system mounted on RRT vehicles,

4) Conflict area specific LED display boards to warn the public about presence of elephants in the locality operated remotely through SMS,

5) Public awareness programmes,

6) Capacity building of watchers,

7) Subsidized solar fencing for farm lands,

8) Railway barricading to preventinflux of elephants from Kodagu (Southern Border),

9) Real-time sharing of information about presence of elephants through bulk SMS, social media group like Whatsapp and Telegram,

10) Payment of Compensation for damage to property, crop etc., through e- Parihara portal.

Among the conflict mitigation measures, identification of problematic individual, capture and translocation of radio collared elephant to suitable alternate habitats has been adopted as one of the measures to manage HEC in Karnataka. One such elephant “Chhota Bheem” was captured in February, 2021 and translocated to a Protected Area. The tracking data helps in designing the future translocation considering the following parameters at the source and destination:

1. Association of the Problematic Individual with the Herd.

2. Habitat usage data

3. Terrain & landscape data

4. Presence of human settlements in the vicinity

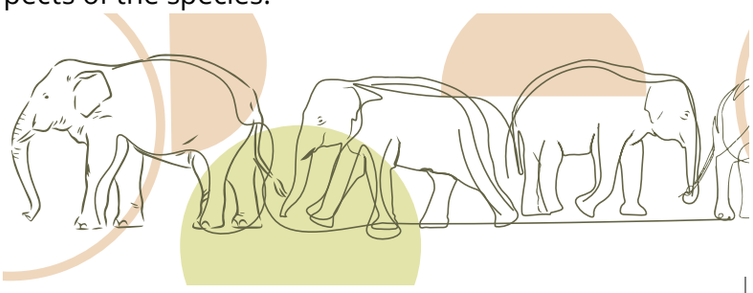
5. Agricultural landscape

6. On ground monitoring

7. Quick response in case of coming in conflict again.

Phase of Exploration of the New Habitat: In Pic-1 Radio Collared Monitoring of the individual revealed that initial 6 months of time the elephant tried to explore the new habitat for its suitability.Phase of Settlement in the New Habitat :- In Pic-2 & Pic-3 Radio Collared

Monitoring of the individual revealed that in the next phase the elephant had established its territory and confined its movement to smaller area. Further long term monitoring, analysis of the movement and spatial data would enable us for proper planning of the translocation operations taking into consideration the welfare aspects of the species.



Living with Elephants: Challenges of Managing Human-Elephant Conflict in India

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The Government of India has demonstrated tremendous support and strengthened efforts for conservation of the National Animal, the tiger and the National Heritage Animal, the elephant, through Project Tiger and Project Elephant respectively. India has a stable elephant population, with approximately 30,000 elephants, and 31 notified Elephant Reserves. However, our country also has 1.35 billion people and is predicted to surpass China by the next year as the world's most populous country. Naturally the interaction between a large animal like the elephant and people is common in areas that are inhabited by elephants and often there potentially fatal encounters. The critical balance between development needs of a rapidly growing nation and shrinking movement space for a long ranging animal like elephant often gets disturbed.

Human wildlife conflict results from a variety of ecological and human – induced drivers, especially in spaces shared by people and wildlife. These drivers include climate change, climate variability and extreme weather events, animal movement patterns, habitat loss, land-use change, livestock management, resource extraction, etc. Movement paths and identified corridors of elephants that are getting blocked due to land-use change, are attributed to a variety of reasons ranging from linear infrastructure development, urbanization, commercial agriculture expansion, and industrial expansion. But more importantly, it is the 'negative interaction' between humans and elephants, also known as human elephant conflict that attracts attention and causes immense stress among communities and conservation practitioners.

Reportedly, the total number of human deaths due to human elephant conflict in India in 2016-17, 2017-18 and 2018-19 were 516, 506, and 452 respectively. Approximately 100 elephants are also killed in retaliation every year. Crop raiding by elephants was estimated to damage over 1 million hectares of farmland and plantations annually, affecting over 500,000 families. In neighbouring Sri Lanka, by comparison, 121 people and 405 elephants were killed in human elephant conflict during 2019.

Scientists have shown that human elephant conflict disturbs the wellbeing of marginalized communities. Their work in Assam has brought out how people get impacted mentally over longer term, which is not seen beyond the immediate physical injury and/ or property or crop damage. These effects impact families for generations and need to be looked into. One of the approaches that needs to be scaled up is One Health, that looks into the intricate relationship of human health – animal health – ecosystem health. If ecosystem health gets altered by habitat degradation, pushing elephants to more human dominated spaces causing human elephant conflict, that is likely to have negative impacts on human wellbeing.

Methods that are deployed by authorities to manage human elephant conflict are always non-lethal in India. Killing an elephant is – unless absolutely necessary - against the culture and law (Wildlife (Protection) Act, 1972 and subsequent amendments) of this country. The methods include the following:

Deterrents and Repellents have been found to be effective for reducing crop raiding by elephants. Light and sound have been used as an early warning system (EWS) through an indigenously developed model known as ANIDERS (Animal Intrusion Detection and Repellent System) that has been tested to deter elephants in parts of the Terai Arc Landscape. It is a solar powered unit that detects large mammal movements and

emits high intensity LED light and siren. Chemical repellents have been used in the form of chilli spray and chilli smoke. Conservation practitioners have found mixed response to use of chilli elsewhere. A study of chilli-based elephant deterrents was tested around Way Kambas National Park in Indonesia. Researchers found that community-based guarding using conventional tools like noise making devices was key to keeping elephants out of crop fields, and chilli-grease fences did not prove effective. However, they also suggested that chilli can be a high value and elephant resistant cash crop. Use of carnivore urine-soaked cloth and gunny-bags have been reported from some parts of the country, but that is not feasible most of the times. Such deterrents and repellents are unlikely to work indefinitely on their own, as elephants will gradually get used to them. But they could work well in combination with barriers.

Physical barriers for stopping wild elephants from moving into human dominated spaces have been used in India for more than four decades. It started with passive barriers like elephant proof trenches (EPT), stone walls, metal fences using rails and iron posts. More recently, use of active fences like solar energized fences have been seen in most elephant landscapes across the country. All these types of barriers work to some extent as long as they are maintained regularly. Solar energized fences require regular maintenance due to their nature, and even long undergrowth below the fence could short-circuit the wires making it non-functional. Studies have found that solar fences do not reduce crop raids completely, but proved to be more effective than other methods.

Government agencies and NGOs have been implementing several techniques for addressing human elephant conflict in India over short term. One of the popularly known practice is the Sonitpur model, taken up by WWF India, in collaboration with the Assam state Forest Department and local communities. Their collaborative efforts started in the Sonitpur district of Assam, during 2003-04, when that district itself had reported annual loss of 25 elephants and 27 human beings due to conflict. Over the years, the joint initiative picked up a single approach – i.e., driving wild elephants from human dominated spaces back to the wild with help of community volunteers serving as first responders known as anti-depredation squads and using captive trained elephants, known as Kunki elephants. As studies in other parts of the world have also found out, any barrier or deterrent works well when a community centered or community managed approach to manage conflict is adopted.

While some of these short-term approaches for addressing Human Elephant Conflict will remain, long term solutions need to be adopted for reducing loss of life, both human and elephant. Long term measures are required for solutions that are sustainable. The short-term approaches have demonstrated the potential to reduce human death, loss of crops, and elephant mortality, which need to be supplemented, financed and extended over large elephant landscapes across the country. We also need to understand fundamental facts, like where are the hotspots for conflict, where are people and elephants getting killed due to conflict, what are the drivers of this conflict and how can it be mitigated. A spatial analysis of Human Elephant Conflict needs to be done to find out how elephant habitats have modified, especially outside Protected Areas in the elephant landscapes of the country. That will help identify multi-use areas which are frequented by elephants, where land-use planning needs to be carried out involving the district administration and forest department. Active management of elephant populations also needs to be taken up after comprehensive study of the population(s) and their habitats. It is time to promote coexistence and co-occurrence of the living God and people.

PROTECTION & CRIME MANAGEMENT

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Illegal Trade on Elephants and its Body Parts in North Bengal and Western Assam with Some Recent Case Studies

Bibhab Kumar Talukdar, Jimmy Borah, Binita Baruwati and Ivy Farheen Hussain
Aaranyak

Introduction:

The Asian elephant Elephas maximus is listed in Schedule-1 of India's Wildlife (Protection) Act 1972 and included in Appendix-1 of the Convention on International Trade on Endangered Species of Wildlife Fauna and Flora (CITES). Asian Elephant is also listed as "Endangered" in IUCN Red List of threatened species. The species is also declared by the government of India as Heritage Animal of India, because of its strong cultural and spiritual linkages with human-beings. Asian elephants help to maintain the integrity of forest and grassland habitats. In many forests, elephants play a crucial role for the environment. They deliver several ecosystem services, such as providing food, shelter and water, helping to create paths in forests, and identifying salt licks. These services not only benefit elephants, but other species as well.

Illegal Trade on elephant body parts:

Ivory, which comes from elephant tusks, is considered very valuable by a section of people in the world for which there has been a demand. Asia still remains a major market for legal and illegal trade in live elephants, ivory and other wildlife products. The local and regional demand for live elephants is sufficient to affect elephant population adversely. Besides the demand for live elephants, the illegal trade also involves elephant products like ivory, tail hair, skin, tail and meat. The porous borders between most range countries that do not allow monitoring or

regulation of the movement of live elephants, is one of the biggest challenges for enforcement agencies. Limited resources, weak law enforcement infrastructure and capacity, and lack of political will in range countries allow for poaching, illegal captures and illegal trade in live elephants, ivory, and elephant products.

While many countries including India, have banned sale of ivory, but, demand in Asian markets has posed wider threats to tuskers in Asian and African elephant range countries. At global scale since 1997 the Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES) mandated TRAFFIC to establish and maintain a robust system to monitor ivory trade, now known as the Elephant Trade and Information System (ETIS). This centralized database holds tens of thousands of records pertaining to ivory seizures and law enforcement actions from more than 100 countries and enables us to monitor and analyse complicated trade flows and evolving market dynamics with unrivalled precision.

According to the Assam state forest department, in 2021, a total of 72 wild elephants died while 61 people have been killed in jumbo attacks. Of those 72 deaths, 4 wild elephants perished from poisoning, 18 from lightning, 24 from natural causes, 17 from unknown causes, 5 from train accidents, 3 from electrocution, and 1 from injury. 926 wild elephants have died in the state since 2010, while 812 people have also died during the same period. Aaranyak has been maintaining a database of all illegal elephant cases whether its seizure or deaths to aid in the general understanding of temporal and spatial hotspots of such crimes.

Since 2018, in north Bengal and western Assam region, there have been **17 major incidents** of ivory seizures, amounting up to more than **150 kgs of ivory**. Out of 17, 12 of them have been from the western part of Assam whereas five of them were in North Bengal. There have been three reports of elephant carcasses with their tusks cut off being recovered inside the protected areas of Assam- all from the Manas Tiger Reserve.

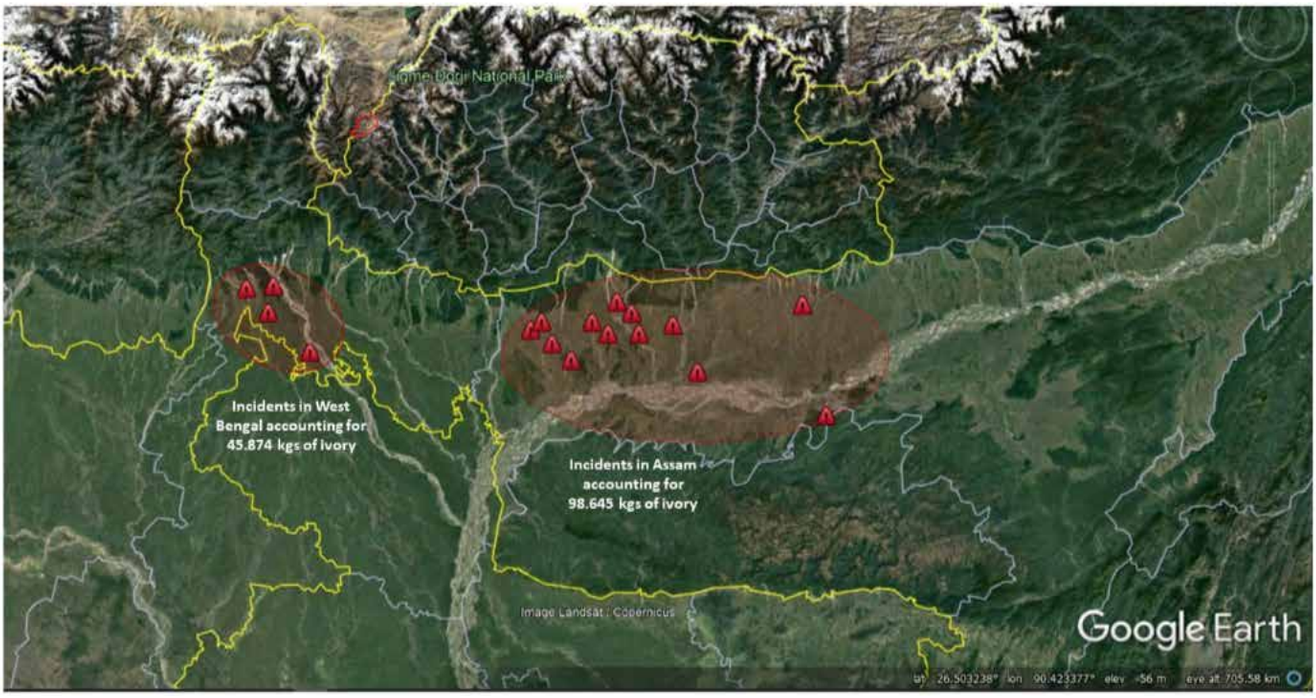

Figure 1: Recent ivory seizure incidents (2018-21) in North-eastern Part of India

Some of the relevant cases from the region are as follows.

Date/ Month	Year	Incident	Place of Incident	District	Total Number/ Numbers of Apprehended Person/ Persons	Recovered Animal/ Animal Body Part/ Parts	Weight (in kg)	Protected Area	Agency Involved
February	2018	Ivory recovered	Siliguri	Siliguri	-	Tusks	12.41	-	Directorate Revenue Intelligence (DRI)
28-05-2018	2018	Ivory recovered	Guwahati	Kamrup	2	Tusks	5.8	-	Directorate Revenue Intelligence (DRI)
19-07-2018	2018	Ivory recovered	Siliguri	Siliguri	2	Tusks	9.908	-	Directorate Revenue Intelligence (DRI)
02-01-2019	2019	Ivory recovered	Siliguri	Siliguri	1	Tusks	16.962	-	Directorate Revenue Intelligence (DRI)
15-02-2020	2020	Ivory Recovered	New Jalpaiguri	Alipurduar	1	2 Elephant Tusk (Ivory)	-	NA	Directorate Revenue Intelligence (DRI)
21-03-2020	2020	Elephant Poaching	Panbari Forest Range	Chirang	-	Carcas	-	Manas National Park	Assam Forest Department
24-08-2020	2020	Ivory Recovered	Dadgiri	Chirang	1	2 Elephant Tusk (Ivory)	10	-	Assam Police and Assam Forest Department


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25-08-2020	2020	Ivory Recovered	Daimuguri-Laimuti	Chirang	1	2 Elephant Tusk (Ivory)	7	-	Assam Forest Department and SSB (Sashastra Seema Bal).
28-08-2020	2020	Elephant Poaching	Batabari Reserve Forest	Baksa	-	Carcass	-	-	Assam Forest Department
06-09-2020	2020	Ivory recovered	Baksa	Baksa	-	Tusks	3.75	-	Assam Police
07-09-2020	2020	Poachers arrested for Elephant poaching	Batabari Reserve Forest	Baksa	4	2 Elephant Tusk (Ivory), Deer Antler	3.7	Manas Tiger Reserve	WCCB, Assam Forest Department, Assam Police and SSB
30-09-2020	2020	Ivory Recovered	Kachugaon	Chirang	4	2 Elephant Tusk (Ivory)	2.16	Manas Tiger Reserve	Forest Department
12-10-2020	2020	Electrocution of Wild Elephant	Dihira	Baksa	2	Carcass	-	Manas Tiger Reserve	Assam Forest Department
16-10-2020	2020	Elephant Carcass	Kumarikata R.F.	Baksa	0	Carcass	-	Manas Tiger Reserve	SSB, Assam Forest Department
17-10-2020	2020	Ivory Recovered	Chirang	Chirang	0	2 Elephant Tusk (Ivory)	-	Manas Tiger Reserve	Assam Forest Department, Assam Police, SSB
14-11-2020	2020	Ivory seized	Koilamoila	Chirang	3	4 Elephant Tusk (Ivory)	16.85	Koilamoila Reserve Forest	SSB, Assam Forest Department, WCCB
03-02-2021	2021	Ivory recovered	Kajalgaon	Chirang	1	6 Elephant Tusk (Ivory)	-	Bangtol RF	WCCB, Assam Forest Department
07-02-2021	2021	Ivory recovered	Basugaon	Chirang	1	1 tusk and 105 live bullets	-	-	Assam Police
21-06-2021	2021	Ivory seized	Kachugaon	Kokrajhar	1	2 Elephant Tusks (Ivory)	12.66	Raimona National Park	SSB, Assam Forest Department
22-12-2021	2021	Ivory seized	Madulijhar	Barpeta	5	Tusks	-	-	Assam police and Central Reserves Police Force
April	2022	Sculptures carved from ivory	Begumpur	-	1	Sculptures	-	-	West Bengal Forest Department and Central Wildlife Crime Control Bureau (WCCB)

Table 1: Recent cases of elephant products seized or recovered from the region by various enforcement agencies

Our efforts to complement the efforts of other law enforcement agencies in NE India:

Our Legal and Advocacy Division (LAD) under its umbrella initiative D.E.T.E.R.S. (Disrupt and End Trade in Endangered and Rare Species), are embarking on a journey by complementing the efforts of other law enforcement agencies to deter wildlife crime in Northeast India. We conduct sensitization workshops among various stakeholders including police, paramilitary force and forest personnel, legal experts including district level judges, media executives and students to raise the mass awareness level on the burgeoning crime against wildlife, which is now considered the fourth largest illegal crime in world after drugs, trafficking and arms smuggling. Such efforts have resulted in seizures of multiple tusks and people being apprehended at Manas Landscape. Relevant information related to elephant poaching cases and seizures are shared regularly by and with enforcement agencies.

What can be done to check illegal trade on elephant body parts:

To ensure that the illegal trade in elephant body parts is curtailed, it is imperative that the information as well as monitoring gaps which are present in the system are filled in. These gaps include, but not limited to, paucity of resources, shortage of manpower in forces fighting poaching and illegal wildlife trade, lack of regular training in combating wildlife crimes, absence of modern tools and techniques available with the enforcement agencies, and lack of coordination among various enforcement agencies.

To bridge these gaps, it is of utmost importance for all stakeholders to:

1

• Mandate enforcement capacity-building programmes for enforcement agencies

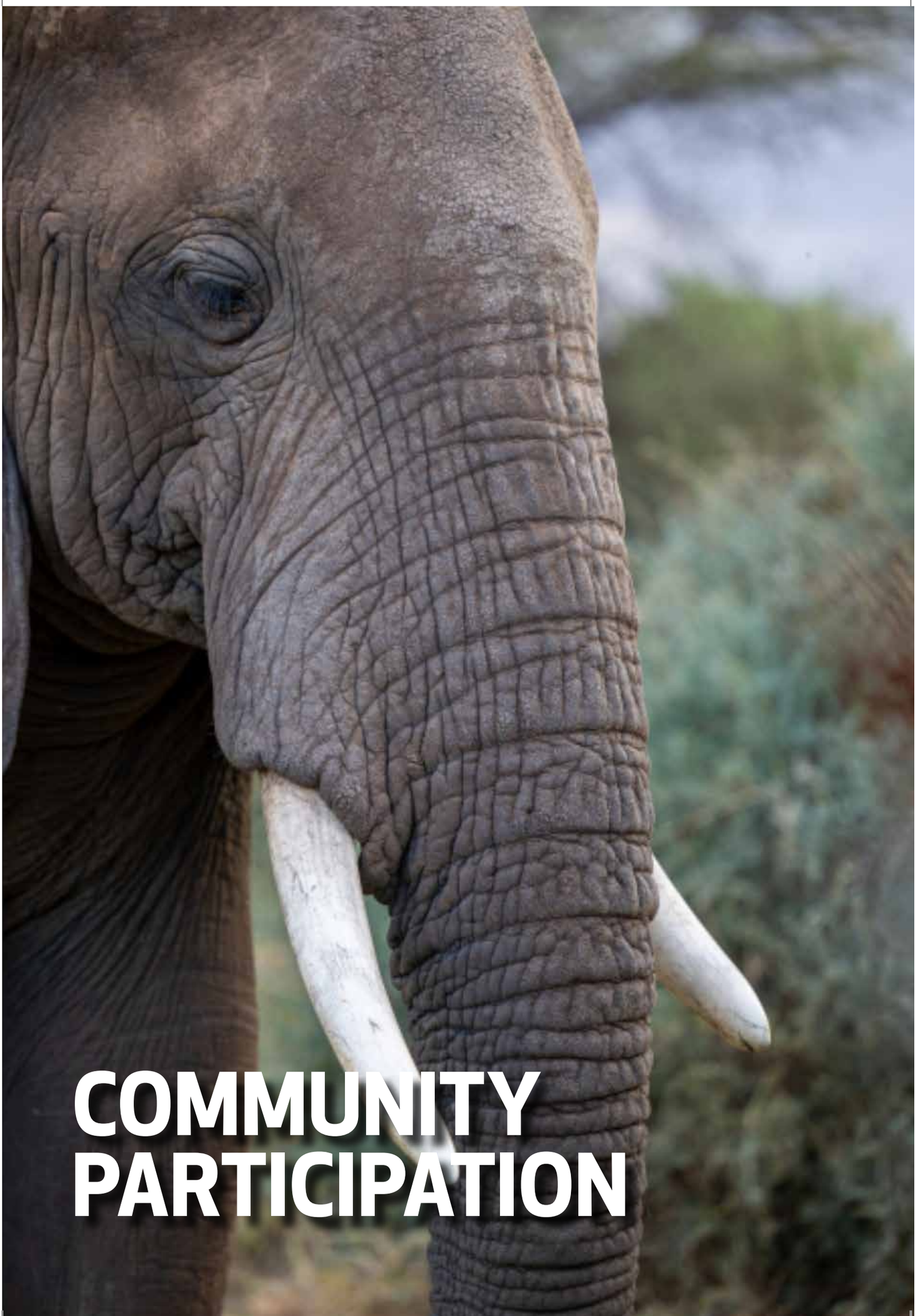
2

• Generate and provide actionable information support to various law enforcement agencies.

3

• Support post-seizure prosecution by providing legal assistance.

The scale of illegal ivory trade in Northeast India demonstrates that the region lacks adequate enforcement control for curbing the trade. Although regionally, regular information-based collaborative operations by Assam Police, Assam Forest Department and various border enforcement agencies like the Sashashtra Seema Bal, Assam Rifles and Directorate of Revenue Intelligence and Wildlife Crime Control Bureau have aided these seizures, the bigger picture still remains uncertain. The implications of the illegal trade in elephant parts reach far beyond trade species, potentially affecting ecosystem health, and spread of zoonotic disease, which in long term can be deleterious to humankind. Assam, with the second highest wild elephant population in India; which also follows enhanced punishment through amendment to Wildlife (Protection) Act 1972 which was gazette notified by Assam Government as Wildlife (Protection) (Assam Amendment) Act 2009; inter-regional crimes against the protection of elephants remains an unfortunate grey area in conservation. Illegal trade of ivories and other wildlife and their body parts can trigger serious threats to national security as criminal syndicate aiding illegal trade on wildlife are also involved in illegal trade of arms and ammunition. As such checking illegal trade on elephant and its body parts along with other wildlife has to be taken as serious threats from national security point of view and concerted efforts among all allied law enforcement agencies of India need be ensured to check wildlife crime and illegal trade of the products.



COMMUNITY PARTICIPATION

Elephants on the Line -- A Community Based Program to Reduce Human – Elephant Conflict

Mubina Akhtar, Kushal Konwar Sarma, Jayanta Kumar Das

It was early 2014. Jeet Munda, a tea garden worker from Bhutiachang tea estate in North Assam's Udalguri district, had gone to meet his wife at Coramore, another tea estate close to the Bhutan border. The next morning, as Munda was collecting flowers for puja in the fringe of the tea garden, he was struck to the ground by a wild elephant that seemed to have appeared from nowhere! Fear gave way to a terrible pain as the jumbo trampled on his right leg, breaking his femur. Soon, another elephant appeared on the scene. "I tried hard to keep still, fearing to be trampled on my chest any moment," Munda recalled.

"Their attack seemed "playful" to me now, same way a cat plays after it catch hold of a mice! But the "playful" attack almost paralyzed me and I lost my consciousness. When after some time I regained my senses, I could see in a distance another elephant. The big elephant must have been the matriarch of a herd! She butted away the attackers from my side and saved me!"

Jeet Munda's believe it or not story intrigued us to have an audience with him. He showed us his injury marks and said that it took him six months to be back on his feet again. No doubt, Jeet Munda has been fortunate; fortunate that he could make it! Fewer people have been as lucky as Jeet Munda. Assam Forest Department data shows a total of 245 people killed in human-elephant conflicts in the Assam-Bhutan border between 2001to 2014. The number of elephant deaths during that period had been 146.

Udalguri-- hotbed of human-elephant conflict

The Udalguri district has continued to be the hotbed of human-elephant conflict in Northeast India. The man-elephant conflict that has taken a heavy toll on either side is a fall out of the shrinkage of elephant habitat. These giant species that require hundreds of kilograms of food each day go for easy food and make easy targets like the paddy fields and backyard orchards. It has been observed that during the dry season, human activities inside the forest also increases and coupled with that the shortage of food for elephants in forest areas, compels the pachyderm to move towards farmlands in the quest of easy and more palatable food. Loss and fragmentation of large areas of the habitat, forest fires, growth of invasive species in degraded forest areas and obstruction and migrating routes have been the other factors blamed for increasing human-wildlife conflict in the region

Rapid deforestation and human use of wildlife

habitats increasingly brings people and elephants face to face resulting in deadly outcomes. Local organizations and media reports confirm the death of 360 people from 2001 to 2021, and 212 elephant deaths in Udalguri district alone.

Data from the Assam Forest Department shows, 50% of the area of Reserved Forests on the district's borders with Bhutan and Arunachal Pradesh have been cleared for

tea-growing and other uses. As elsewhere in Assam, the species has lost vital habitat including corridors connecting different forests in the Assam-Bhutan border and the very survival of this species is under threat.

Community based program Elephants on the Line to reduce lives of human and elephant

In order to address the major problems associated with these issues and build local capacity Elephants on the Line (EOL), a partnership between countries in the India-Bhutan trans- boundary area was developed in 2014. The Program had invited participants including educators, community leaders, local NGOs, government officials, and other representatives.

Elephants on the Line, a community based program to reduce the loss of human and elephant lives in the Bhutan-India Trans boundary area, brought together a solid network of local partners and international collaborators committed to reducing Human-Elephant Conflict (HEC) and protecting human and elephant lives. Prof. Scott Mills from NCSU, USA was the main mentor of the program, who arranged a major share of the fund support from USFWS. The primary target area for the program was the region encompassing Udalguri district (in Assam, India) and southern Bhutan border areas. Udalguri district reports the highest HEC- related human and elephant death rates for the Bhutan-Indian Trans boundary elephant population, as well as the highest recent HEC death rates in Assam and India as a whole. Media and local forest department reported death of 13 people in 2012, 19 in 2013 and 22 in 2014 as against number of elephant deaths as 8, 10 and 7 respectively caused by intentional electrocution, poisoning and shooting of various age-class animals and death in tea-garden deep trenches.

The first official meeting of Elephants on the Line, presided over by the Deputy Commissioner Udalguri district, Ms. Sadhana Hojai was attended by seven Divisional Forest Officers (DFO) from Bhutan, Lisa Mills and Dr. Ellen Cheng from North Carolina State University, USA while Dr. K. K. Sarma, Jayanta Kumar Das, Mubina Akhtar, Pranjal Bezbaruah, Dipen Bodo and Nerkhang Khaklari of the All Bodo Students Union represented the Indian side along with the DFOs of Baksa and Udalguri forest divisions. Several high ranking forest officials of Bhutan also participated under the leadership of Mr. Sonam Wangdi. Subsequently, two more training programs for EDC volunteers were also organized one in Royal Manas (Bhutan) and another in Orang National park. International elephant experts like Heidi Riddle and Mamatha Satyanarayan, a wildlife educationist from Mysore also attended as one of the technical experts while other participants included Adivasi Students union members, Army and SSB officials, local tea garden management representatives, media persons and local community members.

Primary components of the program

With collaborators from both Bhutan and India, the program sought to share updates on the status of elephants in Bhutan and discuss trans-boundary region elephant population status that the education and outreach can be based on the most recent information available.

The information as a collective work of local forest departments, researchers and other relevant stakeholders, divided into 12 sectors under the supervision of at least six people including sector in-charges and forest officials helped in targeting priority areas for HEC mitigation. The most important part of the program has been GIS and GPS training provided to build local capacity for using GIS tools in conservation work. Training workshops were held in Bornadi Wildlife Sanctuary and at the Nonai Range Office in Khalingduar Reserve Forest. Mapped elements included locations of villages, areas of recent encroachment into key elephant corridors or habitats, new development infrastructure disrupting elephant movement, water sources (seasonal and permanent), and different forest types as relevant to elephant habitat use.

A control room was established at Bhutiachang Tea Estate with laptops, GPS, binoculars, digital cameras etc for use of sector committees. Two trained youths manned the control room on round the clock duty.

A HEC Rapid Response Team was created with trained volunteers from 24 villages identified as having high levels of experience with HEC (Udalguri

district). The team conducted elephant watch programmes and had been entrusted to issue communication alerts when elephants approach villages or when incidents have occurred.

Training in elephant behavior and HEC prevention strategies were provided to volunteers along with preparedness kits (cell phones, dragon lights, fire crackers, incident report materials etc).

A database with existing HEC data had been compiled and additional data deemed necessary was collected from Udalguri district and bordering villages in Bhutan to evaluate HEC intervention strategies.

The program had education kit in the form of colored posters and brochures in local Assamese and Bodo languages with information on elephants and do's and don'ts during human-elephant interaction and these were handed out to people in the HEC areas.

A total of 61 villages were covered under the EOL program.

With active participation of a number of tea gardens a number of activities followed that included regular updates on elephant movement, mapping projects to link elephant corridors, community awareness program, incentives for garden youths engaged in rapid response and reward in the form of certificates for efforts of tea garden management. The "Elephant-friendly Tea" concept had been the outcome of such activities engaging the tea garden management within this program and two tea garden—Bhutiachang and Paneri—were given certificates for their efforts to put in place a numbers of recommendations to reduce the conflict.

It was observed that after carrying out these activities under the Elephants on the Line Programme from 2014 (second half) to 2016 number of both human and elephant deaths have come down in the Udalguri district. The death rate could be easily compared from the tables below:

Table: 1 (2012 to 2014)		
Year	**Elephant death**	**Human deaths**
2012	**8**	**13**
2013	**10**	**19**
2014	**7**	**24**
Total	**25**	**56**

Table: 2 (2015 to 2018)		
Year	**Elephant death**	**Human deaths**
2015	**5**	**21**
2016	**6**	**8**
2017	**8**	**7**
/	**3**	**Nil**
Total	**22**	**36**

For the globally endangered Asian elephant, the Bhutan-India trans boundary area holds special significance, as it provides refuge to nearly 10% of the species' world population including 40% of India's remaining elephant population.

The primary focus of the EOL project was to reduce human-elephant conflict and reduce the loss of elephant and human life, while improving habitat to support conservation of elephant populations as well as a wide range of flora and fauna within the same habitat in a key landscape in a World Biodiversity Hotspot Region in the Eastern Himalayas.

The EOL project succeeded in minimizing man-animal conflict in the Bhutan-India border with active participation of all stakeholders. Retaliatory killing of elephants came down with awareness drives and support offered to the community.

The Elephants on the Line program continues to serve as a guide for significant community-based conservation involving education, training, scientific data collection and resource management and demonstrated how the utilization of the same could be put together to reach the common goal for mitigation of HEC. A major concept that came out of the experience was that the elephants require space, which they are losing rapidly and though no alternative to that will ever be available, Community Elephant Refuge (CER) if can be created in fallow lands/denuded forests in the line of the "sacred forests" of Meghalaya, the damages could be minimized to a great extent, and that people participation in the conservation effort is the need of the hour.

Enabling Safer Shared Spaces Between People and Elephants Through Community-Led Efforts

Aritra Kshettry
Director, Coexistence Consortium Team Leader, Coexistence Project

A loud siren at 6 marks the start of a long day in a tea plantation in West Bengal. Workers gather near the tea bushes to start plucking the tender leaves and buds that go into making our favoured drink. But unknown to the women engaged in plucking tea leaves, a trunk lifts up like a periscope at a forest patch right at the edge of the tea plantation. A female elephant with her family is waiting at the edge of the forest and trying to ascertain the best time to quickly move through the tea plantation and enter the forest on the other side. Monsoon has just begun and the forest patch on the other side of the tea plantation promises lush green grazing fields for the female elephant and her family. She is soon spotted by workers in the garden and the workers anxiously move away to avoid any confrontation. The elephant herd also moves inside the forested patch to avoid people in broad daylight. The herd decides to wait for nightfall and then dash across the tea plantation and into the adjacent forest. But why do the elephants need to move through tea plantations? They surely do not feed on them. And why are the women tea puckers so afraid of the elephants? Let us take a step back in time and try to trace the origins of this complex relationship between people and elephants in the tea landscape of northeast India.

During the British occupation of India, tea was discovered as a magic drink which quickly gained popularity across the world. In the mid-1800s, the British wanted to grow tea in India as till then China was the only source of this tree. Subsequently, vast stretches of primary moist-deciduous forests were cleared to make room for tea plantations. The

clearing of forests also provided the British colonialists with timber to expand the railway network. Expanding the railway network also made it easier to clear more stretches of forests and transport the extracted timber. As a result of this unplanned and rampant modification of the land, the forests were severely fragmented with stretches of tea juxtaposed between small remnant forest fragments. Hunting also depleted the native fauna and like other wildlife, elephant numbers were also drastically reduced. The remaining elephant populations still had to move through the tea plantations to access the fragmented forests.

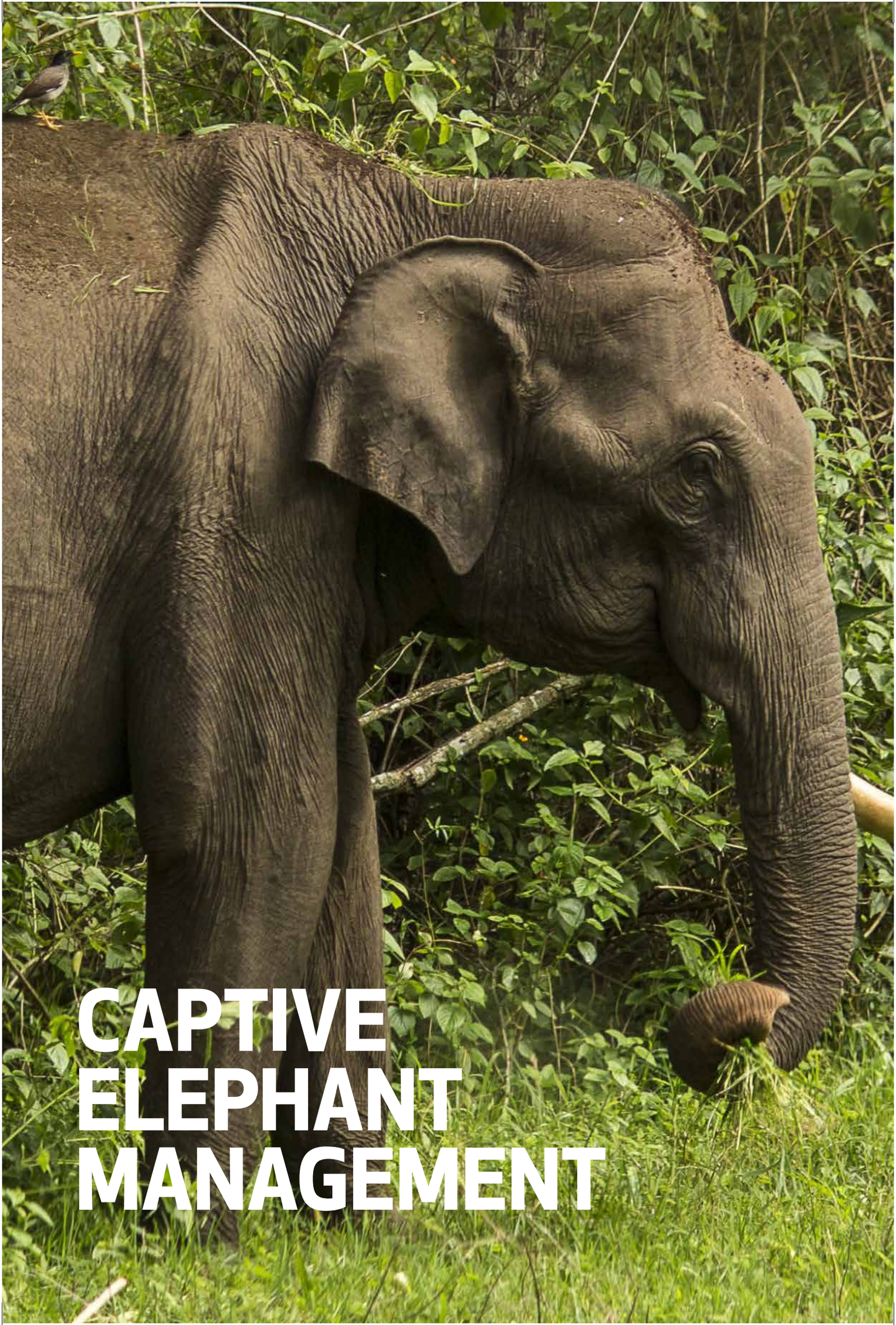
ast forward to the twentieth century, elephants have adapted to this fragmented landscape and have found ways to also access human-sourced food such as maize, paddy, plantain, areca nut and even country liquor. Both bull elephants and herds enter crop fields to feed on standing crop like maize and paddy. Moreover, bull elephants also enter human settlements to access stored food and country liquor. People also venture into the fragmented forests for fuel wood and other forest resources. As a result of this frequent overlap of human and elephant ranges, damages to both people and elephants are severe. Every year, more than 45 people die due to encounters with elephants, the number of injury cases are three times with 150 cases each year reported from the northern West Bengal landscape. More than 5000 hectares of crop losses are reported due to elephants each year and studies indicate that the actual losses maybe twice as much. The highest frequency of such incidents is reported from the Gorumara Forest Division which accounts for 46% of all human casualties among the ten forest divisions in the region. Elephant deaths due to railway accidents and electrocution are also high thereby endangering the small elephant population of the region, estimated at approximately 500 individuals.

n 2015, the Coexistence Project was set up to understand the reasons behind such high human casualties and also to devise locally relevant mitigation measures. The project was started in Gorumara Forest Division considering the highest intensity of negative interactions. The project

involved local collaborators from the community and tried to integrate all stakeholders in the region to find shared solutions to the problem. The critical issue of human casualties was found to be due to three primary reasons, firstly, men often chased elephants from crop fields at night and accidents occurred when people went too close to the elephants. Secondly, when elephants entered habitations at night, casualties occurred when elephant broke the walls of the house or while people were trying to escape. Thirdly, people often roamed in poorly lit areas after dark without flashlights and came across elephants suddenly, such incidents also occurred when people went for morning ablutions in the open. The Coexistence Project worked with the Forest Department and the tea estate management in the region to organize safety awareness workshops. Flashlights were distributed to increase visibility and solar lights were installed by the Panchayat along the key roads to increase the detection of elephants at night. The project also created a small awareness video that was broadcasted on Doordarshan TV by the Forest Department. The at-risk communities also realised the importance of safety precautions and began to cooperate and follow the safety practices. Local teams call Quick Response Teams were created by a local NGO and these voluntary teams in each tea estate or village were tasked with handling elephant emergencies and controlling the crowd. Currently, more than 30 such voluntary teams are active in the region.

Proactive measures to protect crops and housing areas have also been developed by the community with help from the Coexistence Project through government and non-government funding. Members of the local community have installed solar fences to protect their croplands, the technical knowledge to develop these fences was also provided by a local NGO with domain knowledge. Entry of elephants into housing areas is being deterred using trip wire fences which trigger sirens and flashing lights whenever the fence wire is tripped by elephants. The maintenance of these fences is done entirely by the local community members. Moreover, elephants continue to persist in the landscape due to the deep reverence of the local communities towards elephants. Studies show that most families who face crop losses due to elephants do not even claim ex-gratia relief due to their belief in the elephant God, Mahakal.

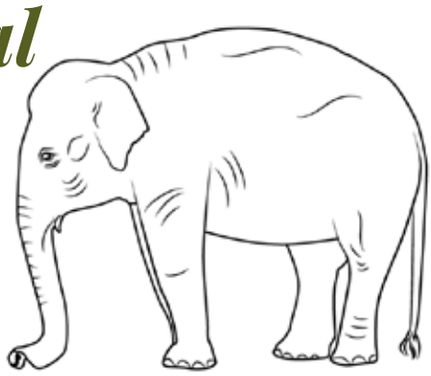
Positive engagement between the Forest Department, Tea-estate Management, Panchayat, Police, Local NGOs and the local communities have enabled safer shared spaces between people and elephants in the landscape. However, there is much more room for improvement through incentivising the local communities, reducing their losses, and providing quick and fair relief against any losses incurred. Both Government and Non-Government agencies could play a vital role in ensuring that the costs and benefits of conserving elephants are shared equitably with the local communities who bear the real costs of elephant conservation.



CAPTIVE ELEPHANT MANAGEMENT

Arthshastra to Captive Elephant Rules with Special Reference to Kerala

G Hari Kumar
Former, CWLW, Kerala



THE ARTHASHASTRA

The Arthshastra,1 a trailblazing work on statecraft is also the first treatise on Captive Elephant Management and maintenance. The text comprises of fifteen books, comprehending the art of governance. Book 2 contains prescriptions on management and maintenance of captive elephants. Pertinent prescriptions, spread across different chapters1 and appendix1 are codified in a nutshell as follows: -

CARE OF ELEPHANTS: Record must be maintained for each elephant. (Book 2, Chapter 27, Verse 9. Hereinafter referred to as 2.27.91). Elephant handlers mostly comprise of mahout, tetherer, tracker, trainer, attendants, cook. feeder, and veterinary doctor. (2.2.10). Normal routine of elephant is prescribed dividing the day into eight parts: First part, bathing; Second part, feeding; Third/Fourth parts, exercise; Fifth/Sixth parts, rest /displays: Seventh part, bathing; Eighth part feeding; (2.31.5-7).

DUTIES OF VETERINARY DOCTORS AND OTHER ATTENDENTS: The doctors shall be responsible for treating elephants in musth, aged, sick, and exhausted elephants. Other staff shall ensure (i) not to beat elephants in sensitive parts of their bodies, (ii) the stalls are kept clean, (iii) fodder is collected on time, (iv) elephants do not rest on bare ground, (v) ensure not to allow unauthorized persons to ride or ride elephants themselves at unauthorized times. (2.32.16-19)

FEEDING OF ELEPHANTS: Ration consists of rice grains, oil, ghee, salt, fruit pulps, greenfodder, dry grass, invigorating drinks, and oil for smearing on limbs and head. Ration for an elephant is calculated based on the height. For example, for an elephant of seven aratnis* (10.5 feet) in height, seven units of ration is provided. Normally, superior elephant measures seven aratnis* in height, nine arantis* in length, and ten arantis* in girth when it is 40 years old. The medium type at age 40 (best kind at age 30) measure 6 arantis* and will be provided with six units of ration and so on. (2.31.11,12,15).

HOUSING OF ELEPHANTS: The Stable shall face either northerly or easterly, with an entrance hall. Height of stable shall be twice that of the height of elephant. In the stable, independent stalls shall be provided for each elephant. Stall shall have plank flooring, a tying post, drainage facilities etc. The interior of the stall provide place for elephant to lie down. At the back end of the stall, a platform half the height of the elephant is mandatory for elephant to lean on. (2.31.2,3)

CUTTING OF TUSKS: Tusks of elephants shall be trimmed once in two and a half years. The tusk shall be cut off at the place wherein, the length left behind is twice the circumference. (2.32.21,22).

PUNISHMENT FOR VIOLATION: Failure to follow the directions shall be punished. For example, failure to obey regulations such as lack of cleanliness, maltreatment of animals etc. will be punished with deduction from ration or wages (2.32.20).

1. MODERN TIMES

The Elephants Preservation Act 1879 is the first act for the protection of elephants. In the early decades of Independent India, captive elephants were either with Royals/Nobles or with temples. Gradually, the elephants migrated from the throne of kings & royals to the open sky of common man.

The Wildlife (Protection) Act, 1972 (WPA 1972) and Constitution (42nd Amendment) Act 1976 are important legislations having relevance on captive elephant management, enacted during the Golden Decade of Conservation (1970-1980). Initially, Indian Elephant (Elephas maximus) was included in Schedule-II (Part I), and ivory was kept outside the ambit of WPA 1972. The Elephant (Elephas maximus) got promotion to Schedule-I on October 5th 1977. Domestic trade in the elephant ivory was banned in November 1986. 2

Ministry of Social Justice and Empowerment is also involved in Captive Elephant Management through Animal Welfare Board, by implementing Prevention of Cruelty to Animals Act, 1960 & Performing Animals (Registration) Rules 2001.

Elephants inspire awe and respect. In Kerala, a temple festival is absolute only when the deity atop on caparisoned elephant, become part of the pageantry. When pomposity creeped in elephant parade, elephant welfare took a backstage leading to the necessity of enacting the Kerala Captive Elephants (Management and Maintenance) Rules 2003 (Rules 2003). Thus, Kerala became a trailblazer in Captive Elephant Welfare.

The Rules 2003 have 12 sections. 1) Short title and commencement. 2) Definitions. 3) Mahouts- certified by department. 4) Housing of elephants- minimum floor area & height prescribed. 5) Care of elephants- veterinary care, daily bath, care for elephants participating in festivals, elephant in musth, dealing with death of elephant. 6) Feeding of elephants- feed based on height, running water, responsibility on owner, contractor and hirer. 7) Work load of elephant- based on height. 8) Norms and standards for transportation- walking restriction, transport by truck specifications, health certificate. 9) Retirement of elephants- at 65 years. 10) Records to be kept- vaccination record, disease/treatment record, movement register, feeding register and work register. 11) Cutting Tusks- permission of Chief Wildlife Warden. 12) Acts which tantamount to cruelty to elephants- 26 acts of cruelty prescribed and prohibited. 2 appendixes viz, form for certificate of fitness and forms of records and registers as per rule 10.

Guidelines for care and management of captive elephants (Guidelines) issued by MoEF&CC in Project Elephant Division (PE) dated 08/01/08 is a well drafted upgraded version of Rules 2003. The major improvements are the guidelines for Ownership Certificate (OC), and Norms & Standards for Transportation. Rest of sections are as per Rules 2003. This guideline is to be followed by all states until respective states formulate their own Rules. Tamil Nadu (TN) published The Tamil Nadu Captive Elephants (Management and Maintenance) Rules 2011. Other Captive Elephant States are yet to publish their own Rules.

Subsequently, the Government of Kerala published the Captive Elephants (Management and Maintenance) Rules, 2012; Incorporating Rules 2003, Guidelines, Circulars, Notifications, Orders of Government/Competent Authorities, and judicial pronouncements issued between 2003 and 2012.

2. MOVING ON - CAPITALIZING TECHNOLOGY

As on 31st Dec 2018, the total number of elephants in captivity in India was 2454. 1809 is the number of elephants kept under private ownership. Private ownership marshalled elephants into bread winners for thousands of families, either directly or indirectly. Further, 664 of the captive elephants are without OC. The proposed Wildlife Protection (Amendment) Bill 2021, seeks to insert a new sub-section (4) in Section 43 which exempts 'live elephants' from the prohibition of commercial sale. Once, the WPA72 amendment becomes effective, major issues on ownership will get resolved.

In Kerala, temple festivals, and resultant demand for captive elephants are from September -October to April-May. During this period, there is a mismatch between demand and availability of elephants. To bridge the gap, merciless measures being adopted by a few include criss-cross trucking of elephants to multiple festivals flouting the Rules, and arresting of the 'musth'3. In the process, empathy and generosity on elephants vanish into thin air. To bring back lost humanity, persons associated with the broad spectrum of captive elephant management have to be trained during lean season; to ensure welfare and longevity of captive Elephants3.

Boon and bane of the elephant is the tusk. During 2015, an investigation of an Elephant poaching case in central Kerala; lead to an ivory trail culminating in seizure of 487 kilograms of ivory and ivory artifacts from Delhi. This prompted Kerala Forest Department (KFD) to develop a protocol to DNA fingerprint elephants using dung and tusk samples, which could help solve crimes; including poaching and illegal trade. During the year 2017, KFD has created Data base of all 519 Captive Elephants through DNA profiling and fingerprinting with the assistance of Rajiv Gandhi Centre for Biotechnology.

DNA profiling and fingerprinting and creation of online data bank on all captive elephants is the need of the hour. By taking advantage of automation technology, insisting on transportation of Elephants in GPS enabled vehicles, restricting distances travelled, & online monitoring of their movement is expedient.

OC need modification in tune with the times. OC should be tamper proof and have embedded chip to include all relevant information such as DNA fingerprints, microchip based identification mark etc. A mobile application has to developed for reading OC and identification mark affixed on individual elephants. This mobile reader can be linked to the online data base; with permissive access available to all concerned officials.

To conclude, Why should the first entry in schedule I** be left in the lurch? Time and technology has matured for MoEF & CC to promulgate Captive Elephants (Management and Maintenance) Rules. Meanwhile, PE need financial muscle and legal tusk on the lines of NTCA. Let PE, bring forth the days, wherein Trumpet of Elephants become Music to All Ears.

*1 aranti = 18 inch = 45 centimeters.
** Wildlife Protection (Amendment) Bill 2021

[1]Rangarajan I N. 1992. Kautilya: The ARTHSHASTRA Edited, Rearranged & Translated. Penguin Classics: ISBN 0-14-044603-6

[2]Bist S.S, Cheeran, Choudhury, Barua and Misra. 2002
The domesticated Asian elephant in India RAP Publication (FAO)

[3]Sreedhar Vijayakrishnan, Anindya Sinha. 2019. Human-Captive Elephant Relationships in Kerala: Historical Perspectives and Current Scenarios. GAJAH 50

Autobiography of a Temple Elephant

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You Homo sapiens will probably mock, laugh and guffaw at this idea of an elephant penning down its own story as our species are yet to develop skills with words and letters, though we are arguably very good at communications and language. You are right and hence I chose the individual who banned my public appearances as temple elephant giving me the much-needed solace and comfort and the captor restless days and nights which he deserved. His seemingly off-handed and rude action, actually generated so much trust that I burden him with the responsibility of writing my story, as it unfolded. After all I was the only beneficiary out of this episode. And one more thing, even at the cost of sounding a bit gratified and impolite, I am to tell you that I have a huge fan base having my presence at Facebook and Wikipedia which many of you may not have. Yes, you guessed correctly, I am Ramachandran. People also call me Raman lovingly and they also bestowed the title of Ekchhatradhipati, the only Emperor. But behind all these glorious high sound words, there is something else that I want to tell you.

My childhood

People say that I was born Moti Prasad in far off Jehanabad in Bihar. No, this is too far from truth. This was the year the first Prime Minister of India passed away and I came to this planet as a wild elephant calf in the hills of North Cachar in Assam. People term me captive, born to captive parents, just to escape laws. I am born wild and lived my early life as such roaming in the jungles with my extended family which you people call herd. Then I didn't have any name given to me by my parents. In our world in the forests, the existence is nameless and individual identity isn't something we hanker for. Name and fame are human constructs. We live collective lives of the species itself.

Life in the forest was full of fun and frolic. As a baby in the herd, I enjoyed everybody's care and attention. Whenever I wanted to stray away a bit far, out of curiosity, I was always repelled back lovingly by mammoth elephantine walls deployed around me for my security. Foraging was our only real occupation. We used to trudge miles and miles through dense forests, open grasslands and rivers and lakes. Sometimes we amused ourselves by smearing mud on our bodies and lying in some water pool endlessly. We lived, struggled, enjoyed, mourned – all together. Togetherness and intimacy were central to our existence.

In all our wanderings in the forests, I was taught to be wary and scared only from one species – the bipeds, the human beings. Whenever we encountered them, we changed our directions to let them pass by. Even if we were unable to see them in the dense undergrowth, instinctively we knew they were there. Our sense of smell also was very useful in detecting human presence. Then I didn't know how these tiny and innocuous looking creatures are more dreadful than even tigers. It wasn't long that I understood this reality, but then, that was too late.

The jungle camp

But nothing, good or bad, last forever. One dark night, when the moon still shone up in the clear sky and we were leisurely foraging in an open grassland surrounded by towering trees, things changed forever. There was a huge sound as if lightening, to which we were quite used to, took place. But no, the sky wasn't overcast and there was no possibility of such a thing. Besides no light preceded the sound. This was something else. Before we could make anything out of it, the deafening sound again repeated itself. We were scared to the hilt. We ran for our lives helter-skelter screaming all the way in the moonlit dim darkness. In the run for my life, I fell into a ditch from which there was no way that I could come out. I could hear the wailing trumpet of my Mom in a distance and that was the last I knew of her. I was barely 4 years old then. Only last year I had stopped bothering her for milk. I had started to grow on my own. Two small tusks already adored my head and these went against my fate. Had these tusks not been there, bipeds might have lost interests in me.

Sun showed up the sky as usual, but my life was changed irrevocably and forever. A group of bipeds descended on the ditch where I was miserably confined without any movement as it was too short of free space. They were talking excitedly to each other. They took time to dig a trench to reach up to capture me. I was overpowered and shackled. This new iron ornament was to stay with me throughout my life. I had lost my freedom and was destined to remain enslaved entire life. The life in the make-shift camp in that Assam jungle wasn't something I should ever recall. A small hut in a forest clearing, occupied by two human beings – one ferocious looking robust bearded man and other, a half-naked black person exhibiting all his bones looking as if he had starved for years. Slowly I learnt that the first person was the Master and the second was his servant Pichati whose whole life revolved around what the Master desired. Though we elephants have very strong social connections, we didn't have this type of relationship in our elephant world. Master came there only once in a while to see the progress I am making to adapt to the human world. But whenever he came, the life of Pichati was as miserable as mine. The Master very often scolded and abused him, and occasionally thrashed him especially after drinking some sort of potent liquid usually in the evening.

In ordinary case, I should have been pleased to see my subjugator being maltreated. But then, the bad temper of the Master was systematically transmitted on to me. Pichati poured all his frustrations, anger and suffering over me, once the Master was gone.

In the jungle camp, my both the front legs were shackled and the left hind leg tethered to a tree. Sometimes some fodder was strewn before me. But the physical trauma and the psychological distress of losing my family, especially Mom, were too heartbreaking to allow me to nibble anything and feed myself meaningfully. Over and above that, Pichati always came and lashed me with stick whenever I showed any resentment and tried to restore my freedom. While lashing, he muttered some words which initially didn't make any sense to me, but when he repeated the same words time and again demonstrating the expected action on my part, I slowly started responding to these words. Whenever my response was as per his expectation, he will become happy with me and encourage me by offering a banana or two, caressing and patting me on my trunk. But Pichati never understood that I hardly needed his food and water, and occasional banana. I needed only liberty. Now I understood why my Mom was always whispering

to me to keep away from these bipeds. These fellows don't possess massive bodies like us, or piercing canine teeth like tigers and wild dogs, yet they were so menacing and intimidating. My entire attitude towards the human race got solidified in this jungle camp.

My golden days

Months passed, probably a season, because now the rains had ceased considerably and chill in the night had increased. one morning, there were some visitors in the camp. They came towards me and had a close look. I intuitively felt that my life is going to change. One of the persons was in uniform, the type of people I used see in the forest. Usually, we were unmindful of their presence in the forest and took them to be friendly intruder in our adobe. Sometimes, I have seen them trying to rescue other denizens of the forest, whenever they were in need of emergent attention. The presence of the uniformed person gave me a hope that my freedom will be restored. But I wasn't that lucky. He was the other kind who sold his soul and eventually me and put me on a truck which I had seen earlier from a distance. The truck rolled down for days and nights while I kept on standing and balancing my body. The food was barely adequate to keep me alive. All these days Pichati went on amusing himself with good food and drinks in the cabin of the truck. After three days of roller coaster ride, finally I was there in Bihar plains which was to remain my abode for nearly two decades.

It was a palatial house with high compound walls raised all around. Although zamindari system was abolished by then, the zamindars still existed. This house belonged to one such elderly gentleman Ram Prasad who had a very pleasant and benign appearance. He had three sons and adopted me as the fourth one. The youngest son Bhola Prasad may be a bit older to me. It was here that I was given the name Moti Prasad and I became the newest entrant to the Prasad clan.

A separate hut was made for me and a pond was dug in one of the corner of the huge complex. One person, Badri, was especially engaged to take care of me. Initially I was shackled, but I was taken off it very soon. In lieu of the best treatment given to me, it wasn't hard for me to obey what Badri wanted me to do. All I was to do there was to eat sumptuously, leisure around in the pond, and amble around in the compound along with Badri. Sometimes he took me outside on long walks towards some wilderness. He would climb on trees, cut fodder for me and would teach me to carry the bundle clutching with my tusks and the trunk. Though I didn't like this particular activity, I still did it for the love and affection shown to me.

Badri didn't have instructions to ride over me. This privilege was reserved only for the members of the Prasad clan. Once away from the eyes of Zamindar, he rode me. I took it as

an offence and showed my resentment by trying to force him to dismount. Grudgingly, he meekly came down and started walking beside me. I had started believing that I am really one of the privileged Prasads.

There wasn't an iota of doubt that I enjoyed an extraordinary upbringing and care, just like a prince. Prasads and their appointee Badri had almost made me forget that once I was a free bird in a lovely forest. I had grown into an adorable tusker and acquired great heights. People poured in to have a look of me. Prasads will allow them to look at me only from a distance.

Once it so happened that some people threw a bunch of bananas from across the wall in the compound. That time I was lying in my private pond. Unfortunately, one of the cows of the zamindar happened to be strolling there. She ate those bananas and she died shortly after that. Obviously, these bananas lashed with deadly poison were meant for my annihilation. After that incident, the security around me was beefed up. No stranger was allowed to come near me and offer food. The height of the already high compound was further raised. And I was given special training to accept food items only from members of Prasad clan or from Badri and his deputy Sahdeo.

Life went on comfortably years after years. Though all my physical needs were met, I still had my biological and social necessities. Isn't it unfortunate and sad that I was forced to remain bachelor the entire life? Celibacy may be a desirable virtue in the human world, but not in ours. It wasn't good for the elephants in general that a genetically superior specimen like me was prevented from reproduction. But Prasads could hardly understand and do anything about this.

In course of time, the zamindar grew very old. He seldom came out of his house and remained confined to his armed chair in the verandah looking at me. The two elder sons had taken up some jobs in far off cities and they came there only once in a while. Bhola, with whom I grew up together and played all these years, left for some foreign country for his studies. My life was more or less confined to the company of Badri and his deputy. Still life wasn't all that bad.

And one day, the Zamindar Babu Ram Prasad passed away in his sleep. It was shocking for me personally. I had grown into this shape only because of his kindness and care. The two elder sons arrived and the final rites of Babu Ram Prasad was organized with fanfare. There were hundreds of people in the funeral procession. I and Badri also followed. There were musical bands and chanting of Ram nam satya hai, sabka yahi gat hai. I got confused whether people are mourning or celebrating. As for me, it was definitely an occasion to be miserable. I wailed inside and fretted for my future.

Bhola prasad arrived after two days. The haveli was abuzz with friends and relatives. Bhola would often come to me and look at me forlornly. Perhaps he also was thinking of me. And my future. After all, who was going to take care of me was the moot question? What magnificence and respectability can be added by an elephant to a haveli without a master? Who is going to spend on me without anything in return? Only Babu Ram Prasad could have done it and he was no more.

When Babu Ram Prasad was alive, there were certain people from far off Kerala who were eying on me. My height, built, and tusks were the main attributes which they were crazy about. But every time, such advances were repelled by the stern Babu Ram Prasad, saying Moti Prasad was his son. And which wretched father sells a son?

But now that he had passed away, those people from the distant place were contacted and I embarked on yet another tortuous journey on the truck. When I looked back at the haveli, there was nobody to waive at me. My eyes welled up, but no one noticed.

Badri and his deputy Sahdeo had accompanied me all through this arduous journey. At every check post, uniformed people came and inspected me. They raised feigned objections to my transit till their pockets swelled up to their expected levels. I had already lost the hope in them since my last day in the jungle camp. I also wanted to continue the journey as there was nothing to look back to my years in Bihar.

Life in the company of divinity

This was an ancient temple, with Bhagavathi as the main seating deity, along with several other updevatas. People thronged there day and night dumping all kinds of weird desires and wishes upon the deity. Most of them would come and have a look at me and wonder at their lucks of

having seen me. Some of the devotees would fold their hands in deference, taking me to be the incarnation of Lord Ganesha. Temple priest rechristened me as Ramachandran after their most revered God. But people lovingly addressed me Raman in short. The more enthusiastic and crazy fans titled me with Ekadhichhatrapati in due recognition of my great elephantine features.

But my daily life wasn't that rosy. The food provided was nothing compared to what I used have with Prasads. I was always shackled. Vast compound of the temple wasn't of any use to me as I was never allowed to roam about. I wasn't very eager to chew the leaves and branches thrown to me and very often I showed my disgust to the mahouts throwing tantrums. This sort of behaviour was responded with beatings by the iron rod. They will come to my hind legs and lash me with rods. I would bleed and wail, but they always failed to see my sufferings.
The continued misbehavior on their parts renewed my hidden animosity towards the human race. And one fine afternoon, when I was taken to a temple festival I ran amok and killed both of them. This was a landmark in my life when I had undergone metamorphosis from a gentle giant in the haveli of Prasads to the killer temple elephant. I did my first sin in the close proximity of deity and anticipated the punishment.

New mahouts were recruited. They must have been chosen for their abilities to control a wayward and defiant elephant. I also had made up my mind to pay back in the same coin. To start with they tied my all four legs and kept me without food and water for a couple of days. In the night, when temple priest retired to his quarters, they will drink toddy and come to me with renewed energy wielding the dreaded iron rods. In their inebriation or may be even deliberately, they attacked me on my forehead and damaged my eyes. One eye lost its sight completely while I could see only partially from the other. The untold agony and trauma made me more resolute in animosity towards the bipeds.

I thought mahouts would like to kill me. But that wasn't their agenda. A dead elephant is worth only the tusks which valued nothing compared to the continuous income I was capable of delivering. My height had made me the most desired elephant for all the festivals in Kerala. People were ready to pay fortunes to hire me for a day. So mahouts kept me alive not out of empathy, but for the greed of my captor.

I was often decorated with golden yellow ornaments, nettipattam and was made to carry the idols on my back. I was accompanied with panchvadyam- a music of five instruments, ilathalam, thimilia, maddhalam, idakka and kombu. Colourful umbrellas would also be displayed. Devotees would go inside the temple and will do pradakshina three times around the temple. All these whiles, I would be made to stand and do weird things like raising my trunk up in the air or bending on my knees. People may think that these were voluntary actions on my part. No, it wasn't. The mahout would poke sharp iron in my body to perform these.

Same worshippers were coming to the temple on daily basis. I wonder what were wrong with them? That simply meant that that their requests and applications were yet to be considered by the deity or they are coming with newer requests after the fulfillments of the previous ones. Whatever may be the case, their faith in the deity were unwavering and resolute and expected the deity to listen to them on some appropriate and sacred days.

On my part, Bhagavathy Amma never heeded to my cries and wails; never saw my wounds and never relieved me from my sufferings, although I was in attendance to her on almost 24 hours a day basis.

Festival times were a great fun for the people and a great time to make money by my captors. But it was a real ordeal time for me. I was made to run from one place to another without proper rest and water and food- chained, beleaguered, hungry and thirsty. Noisy panchavadyam, explosion of crackers, cacophony of the multitude all amplified my psychological woes.

Even when I was in musth, which is my physiological state to be repeated every year, I was treated as if I had gone crazy. With the help of certain people who called themselves vets, they suppressed these symptoms by injecting me with drugs. One of the vets was really a blind person, not physically but otherwise. He could never see my wounds or my musth and always gave me fitness certificates to attend to all these festivals. He was so unreasoning that my own blindness was of no consequence to him. The fitness certificates flowed unabated from his

pen yielding a fortune to this wretched vet. I nourished a real desire to kill him. But he never came too close to give me a chance. Perhaps he had guessed my intentions.

Temples weren't the only worry for me. Gradually, masjids and churches also started to follow the suit, and the demand on my time and those of fellow brethren like me went on increasing.

Very often, my physical and psychological woes surpassed my limits of tolerance and I ran amok several times killing scores of people. I am surprised that my fan followings went on swelling up despite my extremely violent behaviour. I am really unable to understand these fans who chant 'Raman, Raman...' whenever I made public appearance.

But my last killing wasn't premeditated. I was standing comfortably in a narrow lane where I was brought to bless the house warming ceremony of a neo rich who earned lots of money in some foreign land. Music was light and soothing. But then suddenly, lots of fire crackers came alive and some of them hit me too. I panicked out of sheer fright and ran in the narrow lane, dashing with the walls in my blindness. In the milieu, two persons were dead. But I hadn't meant that. After all what a blind human would do if suddenly, he is hit by some fire crackers. He would definitely panic and run in any random direction. I had done the same.

Elephant owners and the people at large weren't bothered about this episode also. They had taken it as my natural right to kill once in a while. But one person sitting somewhere at the top in far off Thiruvananthapuram studied my profile carefully and retired me from public life in the best interest of the people. It was in my best interest also, but powers-that-be wanted otherwise. They argued in the name of culture and tradition and of course public demand, and tried to reintroduce me to that hellish experience. But I was lucky this time. The lifelong ban prevailed and now I live a life of anonymity, away from the glares of light and deafening noises.

Life isn't great in this little corner of the temple under the ancient banyan tree, but what else cane be done or undone? My wishes to join my group in the wilderness would remain a far cry, I know. But I have plenty of time to ponder and enjoy my days and nights vicariously. I sincerely hope that these clever and cunning bipeds would develop real emotional intelligence one day and spare our species from untold injustice, agony and sufferings in future.

Captive Elephants in Dudhwa Tiger Reserve: Utility & Management

Sanjay K. Pathak
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Captive elephants have been an integral part of forest and wildlife management since time immemorial. They were used in timber operations and for hunting purposes by the Kings and royalties in past, besides being used as a means of transport inside forest. Later on, they used to be kept in captivity for the purpose of demonstration in Zoological Parks too. Apart from that, they used to be reared and kept as a symbol of power and prosperity by the landlords and royalties. Historically, they were used in wars too. They were there in temples and are still kept in some of them, especially in Southern India. With the amendments in Wildlife Protection Act, 1972 and through rules and regulations promulgated by the Government of India from time to time, there has been a constant decline in the number of elephants kept for the above purposes. Now, demonstration in Zoological Parks and circuses has been completely stopped. Sell purchase of elephants have also been banned.

Earlier, elephants used to be a revered animal in India. With the historical perspective in mind, elephants have been declared as our heritage animal. Elephants have proven their worth for the mankind since ages. That's why they are considered as our friends and yes, which place could be a better place than a tiger reserve to watch that bonding of human with elephants! Stories regarding their

bonding with their Mahaouts are quite prevalent in Tiger Reserves and people have many tales to tell. One would find their usefulness there in umpteen number of aspects, be it monitoring, be it patrolling or going inside the remotest part of forest, inside wetland or grasslands or woodland. Their roles are multiple, whether you use them in mitigation of human wildlife negative interface related incidences or for recreation of tourist to see a rhinoceros or a tiger in an area where one cannot think of going by any other means.

It goes without saying that tiger reserve management cannot think of an efficient and effective management in absence of elephants under their disposal. Like most of the Tiger Reserves, Dudhwa Tiger Reserve in the State of Uttar Pradesh has also got an elephant squad under its control. Since inception, these elephants have proved their worth. They were there in small numbers in the beginning for patrolling purposes but their importance went manifold with the re-introduction of rhinoceros in Dudhwa. They found use for the purpose of rhinoceros monitoring. As known, rhinoceros were re-introduced in the year 1984 and since then, these camp-elephants have performed their duty very diligently and efficiently. Rhinoceros re-introduction programme of Dudhwa Tiger Reserve in the State of Uttar Pradesh has been a very successful programme of conservation of an endangered species. Their number has increased six-fold from a seed population of 7 to 42 at present and that could not have been possible without contribution of the camp-elephants of Dudhwa.

There are a number of stories associated with them, some of them have excelled in mitigation of human-tiger negative interface related incidences, whereas someone is a good dancer; someone is dare-devil while someone is timid. Two elephants who always played their role fantastically in events of driving aberrant tigers included Pushpakali, who passed away a few years back and another one who is surviving and is second to none is Pawankali, who is still the leader for such incidences despite being

leading a superannuated life. Following them is two other cow elephants, namely Gangakali and Roopkali, who are also bold enough to venture into any tiger's territory. Currently, they are the leaders in such operations. Next in command is Diana, a young cow-elephant who has learnt the art of facing problem tigers without getting frightened a bit and she has learnt this very art from Pawankali and the other duo.

These camp-elephants prove their utility in driving stray tigers back to the forest and thereby play an important role in preventing any untoward incidences. They have always been immensely useful in tiger rescue operations. One is at liberty to venture in any area, sitting on elephant's back. The veterinarians at number of times have gone inside the invincible forest area sitting on elephant's back for darting an aberrant tiger or a tiger to be rescued. Because of these elephants, they not only derive confidence in tackling such cases with ease, but also feel safe. Their presence in the affected area also instils much required trust amongst the villagers in cases of human wildlife negative interface related incidences.

Mobility during monsoons becomes a serious issue, especially in the Terai area where the kuchcha forest roads become muddy and unmotorable. At that time also, camp elephants prove to be the saviours as they play an important role in patrolling to the inaccessible areas. Now-a-days, Tiger Reserve management is using drones or Unmanned Aerial Vehicles to surf the situation in inaccessible and invincible area. Same was not the case in earlier days and so, the elephants were the only tool to use for such operations. There are areas which get inundated and cut off from rest of the forest area. Protection in such isolated patches becomes very difficult and that time also, these camp-elephants become very indispensable. They are the means of transport in such areas.

To have an efficient and effective elephant squad, proper upkeep and maintenance is must. For that, their health ought to be up to mark. They need to be fed properly with emphasis on proper nutrition, regular health check-up, cleanliness of the premises where they are residing, regular bath and massage as per season, prevention from flies and parasites etc. Nutrition supplements are to be given off and on, besides such herbal preparations which have cooling effect during summers and warming effect during winters.

In Dudhwa Tiger Reserve, we have 26 elephants including all males, females and calves. Each elephant has got its service book which comprises of items inter alia including information sheet of its handler, elephant's history card, observation sheet, treatment sheet, pathology sheet, date-wise table of progressive size and weight filled up periodically, details of de-worming, vaccination sheet, special events in life, details of tusk trimming, details regarding administering winter and summer special supplements etc. The Mahouts take good care of their elephants. They keep the elephants as well as their abode clean. The chara-cutters are the ones who bring fodder for them, which mainly include branches and twigs full of leaves of broad-leaved species of trees besides long grasses, of course with help of these elephants. The Mahouts and chara-cutters prepare big fat rotis out of wheat flour for these elephants and feed them in the morning and evening with much-liked jaggery. They are also fed with sugarcane during the harvesting season. It is also a ritual to feed them with jaggery by VIPs and senior officers, whenever they happen to visit the Reserve.

The veterinary doctors of the Reserve take care of their health issues. Besides veterinary doctor, their Mahouts do take care of their health issues and provide them naturopathic treatment, as and when required. The most challenging task for the Mahouts and Veterinary Doctor is to manage the male elephants during musth. Not only the elephant in musth becomes aggressive because of rise in reproductive hormones and temporal drainage, but it also behaves erratically and sometimes becomes violent. There have been instances of Mahouts and Chara-cutters getting seriously injured or even killed by the particular elephant. We lost our one very efficient Mahout and another dedicated Chara-cutter in attack by camp-elephants but such incidences never acted as deterrent for our other Mahouts and Chara-cutters. Even now, those erring elephants are taken care of in a proper way.

At times, the wild elephants cause problems when they come to the elephant camps and try to elope with young cow-elephants. On getting opposed, they not only ransack the things as well as local infra-structure, but also try to injure the cow-elephants. Sometimes, they become successful and there have been occasions when the camp cow-elephants could return to her camp after a few days, and that too by efforts put in by the Mahouts and Chara-cutters. Sometimes, the injuries were such that it took months for the wounds to heal and that too with great care by the Veterinary Doctor and the associated Mahouts. The calves are also reared in-house only.

Dudhwa Tiger Reserve now organises annual health camp for the camp-elephants as a matter of routine in collaboration with WWF-India, in which the experts from different parts of the country, specialist veterinary doctors besides those from Dudhwa Tiger Reserve, provide their services to these noble creatures. On culmination of the said health camp, a fruit feast is organised where the elephants are fed with a variety of available fruits. That is the day when they are made to feel special. The event is organised with much fan-fare in which media personnel, members of civil societies, NGOs and staff of Tiger Reserve do take part.

Advancement in veterinary care is being brought up with every passing year. A healthy camp-elephant population is need of the hour for better and effective management of tiger reserves. More and more camp-elephants are required to be trained for tackling the issues relating to tiger reserve management in general and human wildlife negative interface related incidences in particular. We cannot even imagine a protection scenario without presence of these immensely useful creatures.

State of Captive Asian Elephants in Tamil Nadu and its Implications for Sustainability

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Background

The Asian elephant (Elephas maximus Linn.) is an integral part of Indian culture and mythology. The first Asian elephant capture dates to about 4000 years ago; by the people of Indus Valley civilization. At present, the captive Asian elephants used as work elephants, constituting about 22–30% of the remaining Asian elephant population. However, most of the captive populations across the world are not reproductively sustainable and are in need of conservatory inputs from the wild for their sustainability. In India, captive elephants are managed in almost all states, as they play an integral part of the country's cultural and religious landscape. According to 'Project Elephant', about 3400–3600 captive elephants are distributed across 23 states and union territories including the Andaman and Nicobar Islands. A majority of these are found in the northeastern (55%) and southern (25%) states. In Tamil Nadu, a southern state of India, elephants are managed in captivity by the state forest department, religious institutions such as Hindu temples, and mutts, trusts, charities, mosques, and individual owners for various purposes. The Government of Tamil Nadu categorized these elephants into three captive systems—forest department captive elephants (managed at timber camps and zoo), temple elephants (managed at Hindu temples) and private elephants (managed by mutts, trusts, charities, mosques, and individual owners). The captive Asian elephants, despite having a long history in captivity; globally, suffers with a wide range of welfare problems. India, despite being the birth place of captivity of Asian elephant, continues to lack comprehensive data on various management practices of captive elephants and their influence on the elephant welfare. This article deals about the status of population and management of captive elephants in three systems viz. Private, Hindu Temple and Forest Department in Tamil Nadu, India.

Population

An extensive survey during 2003-2006 in Tamil Nadu, showed that 135 elephants were managed under private (42 elephants), temple (41 elephants) and forest department systems (50 elephants). Age class composition data revealed that adult segments (75%) outweighed the other age-classes (25%) together in all the three systems indicating an aged population trend. Sex ratio of the populations were biased towards females in private (male to female 1:10) and temple (1:21) systems, but males biased in the forest department (1:0.5) with adult males constituting 50% of the total population. There was no breeding in private and temple populations. While in forest department population, fecundity has dropped (0.065/adult female/year) over the past 10 years (1996-2005) compared to an earlier (1969-1989) estimate (0.155/adult female/year). Mean mortality estimated together for the three systems was higher (3.9%) than that reported previously (1.9%). Given the aging population trends, with no breeding and fewer chances of additions from the forest department due to ban on elephant sale; captive populations in private establishments and temples may not survive in the long run. Sustainability appears rather remote for the
population under the forest department system with male bias, increase in mortality and a decrease in fecundity.

Social life

In natural conditions Asian elephants live in complex social groups. Social bond is very strong among females, who live in groups with related females and their offspring of both sexes. The groups are led by the matriarch, the oldest female. The matriarchal group consists as much as 50 individuals. Males leave the maternal herd at around the age of 15 and, mostly lead solitary lives. At times, however, the males join female herds for breeding; alternatively, or when not sexually active, they may join other males to form bachelor herds with weak social bonds. Captive elephants, especially in the temple and private places, are maintained in conditions that do not closely resemble the social environment of their counterparts in the wild. For instance, majority of the facilities in the private (82%) and temple (95%) systems managed single elephant without opportunity for conspecific interaction. On the other hand, the forest department managed their captive elephants in social groups mimicking their peers in free ranging conditions. Lack of socialization with conspecifics along with confinement due to management of elephants in solitary condition is known to increase stress levels and acyclicity among female elephants in captivity.

Daily routines

On a day-to-day basis, elephants in natural conditions engage in different activities like feeding, resting, moving, socializing, etc. with bulk of the time spent on foraging activities that include moving in search of food resources, food gathering and processing. These activities are scheduled within the day-night cycle while ensuring sufficient time for each activity, which changes seasonally in response to climate. While doing so, they experience varieties of spatial environments that vary according to habitat, and season and come across hundreds of familiar and unfamiliar individuals, including friends and foes, relatives and non-relatives, higher-ranking and lower-ranking competitors, and other species, both friendly and unfriendly.

On the other hand, captive elephants in general, especially those at Hindu temples and private facilities, lack the biologically relevant mental stimulation, physical activity, complex social and physical environments owing to limited daily routines, and timed monotonous work throughout the year. They are managed mostly in isolation without conspecifics, movements are confined through chaining in small barren indoor enclosures, without access to the outdoor enclosures or natural feeding; and, with little opportunity for walking or exercise. For example, the captive elephant in private places, especially those under individual owners are put to work more (7½ hours/day), mostly begging in towns and cities, with stressful walking in hot climate. While elephants in the temples remain at the indoor enclosures for longer period (16 hours/day) with very little time (<1 hour) spent on walking/exercise. In contrast, the captive elephants in the forest department system are assigned with lesser work (2½ hours/day) and more time for natural feeding (13 hours/day), which they also use for other activities like resting, socializing and reproduction like that of wild elephants. Lack of exercise and confinement, with the absence of conspecifics, affects the physiology and behavior of captive elephants.

Food and feeding

Asian elephants in the wild feed on wide varieties of food plants ranging from 54 to 390 species. Their natural diet includes leaves, twigs, stems, barks, fruits, and roots from

herbs, shrubs, and trees; although their major food items are grass species. The wild elephants are also known to change their diet species and parts according to season with an increase in browse consumption ratio during dry season as compared to wet season. This is related to seasonal variation in nutrient quantity of food plants and their parts. However, the captive elephants managed by the private and temple facilities do not have access to such wide varieties of food plants, as all these elephants are stall-fed and some of them are also fed with lesser quantity. The captive elephants, on the other hand, managed by forest department system at the timber camps have access to natural feeding apart from supplementary diet. The inadequate quality and quantity of green fodder and the supplementary diet in case of private and temple elephants could lead to insufficient supply of minerals and vitamins that in turn may affect their health conditions.

Housing and chaining

Free ranging Asian elephant in the wild move 4–6 km per day and with their annual movement ranging from 600–800 km2. A sizable number of elephants in private (30%) and temple (27%) systems were housed in smaller (20-40 m2) enclosures. The number of elephants managed without outdoor enclosure and duration of chaining were the highest in temple (85% of time/day) followed by private (72%) and the least in forest department system (27%). Such manmade interventions affect their behaviour and welfare in captive condition in terms of limiting their movement, play, and social interaction. Foot problems like foot rot due to the damp, unhygienic conditions, and uneven wear of feet due to predominantly stationary existence on smooth surface, joint problems such as arthritis due to overweight and reduction in movement, and acyclicity among female elephants and above all has led to an increase in stereotypies.

Disease prevalence and veterinary care

Overall, a higher occurrence of foot rot, stereotypies and arthritis was found among the elephants in temple and private systems and least or absent in the forest department system. On the other hand, eye problems and parasitic prevalence were found more among forest department elephants than those in temple and private systems. All elephants in the forest department systems received regular veterinary care, while 75% of elephants in temple and 25% of elephants in private had periodic veterinary care. Assessment on health condition revealed that the proportion of elephants with poor health condition was highest in the private facility (24%) followed by temples (16%) and lowest in the forest department (6%).

Mahout welfare

The keeper's welfare is an indication of elephant welfare. Average monthly salary per mahout was lowest in the temple management (Rs. 2177), moderate in the private (Rs. 2693) and highest in the Forest Department (Rs. 4849). To compensate for a lower salary, the mahouts in the private and temple systems burden the elephants with additional work: blessing the devotees at the temple-yards and begging at shops and residential places. Nevertheless, the mahouts in less popular temple and rural private places still do not make up the underpayments. As a result, the traditional mahouts are leaving these facilities and the elephants are increasingly left under the control of non-traditional mahouts. The non-traditional mahouts with less compassion and insufficient experience in handling these giants, often mishandle them, which lead to higher amount of man-slaughters in temple systems. Unlike the

past, where mahoutry was a proud profession of a specialized class of people, the profession has now lost its charm due to the lack of comparable economic benefits and improper welfare measures owing to a dwindling importance of captive elephants (MoEF 2004) with the art of mahoutry dying at a fast rate.

• To ameliorate the negative trends in population structure and sex ratio and to retain the long history of forest department timber camp elephants, inputs from the wild, especially females of young adult and sub-adult classes, should be given priority. Capturing and transferring of crop-raiding elephants, especially herds ranging in isolated habitats with no sign of breeding and or long-term survival, to forest department timber camps could be considered as a solution for restructuring the captive population, which will also reduce human–elephant conflict in the natural habitats.

• The captive populations in the private and temple systems may not survive in the long run given that the (i) aged population structures and susceptibility to higher mortality, (ii) absence of breeding, and (iii) lesser chances of additions from the state forest department due to the ban on the sale of elephants. To improve this situation, private and temple systems need to consider common elephant housing that would bring in opportunities for captive breeding apart from socialization with conspecifics.

• At present both the temple and private elephants are distributed patchily in cities and towns. One way to provide them a social environment is to establish "Common Elephant Housings", wherein elephants can be assembled in small groups at specific centralized locations.

• Any zoo in India that manages/receives orphan calves from the wild also needs to house a suitable experienced adult female to take care/ interact with orphan calves.

• Nearly 50% of the temple elephant and 70% of private elephant houses are smaller than the size recommended by the Project Elephant, Government of India (48m2). So, elephant housings in temple and private systems should provide elephants the required housing space as per recommendation.

• Adequate and diverse species of green fodder with more of grass during rainy season and more browse during dry season needs to be provided.

• Chaining elephants in artificial houses should be reduced to bare minimum and the time allotted for walking / exercise and tethering elephants in natural shade during suitable climatic conditions should be increased.

• Reducing the chaining duration, increasing the exercise timing, maintenance of body weight for elephants and maintenance of good sanitary conditions of the houses are to be ensured to overcome diseases such as foot rot and arthritis.

• Periodical medical checkup by veterinary experts and a separate Medical Register should be made mandatory for all the captive elephants.

• Underpayment of mahouts results in further loss of the traditional mahouts, who possess traditional compassion and kindness, an essential factor in handling these magnificent giants humanely without any casualties. Hence, effort to increase the salary of mahout is required to maintain both keeper and elephant welfare.

• Steps to create awareness regarding elephant physiology and behaviour for elephant keepers, especially those in the Temple and Private managements that are presently filled with high proportion of non-traditional mahouts, are essential.

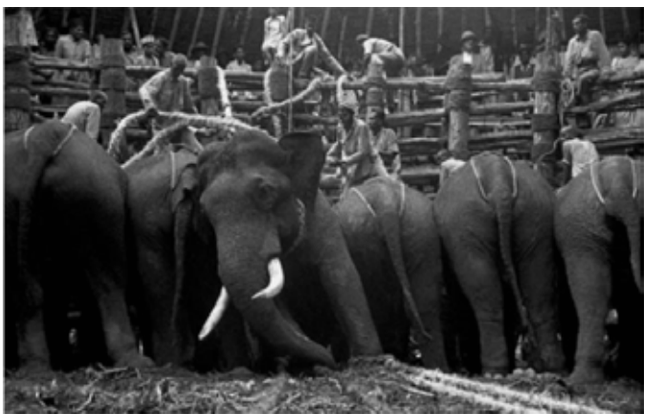
Role of Departmental Elephants in Park Management

Mahesh Kumar
DCF, Nagarhole Tiger Reserve

Karnataka has the highest wild elephant population in the country followed by Assam and Kerala. According to the last All India Synchronised Elephant Estimation exercise, 2017, there is an average count of 1.5 elephants per sq. km in the Nagarahole Tiger Reserve which stretches across 843 sq. km. Having good density of elephant population and connectivity, Nagarahole holds an important place for the long-term conservation of Asiatic elephants and thus included under the larger Mysore Elephant Reserve.

The vegetation pattern of the Nagarahole Tiger Reserve ranges from rich semi-evergreen and moist deciduous forest in the west to dry deciduous forest and thorny scrub forest in the east, interspersed with marshy-swamp valleys called Hadlus that acts as a unique habitat, best suited for wide range of herbivores.

Nagarahole is very popular for Khedda (ditch or an area enclosed by a continuous trench) operation, through spectacular river drive near Kakankote Reserve Forest adjoining Kabini River. Since 1891 to 1971, around 36 Kheddas were conducted and captured around 1902 elephants and were sent to various states and even abroad as working elephants. Due to the Khedda, captive elephants were hallmark of Nagarahole.



Originally, the Departmental elephants were employed for exploitation of timber in inaccessible tracts of forests, arranging logs in depots, loading timber into vehicles, riding, public purposes and sometimes as Kumkis for capturing elephants.
In the recent past, the timber extraction has been stopped completely and the elephant camps are catering to other needs of Department viz., protection and conflict management. Departmental elephants are deployed for the following activities: patrolling, wild elephant driving, wildlife rescue/capture, elephant radio-collaring etc.

Role of Kumkis in Park Management Elephant back Patrolling

Kumkis are very important for patrolling some inaccessible forest areas; elephant back patrolling can be recommended in two situations, one during difficult times i.e., during monsoon time, when many areas of Nagarahole Tiger Reserve gets be cut-off from the normal foot and vehicle patrolling and the second situation when large area of hadlus (marshy swamps) and thick lantana bushes have to be crossed, where normal foot patrolling is difficult and risky.

Wild Elephant Driving

Elephant drives are often carried out in non-forest areas to drive the elephant herd back to the forest areas. Elephant herd tend to crop raid the farmers field in the night and take shelter in the forest in the daylight. In order to provide temporary relief to the famers, Departmental elephants are deployed to drive the large herds back to the forest.

Wildlife Rescue & Capture

Departmental elephants are mainly used in recue/ capture operations of wild elephant, tiger, leopard and bear. Wildlife in conflict results in human injury and sometimes death. In order to avoid human casualty or wildlife death it becomes imperative to rescue the problematic animal from the conflict site (non-forest area) and translocate to safer locations; forest areas or rescue centres depending on the health condition etc.

Rescue team including the Vet staff mount the kumkis and approach the injured/sick animals, as this cannot be done through a vehicle. Swift action on the ground helps the Department to resolve the crisis and also gain confidence of the local community.

Radio collaring

Radio collaring is helpful in understanding the movement pattern, behaviour of elephants. Departmental elephants have played a major role in tracking and locating the animal to be radio collared. The kumkis facilitate the herd to scatter and when the female leader gets isolated, the experts mounted on the nearest kumki shoot the dart loaded with a tranquillising drug. When the elephant is sedated, the collar is fitted on to its neck.

Departmental Elephants Management

The role of Kumkis in park management is very crucial and in order to keep them healthy and fit for various Departmental activities, it is necessary to manage elephants and their staff in a professional manner and have a periodical reporting and reviewing system.

• Service Registers- Each elephant is given a name and its age, sex, height, training, ailments, working capacity etc. is recorded in a dedicated service register, maintained at the Range Forest Office to show the history of each elephant.

• Feed & Fodder- The natural food of elephants is grass and bamboos, although leaves of some plants are browsed. Hence it is very essential to house elephants with good availability of green fodder. The elephants should be let out for grazing after the evening feed is over.

• Veterinary care- Kumkis are regularly checked (fortnightly) by the veterinarian stationed at Division Headquarters who recommend medicines and special ration if condition warrants. Continuous wildlife health monitoring and surveillance, proper diagnosis and timely veterinary interventions are essential for effective conservation of wildlife in general.

•Elephant staff- All the elephant Mahout and Cavady should be housed near the elephant camp with basic minimum facilities and shall be periodically health checked to avoid any spread of disease like TB from animal to human and vice versa.

Role of Departmental elephants has changed from being deployed in timber coupes as working elephants to aid the frontline staff in ground as conflict managers. Kumkis have changed the way how a conflict situation is handled by the forest department. They have strengthened the ground staff and delivered the results whenever it is deployed with a cause. In the days to come, conflict management will be a major task for the Forest Department. Professional handling and management of kumkis and elephant staff shall strengthen conflict mitigation efforts and build the confidence with local communities which is a win-win situation for wildlife protection and conservation.

State of the Art Elephant Rehabilitation Centre at Kottoor in Thiruvananthapuram District, Kerala.

K. J. Varughese
Special Officer, Kottoor Elephant Rehabilitation Centre

Government of Kerala set up an Elephant Rehabilitation Centre in the reserved forest at Kappukad near Kottoor in Thiruvananthapuram District in 2007 with the objective of rehabilitating baby elephants salvaged form forest, mostly stranded from the herd. Later, old elephants in the traditional Elephant Camps of Kerala Forest Department and elephants seized form private persons and institutions charged with the crime of cruelty to elephants were also brought to the Centre and by 2017, the Centre housed 15 inmates, 6 of them below 10 years of age and others above 10 years of age. Over the years, the Centre, situated 30 kilometers from the State capital city of Thiruvananthapuram, became a center of tourist attraction.

In 2017, Government decided to upgrade the Centre to International standards, the first of this type in the whole country, with funding from Kerala Government. The objectives were redefined in the context of latest developments in the efforts to conserve viable population of Asian Elephants at National and International level including the Report of the Elephant Task Force of the Ministry of Environment and Forests (in August 2010), declaration of Elephant as National Heritage Animal in 2010, listing of Indian Elephants in the Appendix I of the Convention of the Migratory Species (CMS). The State of Kerala having four Elephant Reserves spread over three Regions has been successfully implementing the Project Elephant programmes since its inception in 1992. Securing a future for the elephants in India, its continued survival in the wild and its human care in captivity (Gajah report) is top on the elephant conservation agenda of the State. Attrition of living spaces and the tense condition of the human-elephant encounter on the ground (Gajah report) required urgent redressal in the State. The prime objectives of the Center include addressing the vexed problem of man-wild elephant conflict and welfare of captive elephants in the State in tune with the objectives of Project Elephant (to protect

elephants, their habitat and corridors; to address issues of man-animal conflict; welfare of captive elephants).

The Center getting upgraded to international standards at a cost of Rs 105 Crore will have facilities for housing 50 Elephants and opportunities for studies and research. Elephants will be kept in chain free condition in their natural habitat in 176 hectares of forest area, 56 hectares set apart for developing housing elephants and establishing administrative facilities and about 120 hectares for foraging in forests. In the natural forests forming part of Kottoor Reserve, scientifically designed living space for elephants with all elements in the natural habitat are being built. Large enclosures, each spreading up to 5 acres of forest bound by iron rope fencing and having spacious tethering sheds and created water bodies are providing facilities for elephants to live in group, preferably for females and calf elephants, following the social living pattern in the wild. Each tusker is getting similar facilities over minimum one acre of forest. Large tract of natural forests in the foothills of Agasthyamala (Agasthya Hill) provide foraging land for the elephants in the Centre exposing them more to natural environment. Elaborate facilities for hand rearing baby elephants including quarantine centers, specially designed enclosure for elephants in musth, elephant natural history museum, training centre for mahouts, veterinarians, foresters and elephant enthusiasts, elephant veterinary hospital, kitchen and feeding complex for elephants with modern facilities, zero waste facilities including unit for making craft paper from elephant dung, crematorium for elephants, large water bodies carved out of adjoining Neyyar reservoir, entrance plaza, cottages and hostels for researchers and trainees, cafeteria overlooking Neyyar Reservoir, facilities for viewing elephant feeding and bathing of elephants etc are the facilities being established.

The project contributes to enhancing the biological diversity of the forest area, predominantly occupied by planted acacia trees (Acacia auriculiformis), an exotic tree. As part of landscaping and afforestation, 6000 saplings of forest trees, bamboos and palms are planted in the project area.

The Centre receives elephants from different sources. Every year, about half a dozen calf elephants are found stranded in the forest fringes all over the State due to accidental fall in to ditches difficult for the mother and herd to rescue, washed away during flood or during river crossing, death of mother elephant etc. They are generally of the age 3 months to 3 years. Kerala had been maintaining elephant camps in forest areas at Konni in Pathanamthitta district, Kodanad in Ernakulam district, Nilambur in Malappuram district and Sulthan bathery in Wayanad district.

The camp elephants used to be engaged for timber operations in the forest earlier. With the advent of machine power in logging, the camp elephants are no more engaged in logging. The maintenance of these elephants, most of which have become old, is effectively carried out in the Rehabilitation Centre where adequate facilities for food and veterinary care are centrally available. Kerala has about 500 captive elephants mostly owned by temple trusts, joint families and individuals. They are subjected to cruelties by untrained mahouts, avaricious owners or tenants and many a time some of these elephants live in misery due to lack of food and veterinary care owing to poor financial position of owners or trusts. The Wildlife (Protection) Act, 1972 cast a legal responsibility on the State to salvage such elephants which are animals in Schedule I of the Act. State of Kerala is facing acute problem of man-wild elephant conflict resulting in affected people resorting to attacking or poisoning of habitual crop raiding jumbos. Even though Kerala Forest Department has developed meticulous protocol for driving these elephants in to forests, successful operations are becoming far and few, resulting in massive public protest for capturing the habitual crop raiders by tranquilizing. Relocation of such captured elephants rarely happens due to protest from people nearby the proposed relocation areas. The Rehabilitation Centre provides them reasonably healthy living in near natural habitat rather than rotting in chains in conventional elephant kraals.

The Kottoor Centre has a unique baby elephant care centre having facility for housing four baby elephants, rooms for mahouts to stay along with the wards, hygienic kitchen facility, consultation room for veterinary doctor, quarantine facility for two animals along with mahout stay facility and equipments for emergency management. Presently three babies arereared in thisfacility. Veterinary clinic is running round the clock with two veterinarians and para veterinary staff. The hospital has both outpatient and inpatient wards with mechanical handling devices. Pathological laboratory is being set up along with exclusive lab for herpes virus.

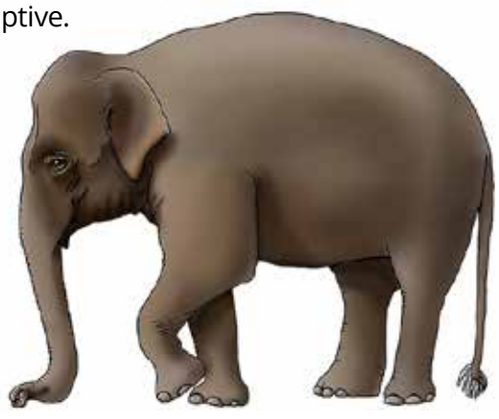
Elephant housing is in the forest area. Housing facilities have been developed as per the "Standards/norms for Recognition of Elephant Rehabilitation/Rescue Centers under section 42 of the Wildlife (Protection) Act, 1972" issued by the Project Elephant Division of

MoEF&CC. Presently the Centre has 14 enclosures, 7 enclosures for individual housing and 7 for group housing. The Master Layout Plan and DPR are approved by the Central Zoo Authority. Each enclosure spread over approximately 5 acres for group housing type and 1 acre for single housing type, has boundary fencing, ponds, mud bath areas and other enrichments. The elephants are taken out for bathing in Neyyar Reservoir around 07.00 in the morning. Food supplements cooked out of rice/wheat, millets, jaggery and minerals are served around 09.30AM. Then the inmates are taken out to adjoining forests for foraging on rotation. Evening bathing is given around 04.00 and finally returned to respective enclosures. Leafy feed like coconut leaves, tree branches etc. are supplied in the enclosures. Mahouts stay in four night shelters spread across the enclosure area.

The centre has facility for managing tuskers in musth. Also kraals constructed using kampakom wood (Hopea parviflora) have been constructed for housing captured elephants. Post mortem facility and crematorium also have been built in the Centre.

The Centre has an elaborate Training and Research Centre catering to the needs of mahouts, forestry and veterinary students, serving staff, elephant owners and general public. An exclusive Elephant Natural History Museum spread over sixteen thousand square feet, first of its kind in the country is coming up shortly to disseminate elephant conservation education to the visitors, especially students. Themes presented in the museum through different media including digital media cover evolutionary history of elephants, Asian and African Elephants, elephants in the wild and in captivity, elephant-human bond and elephants in mythology. Video library and digital interactive rooms are provided in the student's corner.

The construction works started in December 2019 are targeted to be completed by December 2022. Once completed, the Centre will have facilities to house 35 elephants. Three lakh visitors are expected annually. Eco Development Committees (EDC) and Vana Samrakshana Samithies (VSS) are partnering with the Department in managing the Centre. No doubt, the Centre will become a unique model of Asian elephant conservation, both wild and captive.



Evolving Management Practices of Captive Asian Elephants in India

Dr. Brij Kishor Gupta
Regional Representative, Durrell Conservation Academy

Asian elephants (Elephas maximus) have been for centuries regarded as cultural icons and as flagship species for conservation throughout the world. Elephants were managed in captive conditions since time immemorial. As per historical accounts, they were first domesticated in South Asia with evidence of captive elephants dating back to Indus Valley Civilization. Use of elephants is spread across South and South East Asia as a beast for burden, transportation and for warfare. Better management practices of elephants with high standards of animal welfare have both ethical and economic interests. Elephants in India had received protection status for centuries in India. Recent survey of captive elephants in the country shows that there are over 2675 registered captive elephants in India with more than half accounted from the states of Assam, Kerala and Karnataka. About 85 elephants are held across various zoos in the country. While the management practices of captive elephants outside captive centres in beyond the scope of this paper, we look into those that are bring followed in zoos and other captive facilities. The objective of this paper is look into evolving management practices and upkeep of captive elephants in Indian context

In the past, elephants in captivity in India, had to endure mental and physical suffering due to bad management practices. In sharp contrast to their natural habits, they were forced to spend long hours standing on concrete surfaces in confined spaces. Elephants in captivity tend to experience different set of biological and environmental conditions than their wild counterparts that may not be suitable for their welfare. Differences in the living conditions and behavioural patterns in comparisons to those from the wild will result in poor welfare of elephants. Secondly elephants in the wild particularly females, stay in matriarchal associated family groups. However, contrarily, many of the zoos/captive centres in India tend to have unrelated individuals (both males and females). This had severely constrained their behavioural and physiological habits which had led to stereotypic behaviour among many individuals. While captive breeding of Asian elephants is not the sole objective of zoos/ captive centres in India, their management practices has been a cause for concern.

In the past two decades, there had been emphasis on improving elephant management in captivity both by governmental (Project Elephant and Central Zoo Authority under Ministry of Environment, Forest and Climate Change & State government agencies) and non-governmental agencies. Many new rules and guidelines and management of elephants (The Kerala Captive Elephant (Management & Maintenance), Rules 2003; Guidelines for management and maintenance of elephants in circuses, Central Zoo Authority; Guidelines for Establishment & Scientific Management of Zoos in India, Central Zoo Authority, 2013) were formulated particularly to improve standards for care, transportation, training, housing, nutrition, health, record keeping, foot care, environmental enrichment and veterinary care. Till very recently the Project Elephant Division of MoEF&CC vide its office memorandum dated 24.03.2022 has reconstituted a Committee of 10 members on Captive Elephant Health Care and Welfare and they have been also assigned to prepare detailed Veterinary Care Plan for management of Captive Elephants in India.

The Asian elephant is the highest status of protection in Wildlife Protection Act, 1972 as a

Schedule 1 species and the initiation of Project Elephant in 1991 had increased the overall protection of the species. However, exception was made to legally own elephants in India.
However, if the possession of the elephant is not legally owned or declared, ill-treated or if the owner doesn't meet the standard norms of the upkeep of the elephants, the respective State Forest Department has the authority to cease the elephant and send to care centres.

In recent years, there had been advocacy regarding care of elephants in captivity. In 2009, Central Zoo Authority (CZA) of India banned the display of elephants at zoos across India, citing the spatial and behavioural needs of the species. This directive was later revoked and few zoos that met the standards for keeping elephants in captivity were permitted to keep them. The Union Ministry of Environment, Forests and Climate Change (MOEF&CC) has done well to issue a draft notification on November 28, 2018, banning the use of all animals in circuses across the country.

While there were other standard management practices that were advocated in other parts of the world (AZA and EAZA), India being a range country of the species and had evolved management practices considering both traditional as well as modern practices. Also, that unlike the limited number of animals in other breeding programmes, zoos/captive centres in the subcontinent tend to have different set of constraints. While most Asian elephants in Western zoos are now captive born and are held in social herds, most animals in Indian zoos/ captive centres are rescued animals mainly due to Human - Elephant Conflict. Central Zoo Authority had mandated periodic guidelines regarding the management of elephants in captivity from time to time. Elephant training programmes were mandated and organized by CZA for elephant keepers and veterinarians to improve elephant care and management procedures in zoos. This was helpful to adopt and implement newer practices of elephant care and welfare in captivity. Recent advances in research on elephants based on the ecological and biological needs of elephants has provided new information that can be useful in better management of the species in captivity.

Satisfying the needs of captive elephants given their biological needs (behavioural and ecological needs) is very difficult (Veasey, 2006). Knowledge on the natural biology and needs of elephant will invariably be useful to improve their management in captivity. Captive elephants tend to spend less time foraging than their wild conspecifics.

In order to reduce the boredom and improve the overall well-being of elephants in captivity, many of the captive facilities-initiated enrichment activities which provide opportunity for both mental and physical stimulation in the animal. Enrichment activity will directly increase the activity of animals by stimulating their brains, promote social interaction with other conspecifics and encourage their natural behaviours. Project Elephant and Central Zoo Authority came up with guidelines for effective enrichment based on based on basic biology and natural history of elephant. Different types of enrichment for elephants are currently followed that include exhibit, social, dietary, novel and olfactory enrichments respectively. Exhibit enrichment include pools, shade structures, natural/rubber substrates, dust bathing, and roof top anchors for securing food and novel items. Dietary enrichment includes variable feed timing, changing diet composition, spreading food, feeder balls, logs, barrels and hay nets. Social enrichment includes appropriate social grouping, exposure to other species, unrestrained group housing and interactions with keepers. Sensory abilities of elephants are known to be about five times that of humans. Sensory enrichment includes tastes of various food and plant extracts and smells of natural and aromatic compounds. Novel enrichment for elephants includes artificial objects like tires, large hanging balls, water floating balls, barrels, cardboard boxes, water sprinklers, etc. Many of these enrichments are today being followed in most of the captive centres that house elephants.

Issues of health had been a major concern in the management of elephants in captivity. Captive elephants are known to have many health problems ranging from malnutrition, obesity, diseas-

es, man-made wounds on the body, fissures on footpads, orthopaedic and vision related issues. Unfortunately, most of the owners do not have the resources or access to proper health care for their elephants.

Captive elephants are known to be affected from diseases like tuberculosis, tetanus, tuberculosis, haemorrhagic septicaemia, rabies, anthrax and salmonellosis. In recent times, there had been multiple veterinary challenges associated with captive elephants.
The most concerning issue pertaining to disease in captive elephants is the recent incidents of outbreak of the acute fatal Endotheliotropic Herpesvirus Haemorrhagic Disease (EEHV HD) among captive elephants in the country and is a significant threat for their survival. Globally, it is one of the main causes of death in captive elephant mainly among calves. There is currently very limited information available on successful treatments of this disease. It is hoped that more focused research on diagnosis and treatment for this disease is taken up immediately.

Most of the captive elephants in the country are owned by privates, individual entities, elephant camps of Forest Departments and maintaining an elephant is expensive. Many of them cannot meet the standard norms for husbandry and health concerned with the species. Individual histories of captive elephant in India are not properly documented other than in few Institutions. Most Asian elephants in North America and Europe are documented in species specific studbooks. Such initiatives can be helpful in proper care and management of elephants in captivity. Henceforth, there is a need to have a National Studbook for elephants in India. Also, there is a need to train mahouts about proper care, needs and husbandry of elephants (particularly when animals are in “Musth”.

In the past few years due to the stringent laws and guidelines on using and care of elephants in captivity, many owners who could not meet regulatory norms had forwarded requested to concerned agencies for rescue and rehabilitation of these elephants. Also, that many of the older/ injured animals need special medical care for their well-being. This situation was magnified after the COVID imposed restrictions since 2020. Facing with such dire situations, there has been a need to rescue and rehabilitate such elephants. Fortunately, in the past few years, many state governments and organizations had started lifetime rescue and rehabilitation centres and care centres to provide care to such rescued animals where the animals can have a care free healthy life. The objective of these centres is to provide life time care to unwanted, old, sick and injured elephants by providing them with good housing amenities, veterinary care, walk ways, enrichment and nurture them back to good health and to rebuild their cognitive, behavioural, and physical skills.

POLICY FRAMEWORK

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Kathmandu Declaration and the Implications for India

Vivek Menon
Chair, Asian Elephant Specialist Group, IUCN/SSC

Kathmandu exudes an aura of unhurried peace and charm. What better setting than that for range states of the Asian elephant to meet and deliberate on the future for the largest land mammal in our continent. While Jakarta in 2017 had set the foundation for range state meets and declarations to save the Asian elephant, Kathmandu 2022 had a vision to build upon that and concretise action across the range countries. With this in mind, the Nepal Government co-hosted the Third Asian Elephant Range State Meet with the Asian Elephant Specialist Group of the IUCN/SSC with support from the US Fish and Wildlife Services in Kathmandu. While eight of the 13 countries could be present physically (Nepal, Bangladesh, India, Myanmar, Laos, Malaysia (both peninsular and Borneo and Sri Lanka) the other five (Indonesia, China, Vietnam, Cambodia and Bhutan) attended virtually due to enhanced corona regulations in their respective nations.

As Chair of the AsESG, I had the unique privilege of co-chairing several sessions of this key meet with my range state colleagues as was the case in 2017 in Jakarta. The AsESG has as a key objective in its mandate the need to convene expertise needed for conserving Asian elephants. That was exactly the thought that was behind the months of planning done by my secretariat comprising Vice Chair Heidi Riddle and Program Manager Sandeep Tiwari in working with the Director General RC Kandel and his fine team of officials at the Department of National Parks and Wildlife Conservation in Nepal

While the three days of deliberations in Kathmandu at the Gokarna Resort and attendant field excursions also served to build a close bond between officials of the countries who have the mandate to conserve the Asian elephant, a key product of the meet was the Kathmandu Declaration which is reproduced in this magazine in its full form.

The key take aways from this for me are as follows:

1

Nine key priority actions underlined and agreed upon by all range states to attempt to fulfill by 2025. It is not often that declarations come with dates attached to them. In doing so range states have shown their commitment and vision to steer Asian elephant conservation towards measurable goals.

2

Agreement to complete national elephant conservation action plans where not in place and also a range wide action plan that AsESG will be happy to support in creating with the range states.

3

Agreement to have transboundary collaboration on a range of specifics such as habitat conservation, linkage and corridor work as well as enforcement.

4

Agreement to establish a pan Asian elephant database for countries to share relevant data with each other.

5

Agreement to establish an Asian Elephant Conservation Fund to assist in financing conservation in range states.

Many of these are actions that have happened for the African elephant decades earlier and I salute this meeting and its officials for making this a commitment for Asia and beginning a new chapter in international cooperation to conserve this magnificent heritage of Asia.

THE KATHMANDU DECLARATION FOR ASIAN ELEPHANT CONSERVATION

KATHMANDU, NEPAL

April 29, 2022

We, the representatives of the government agencies from Asian Elephant Range States including the People's Republic of Bangladesh, the Kingdom of Bhutan, Kingdom of Cambodia, People's Republic of China, Republic of India, Republic of Indonesia, Lao People's Democratic Republic, Federal Democratic Republic of Nepal, Democratic Socialist Republic of Sri Lanka, Republic of the Union of Myanmar, Malaysia, Kingdom of Thailand, and the Socialist Republic of Vietnam, declare our common goal to conserve the Asian Elephant within its Range States, and:

Recognizing that the Asian Elephant, a seriously endangered species and one of the most iconic animals, faces a challenging future with the loss of its habitat, fragmented populations, high levels of human-elephant conflict, illegal killing, as well as other factors that have resulted in population declines in some of the Range States, and that we should have a common vision to promote Asian Elephant conservation;

Acknowledging that the Asian Elephant is a keystone species and an umbrella species whose conservation helps ensure the conservation of myriads of other species. Asian Elephants are also culturally significant across Asia. A failure to protect Asian Elephants and their habitat will therefore not only result in the loss of elephants but also the loss of biological and cultural diversity and the tangible and intangible benefits provided by elephants and the ecosystems they inhabit;

Noting that while elephant conservation is primarily a national responsibility, there is an urgent need to synergize national actions with international cooperation amongst the Range States for the long-term conservation of Asian Elephants. The reversal of the crisis facing Asian Elephants is additionally dependent upon political, financial, and technical support from the international community;

Understanding the role of international agreements on the conservation of biological diversity and protection of rare and endangered species, including the Asian Elephant, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Biological Diversity (CBD), and the Convention on the Conservation of Migratory Species of Wild Animals (CMS);

Acknowledging the presence and support of other governments, international organizations, non-governmental organizations, and other supporters of Asian Elephant conservation;

Building upon the Jakarta Declaration for Asian Elephant Conservation of the second Asian Elephant Range States Meeting of 2017
Thus, we declare:

• To enhance cooperation between the thirteen Range States both bilaterally and multilaterally, promoting transboundary conservation of the Asian Elephant, and sharing and learning to enhance national conservation measures;

• To promote coexistence by minimizing the negative impacts of humans on Asian Elephants and their habitats, address the root causes of human-elephant conflict, and develop long term solutions to minimize such conflict; engage with local communities to gain their participation in biodiversity conservation and land-use planning; and provide sustainable and alternative livelihoods through financial support, technical guidance and support, and other measures;

• To ensure effective law enforcement across the species' range to prevent illegal killing of Asian Elephants and the illegal trade in live Asian Elephants, ivory and its derivatives, and other elephant body parts;

• To promote and ensure the welfare of captive elephants is maintained at all times;

• To strengthen international collaboration, coordination, cooperation and communication based on bilateral and multilateral agreements where relevant, involving specialized expertise from national and international organizations, including but not limited to AsESG, IUCN SSC, CITES, INTERPOL, CBD, CMS, UNEP, ASEAN-WEN, SAWEN, and UNODC;

• To set up through appropriate mechanisms an Asian Elephant Fund, accessible to Range States and Range State civil society,

to promote conservation of the species and its habitat;

• To develop an appropriate data sharing mechanism among Range States;

• Commit to develop, where necessary, and where applicable implement National Asian Elephant Conservation Action Plans that include, but are not limited to, the priorities listed in the annex to this Declaration.

And call upon the international community to join us in addressing the challenges facing Asian Elephants and achieving a harmonious coexistence between humans and Asian Elephants.

Annex: Priority Commitments by 2025

• Promote the maintenance and connectivity of large Asian Elephant conservation landscapes where new permitted developmental activities such as linear infrastructures are elephant- and biodiversity-appropriate;

• Promote the development of national guidelines on wildlife friendly linear

infrastructure, including elephant, based on those developed by the Asian Elephant Specialist Group of the IUCN SSC and Connectivity Specialist Groups after Range States consultations;

• Develop bilateral transboundary agreements, protocols or understandings in relevant countries to ease movement of Asian Elephants through appropriate corridors and transboundary protected areas;

• Collectively develop, where relevant, and coordinate captive Asian Elephant registration programs in relevant countries, based on scientific research including, where appropriate, microchipping and/or DNA-based systems, and ensure cross-border movements of captive Asian Elephants are in compliance with all national and international laws and regulations;

• Ensure that all Range States have a National Asian Elephant Conservation Action Plan;

•Promote the development of national guidelines on Human Asian Elephant Conflict mitigation based on those developed by the Asian Elephant Specialist Group of the IUCN SSC after Range States consultations;

• Ensure that all Range States have a National Asian Elephant Conservation Action Plan;

• Promote the development of national guidelines on Human Asian Elephant Conflict mitigation based on those developed by the Asian Elephant Specialist Group of the IUCN SSC after Range States consultations;

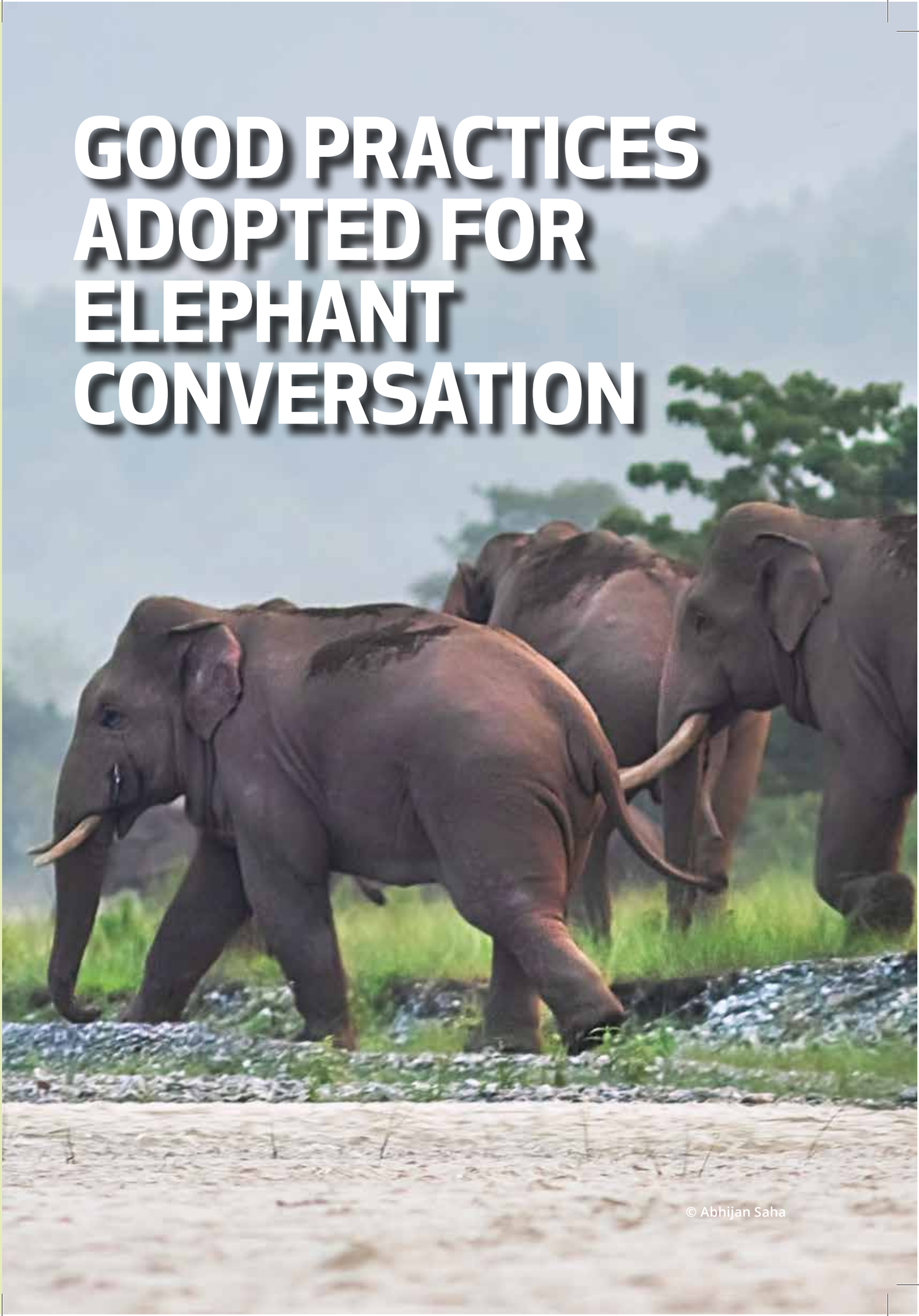
• The Range States support the development of range-wide Asian Elephant Conservation Plan by the Asian Elephant Specialist Group of the IUCN SSC;

• The Range States initiate the establishment of a national Asian Elephant Database with the technical support of the Asian Elephant Specialist Group of the IUCN SSC and CITES MIKE/ETIS;

• The Range States jointly initiate the creation of an Asian Elephant Fund assisted by the Asian Elephant Specialist Group of the IUCN SSC;

DONE in Kathmandu, Nepal on the Twenty Ninth Day of April in the Year Two Thousand and Twenty Two, in a single original copy in the English language.

GOOD PRACTICES ADOPTED FOR ELEPHANT CONVERSATION



Saving Teesta Corridor: Convergence Between Conservation and Development

Vinod Rishi
Former IGF & Director (PE)

Once a very senior forest officer, experienced in the ways of wild animals and forests, told me, "You know, the best road builders in the Himalayas are the elephants in the foothills and ponies in the higher reaches! Most of the roads in the Duars were once elephant highways. The forest officers turned them into fair-weather forest roads." Duars is the name given to the well-drained extensive apron of the eastern Himalayan foothills. Outside the forests the elephant paths have been converted into hard-topped roads.

Remnants of the original elephant highways still exist in parts in the Duars. Sections of these well beaten traditional elephant movement tracks, packed hard under the heavy feet of elephant herds, can be still be seen skirting the foot hill through the forests of northern West Bengal. I had mapped fragments of one such highway in the western Duars in 1975 when I was posted there as Divisional Forest Officer, Baikunthpur Division. It hugged the foot of Kurseong hills in Mahananda sanctuary, and after emerging from the sanctuary it continued through the adjacent Reserved Forest along a fire-line named the 9th Mile fire line till it descended into the bed of the river Teesta. The fire- line formed, in those days, the administrative boundary between Kurseong and Baikunthpur Forest Divisions. After descending into the Teesta River bed near Chumukdanga, a small village at the base of the western bank of the Teesta, the elephant movement path crossed the river and entered Gazalduba forest in Apalchand Forest Range, which formed the eastern section of Baikunthpur Forest Division. From Gazalduba the elephant highway ran through the Apalchand forest emerged from the forest at the western bank of a small river

Gazalduba Teesta Bed Now - photo courtesy Avijan Saha

Teesta Corridor Conserved – photo courtesy Avijan Saha

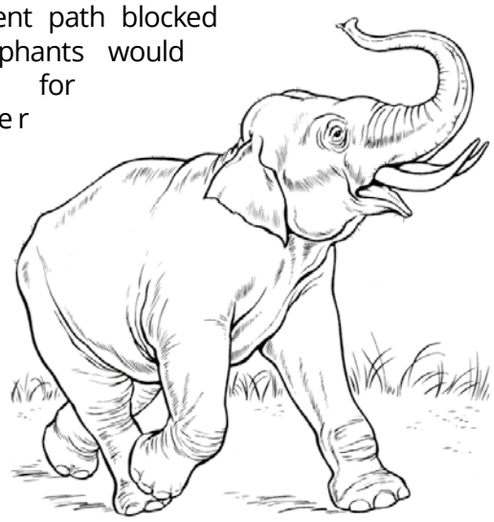
named the Chel river. Beyond the Chel the elephant path continued on through countryside cultivation and patches of forests in the District of Jalpaiguri. I had traced the path from Mahananda sanctuary to the Chel, where my jurisdiction ended, on a map. Dr. D.K. Lahiri Choudhury, an eminent and internationally recognized authority on the Asian Elephant, who mapped the elephant movement paths in the entire north Bengal, called the paths that linked fragments of forests as corridors. I had mapped the Teesta corridor in 1974.

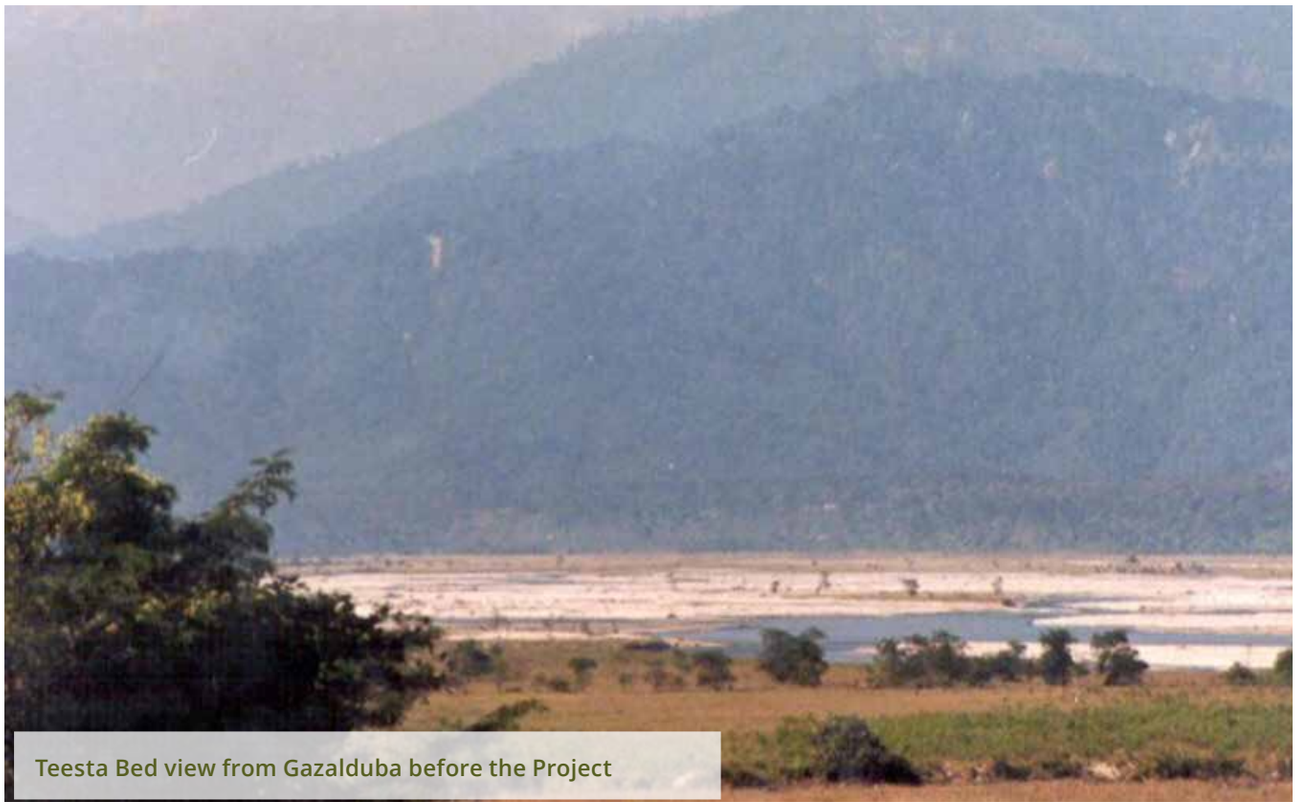
It was also the year when this corridor faced the threat of blockage by construction of a barrage over the river Teesta. The Government had planned to build an irrigation and flood control barrage aligned across the river from Gazalduba Forest Beat Office to a fire line two miles south of the Chumukdanga village. They planned to have an Inspection Bungalow at point where the barrage and its canal met the 7th Mile fire line in the western section of the Baikunthpur forest. The western irrigation canal was proposed to run along the 7th Mile fire line cutting through the Baikunthpur forest into two section, till it met the Siliguri-Assam national highway number NH31. The canal would then turn south and run past Siliguri to irrigate the crop lands in the plains further south.

The matter came to my notice when the proposal for transfer of forest land to the Teesta Barrage Project Authorities was sent to me by the West Bengal Forest Directorate for my comments before the grant of permission to divert the forest land for development works could be considered.

I was familiar with my forest and could immediately notice the proposed alignments of the barrage and its canal were going to create many problems for forest and wildlife in the area. I felt we could avoid the destruction of forest and, at the same time, ensure the Teesta Barrage Project also take its own course.

In my view the protection of forest, the elephant highway, and the people living at Chumukdanga was going to be compromised if we followed the sites and alignments of different construction works as planned under the Project. The proposed alignment of the Barrage would cut diagonally across and obstruct the elephant movement along the corridor between Chumukdanga and Gazaldluba. There would be a large body of impounded water up-stream of the Barrage, which was going to submerge an extensive area of the wildlife rich river bed and also the Chumukdanga village. Furthermore, forest area would be needed to be cleared up if the Government thought of the resettlement of the village elsewhere. With the elephant movement path blocked the elephants would search for another route to





Teesta Bed view from Gazalduba before the Project

cross the river. I could see that they would be turning into human settlements, croplands and tea gardens to seek a new route. It would lead to a significant increase in direct, and violent confrontations between people and wild elephants. We could expect the loss of human life, property and cultivated crops as a fall out of the blockage of the centuries old traditional elephant movement path.

Not that the Project Engineers did not have any concern for the forest. In fact, when I met them at Siliguri they informed me that they had tried to minimise the damage to the forest by proposing the shortest possible passage of the canal through the forest by aligning it along the 7th Mile fire line. By proposing the alignment of the canal along the fire line they minimised the number of standing sal trees needed to be felled. Once outside the forest there was no need to fell trees standing by the side of the NH31. They had planned to build their colony for the barrage on the waste land on the eastern bank of the river outside the forest at Gazalduba forest, so that they averted the need to fell trees for constructing their colony.

What I feared I discussed with them: the problems we would be facing in the protection of the forest, people and wildlife if the proposed alignment was accepted. The irrigation canal was as wide at its top as the fire-line. It was to be deep and had steep banks. Its design made it a barrier against the free movement of the patrolling parties as well as of the wild animals from one side to the other across the 7th Mile divide. For any wild animal that happened to descend or fall into it, or tried to swim across the canal, it would not survive: the steep walls of the canal and its swift current made it a death trap for the hapless animal. The crossing points across the canal, if provided, would be few and far between. It would turn the canal into a serious obstacle in the patrolling of forests by the staff. In the event the patrolling staff found miscreants on the opposite side of the canal it could be almost impossible for the patrolling party to give them the chase, for negotiating the barrier of canal by using the nearest crossing point, if provided for in their plan, would give the miscreants enough time to escape. The advantage would go to the offenders who might enjoy watching the discomfiture of the forest patrols while they carried away their booty safely on the far side of the canal. Even more serious would be the loss of staff morale such failures would eventually usher in. It would not need many a failed attempt at capturing the poachers and other criminals to make the forest staff let the futility of their efforts overcome their zeal to apprehend offenders and poachers on the far side of the canal. The canal was sure to make the forest vulnerable to timber theft and poaching.

But the Project, too, was important for the overall good of the people. I was fortunate that it still was

in a nebulous stage. I invited the senior Engineers to a field visit to the sites they had planned for their Project. We visited various proposed sites, and I also took them to some other sites I felt they could examine as alternative alignments for the barrage and the canal.

We drove down the 7th Mile fire line through the forest. We saw a few cheetal deer grazing peacefully in a glade on the way. From the Teesta high bank at the end of the 7th Mile fire-line we had a good view of the mile-wide expanse of the river bed and the Gazalduba forest on the far bank of the river. We could also see the course the river had taken for miles down-stream. The Engineers pointed out the proposed alignment for the barrage, the site for their Inspection Bungalow and the canal they proposed to build. I discussed with them, showing the stretch of elephant highway that would be submerged by back water, the concerns I had.

Next, we drove through the forest south along a north-south fire-line, stopping at a few points on the Teesta Bank to see new sites I had in my mind and discuss them and many other related issues. We passed a tea garden, Saraswatipur, and stopped at the high bank of the Teesta at Bodaganj. From here also Gazalduba on the eastern bank of the river was visible. I suggested another alignment I had in my mind for the barrage and the canal and also showed another site for their Inspection Bungalow. On the way back I brought them back by a much shorter route to Siliguri. The new alignment I suggested needed a shift of about a hundred yards downstream at the Gazalduba end of the river, from which point the river would be crossed with the barrage and canals in position to meet at a point just south of Saraswatipur tea estate, a village named Bodaganj on the western bank. The canal would then turn south, skirting the edge of the forest to Belacoba where it would turn west and meet their proposed alignment of the canal south of Siliguri. We agreed that it would marginally shorten the total length of their canal, require less forest land for their entire Project, provide them for their Inspection Bungalow at a picturesque spot on the river bank and give them an easy access to Siliguri. It also saved the integrity of the Baikunthpur forest and the elephant corridor.

Fortunately, the Project Engineers accepted the slight changes I had suggested. It was also possible to accommodate the changes within the Project Budget.

The Teesta Barrage Project adopted the alignment and the sites we had jointly worked out. The Barrage and its canals came up with the suggested alignment and was commissioned in 1986. The current alignment of the Barrage and its canals is exactly as we had jointly worked it out in 1974-75. It was my first case of bringing convergence between conservation and development.

There were unexpected rewards from Nature: the impoundment of water, upstream of the barrage turned into a heaven for migratory birds and Gazalduba became a hot centre for wildlife tourism. Not only the people in and around Siliguri found this newly developed asset of immense value for them but the wildlife and forest department also recognized it as a meeting point of Development and Conservation of Natural Resources. That the conservation of forest and wildlife and national development are mutually antagonistic was proved to be a myth. The lesson I received was that it works better to act at Project Formulation stage and co-ordinate with directly with Project Implementation Authorities at the time of granting clearances for land needed for the projects explaining to them your concerns and their needs, and mutually find out ways to integrate them. I have later used this principle in carrying out conservation with major development activities like getting High Tension Power Transmission Line from Tehri Dam cross Rajaji National Park by directly interacting with Power-Grid Corporation, the Project Authorities for the work; reducing damage to Tale Wildlife Sanctuary in Subansiri Valley Project, Chuka Project High Tension Power Transmission line through Jaldapara Sanctuary, to name a few. I have found that conditions set down to be followed by Project Proponents and Authorities do not work because there is no monitoring of their implementation once the Project has received clearance from the Government to go ahead.

Managing Elephant Challenges Through Small Interventions

A N Prasad
Former PCCF (WL) & CWLW, Jharkhand & Former IGF (PE), MoEF&CC

Unlike other wild animals, elephants are better protected and secured due to its deep cultural and religious connect with the people across the country. The very fact that elephants are social animals with high intelligence further makes their conservation easier. If elephants are more secured because of their nature, most of the challenges including the conflict is also the result of its nature. Therefore, despite significant achievements, there are several challenges and management issues which needs to be addressed. Since wild elephants are found across more than 67,000 sq km and are migratory by nature, the future of elephants depend on successful tackling / addressing of these challenges like that of securing corridors and habitats, human – elephant conflict, accidental deaths due to electrocution & train collusions, poaching for tuskers etc.

I would like to narrate two interventions made by me as Field Director of Palamau Tiger Reserve (PTR) in Jharkhand during my posting (2004-06). Palamau Tiger Reserve has a resident population of more than 200 elephants who mostly stay in Southern part of the PTR but move to north (Betla NP) in winters. The Tiger Reserve spreads from south to north and a railway line crosses it east to west on northern end of the PTR. The railway track was a single unelectrified track till late 80s but was converted and electrified into double track thereafter. Being a busy line for goods trains carrying coal, iron ore etc., there were frequent collision with elephants at a particular site resulting in death of more than dozen elephants. Immediately after my joining in 2004, there was a train accident in which 4 elephants were killed after being hit by a train. During inspection, I found that the place of accident was just near a bridge and the two tracks -up and down- were almost 30 mts apart and there was heavy growth of grasses between the two tracks. I was surprised that the herd of elephants did not use the underpass (below the bridge) to cross over but preferred to cross across the tracks. I checked up with local cattle hereders if they have ever seen elephants crossing through the underpass. I was told that at times they have seen elephants below the bridge in the nalla but the moment the train passes over, they climb up and use the tracks to cross over. I waited for a train to come and stood below the bridge. I found the rattling sound of the train so severe that it was impossible to stand there. For me this seemed to be the reason for elephants to not use the underpass. The rich growth of grasses etc. appeared to me the reason for the herd to take longer time to cross over resulting in collision. I immediately ordered the vegetation to be cleared the next day and to do it on regular intervals during their migration season. After coming back to headquarters, I collected the data of all past rail accidents. To my surprise, I found that all accidents took place on down track which was recently laid. I also found that all the past Directors have written to the Divisional Railway Managers (DRM) to put a speed limit of 25 km per hour in the entire stretch of

about 35-40 km falling in the PTR. Railways did not agree to this due to operational reasons. I requested DRM for a meeting to resolve the issue. During the meeting, I told DRM about all accidents taking place on down track and asked if there is any difference between two tracks. He informed that the bridge over the up track was very old and weak so a caution order has been in operation since the electrification of the line, meaning that the engine and the last bogey of the train will pass the bridge at speed of 25 km per hour. I could immediately visualize that in order to do so the train has to reduce the speed much ahead and can pick up speed again after some distance, making the corridor safe. I pleaded with DRM to put the same caution on down track as well, to which he readily agreed and issued the order. Since then, it is more than 18 years and no accident has taken place. What I want to convey is that some time such problems can be resolved by simple interventions if you analyze the data properly.

The second intervention was concerning the damage to mud houses of the local villagers. Being tribal dominated area, the locals collected and stored mahua seeds and flowers inside the houses. They also brewed and stored mahua liquors. Elephants are known to have strong liking for mahua products and mostly such houses were targeted by them. Palamau TR area is naxal infested and in seriously affected areas, Forest Guards had moved away either to Beat headquarter or Range headquarter and most of the Guard residences remained vacant. I met the villagers and persuaded the villagers to use the abandoned pucca Guard quarters for storing mahua products to which they readily agreed. The result was quite visible next year with no damages to their homes. Provision of pucca godowns in such areas for storage purpose can reduce HEC considerably.

The loss of life, crop and property is common in all elephant bearing areas but very extensive in states like West Bengal, Jharkhand, Odisha and Assam. Since elephants stay and move in herds, the losses are extensive and may be to the extent of 100% crop loss in many cases for small and poor farmers. This results in anger among local people leading to retaliatory killing at times. Although all the states provide compensation for the losses incurred, more often than not it is inadequate and delayed. The rates paid are not uniform or at par with what is being paid in adjoining states leading to dissatisfaction. Even the compensation amount for the loss of life varies from state to state. Since survival and conservation of any wildlife depends on support and cooperation of the people, addressing man-elephant conflict needs to be given topmost priority. Therefore, preventive measures become very important in these conflict areas so as to minimize the losses.

The resources available to Forest Department in states or to Project Elephant to support such operations are limited and therefore must be used optimally and prudently. In order to do so, I am of the view that proper analysis of the past data is essential and we may try to do Vulnerability Mapping of all the districts / forest divisions where conflicts occur regularly. The data of last five years of loss of life, crop and property needs be geo tagged with month (by giving different colors of dot). Based on this, areas can be classified into severe, moderate and low categories. One can also link the vulnerability with period or season. Movement of elephants from one area to another normally follows a pattern unless there is some local disturbance. Such maps will help the forest officials to better plan and deploy the resources (fund) and manpower depending on the vulnerability and season. Although the local people including forest officials have this knowledge, yet such mapping will be a good scientific tool for planning and managing the conflict resolutions.

The Report of the Elephant Task Force of 2010 has given a very detailed roadmap to redress this challenge of human-elephant conflict and needs to be implemented in totality.

Translocation of a Wild Tusker in Coimbatore and Sathyamangalam Landscape of Tamil Nadu: Lessons Learnt

N. Manoharan
Retd. Veterinary Officer, Tamil Nadu

Introduction:

In the Thadagam valley of Western Ghats, a capture operation was undertaken in 2010 to catch a 25-30-year old wild tusker straying out of the Reserve Forest in to the human habitations of Coimbatore. Coimbatore landscape witnessed large scale developmental activities in 90s and this was the primary reason for wild elephants of this landscape to look for new pathways and migratory routes to traverse across landscapes. The elephants born from 1990 onwards adopted to the altered lifestyle of straying out of RFs. that resulted in crop raiding, property damages, injuries to humans, death of humans that created fear psychosis of elephants amongst locals. The elephants too were exposed road accidents, train hits, electrocution, falling into open wells, getting stuck in slush etc.

Males attain maturity between 13-14 years depending on their nourishment. Raiding of nutritious crops like sorghum, coconut, sugarcane, banana, areca nut, palm, paddy etc. hastens the maturity process. Male elephants straying away from the herd join with other bachelor bulls and take a higher risk to meet their nutritional requirements, especially during musth. Records have shown that the changing behavior of males have resulted in males crossing National Highways, State Highways, railway lines sometimes up to a distance of about 25 -30 kms away from RF area to raid crops and are not desisted by human presence.

Efforts by the Forest Department:

On receiving information of the tusker in the human habitation, 40 km away from forests, anti-poaching watchers/anti-depredation squad members rushed to the spot. The frontline forest staff used crackers, strong light beams, vehicles etc. to persuade the elephant back to forest areas. Sirens in vehicles were used to drive back the elephant. The animal not accustomed to the sound, took shelter in a sugarcane field. After the news spread, people gathered in strength to see the animal and the situation turned alarming. The District Forest Officer along with the Forest Veterinary Officer and Range staff rushed to the spot to take stock of the situation and plan the course of action. The initial feeling was the animal may get back on its own in the night once external pressure fades away but in the evening the animal started moving in the other direction away from the forests. Throughout the night the animal was tracked in the villages but this could not be done beyond a certain point. The next morning the elephant was sighted in a sugarcane field 70 to 75 kms away from forests close to villages and township. As time was running out and problems became multifaceted it was decided to capture the bull and translocate it. The three kumkies summoned from Mudumalai Tiger Reserve were unloaded from the trucks in the nearby area. They were fed, given water and some rest.

Other logistics:

For the chemical capture, the Forest Veterinary Officer and his team arranged the tranquilization equipment, drugs, accessories, anti-dotes,

restraining materials (different types of ropes for tying legs, neck, pulling, wedge, logs during transportation), transport trucks etc. The animal was sedated in the sugarcane field by the Forest Veterinary Officer sitting on top of a kumki. Xylazine, ketamine and Acepromazine were used to tranquilize the elephant and the elephant men and helpers tethered and secured the animal in standing sedation. Using the kumkies, the sedated animal was brought to the site of loading through the 10 feet tall sugarcane crops. A make shift ramp was prepared by a separate team and truck was kept ready for loading. With some difficulty the animal was loaded into the truck and secured with ropes and moved to the site of release.

Release site

The release site was selected taking the ecological and biological behavior of the animal into consideration. A makeshift ramp was also made at the site of release. Two kumkies accompanied the wild caught animal during the transportation and release process. The ropes were untied and the tusker disembarked from the truck and gently moved away into the forest area. A dedicated team monitored the movement pattern, feeding habits, reaction with other elephant herds for a year and found the animal settling down comfortably.

Lessons learnt

Initial handling of the animal and the situation is of prime importance. As soon as the information of elephant straying into human habitation is received, the team should reach the area to take stock and control the situation. A stress free ambience should be provided to the elephant making sure that the onlookers are kept away from the area. Safety, comforts and space for the operating teams and kumkies should be given due priority. The present location and various possible routes to reach the forest area have to be assessed for planning the course of action.

It is prudent to control the crowd control for a safer and unhindered passage of the elephant. The role of the line departments is critical and their involvement in the process should be planned judiciously. The behavior, temperament, health of the animal, season, climatic factors are to be assessed scientifically. The stressors for the animal are sedation, tethering, restriction of free movement, sound and smell of people close by, vehicle movement, presence of other bulls (kumkies), heat etc. Any dangerous advancement towards the animal should be avoided.

Results

A young bull from a disturbed habitat (degraded forest, loss of migratory paths, physical barriers, boundaries with anthropogenic pressures, reduced/competitive food and water availability in the habitat etc.) when given an opportunity to settle in a good habitat with no behaviourally altered elephant herds, usually stays in the release site. Age, sex, fitness, health, season, are some of the important criteria for successful translocation of elephants.

A Fence Between Keeps a Friendship Green

Deepak S Bilgi, CF & Director, Department of Environment, Tamil Nadu
& Sanjeev Kumar S. R.

The recent wanderings of two groups of elephants in China captured the fascination of millions of people around the world. The incident and its implications for the future have been nicely captured in a viewpoint article in the journal Conservation Letters(Campos-Arceiz et al., no date). The article briefly examines the possible causes of the movement and the lessons this behaviour holds for the future. It rightly points out that while the public was exposed to relatable and cute behaviour of the elephants, it also revealed the dangers, cost and complexities in sharing highly developed landscapes with large terrestrial mammals.

It is stated that 800 officers and 270 vehicles were pressed into service in China to manage the excursion of these elephants from Mengyang in South West China. This level of resource allocation would be unthinkable in India.
The causes for the unusual movement of the Chinese elephants are believed to be a combination of factors including habitat degradation (Wang et al., 2021).

These very issues have long been relevant to the conservation of Asian Elephant in India. Such large-scale movement of elephants have occurred repeatedly in India in the last couple of decades and frequently across administrative borders; e.g., from Tamil Nadu to Andhra Pradesh, Karnataka to Goa, and Chhattisgarh to Orissa etc. These colonisations of new areas which never had elephants in living memory have resulted in heavy human-elephant conflict (HEC).

The latest victims in Hosur Forest Division are two farmers killed on 11 September 2021, in their tomato farms outside Veppanapalli reserve forest in the north of Krishnagiri district of Tamil Nadu (Express new service, 2021). There were no elephants here before 10 years and the closest elephant forest would have been 35 km.

In the last decade and a half, the number of HEC affected villages has grown. Increasingly, even villages tens of kilometres from the forest borders are affected by HEC. In the district of Krishnagiri of Tamil Nadu alone, over 300 villages have been affected by HEC, spread across an area that exceeds the 1500sq km forest cover of the district.

The burden of elephant conservation in India is borne by agriculturists. The impact of HEC on human wellbeing has not been adequlately examined. It is suggested that HEC not only amplifies pre-existing mental illnesses but may give rise to new psychiatric and social pathologies (Jadhav and Barua, 2012). The stress of guarding crops from elephants every night results in sleeplessness, alcoholism and break down of relationships, complicating the havoc of HEC on human lives.

Negotiating the complex process of claiming compensation may not be within the capacity of most affected people. In fact, most tenant farmers or marginalised cultivators of poramboke lands (Govt. Revenue lands) may not even be eligible for compensation. Therefore, the number of compensations claims that serves as a surrogate to gauge the level of conflict may only be a glimpse of the proverbial iceberg. It is not only difficult, but unfair to expect the affected people to bear with the conflict. Any way one looks at it, HEC is a threat to elephant conservation.

At a national level, it appears that elephant deaths due to direct retaliation are uncommon,

however, electrocution – whether wilful or inadvertent accounts for a majority of elephant deaths outside forests. For instance, electrocution accounted for 118 elephant deaths in 91 incidents between 2001 and 2012 in the state of Orissa alone(Palei et al., 2014). Accidents such as falling into open wells, collisions with vehicles and trains are common. Explosive baits and snares that target other wild animals on forest margins end up injuring elephants far more frequently than we realise.

On the face of it, it seems that male elephants are usually the victims of these incidents outside forests, and as a threat, HEC may even exceed poaching in the heydays of the notorious Veerappan.

Fig 1, Kumki elephant test the prototype fence post

The obvious requirement is that elephants must be kept out of agricultural fields. Containing elephants within forest habitats is a well-accepted and essential management concept. It is just that the means employed to achieve this objective have proven inadequate to the task.

Fig 2, Kumki Makhna tests steel wire rope

Fig 3, Wild elephant attempts to break the wire rope

Common techniques such as trenches and solar fences have failed in the face of the elephant's intelligence and local conditions. Some of the more recent initiatives such as the railway barricades and masonry walls may only be partially effective.

A quick review of past strategies reveals that elephants will quickly learn to defeat any sort of barrier that depends on creating psychological fear. The alternative is to devise a practical physical barrier that will hold back the elephant.

The Armstrong Fence deployed in the Addo Elephant National Park of South Africa is a credible success story in elephant barriers. Developed by forest ranger Graham Armstrong, it was constructed out of discarded tram rails and elevator ropes. The fence was so successful in stopping human-elephant conflict that only one breach has ever been recorded. The Armstrong fence helped bring back the Addo elephant population from the brink when it numbered just 11 individuals due to a policy of extermination.

The fence put an end to human elephant conflict around the Addo, and elephant population has recovered to over 400 individuals over the past few decades.

The Melagiri Elephant Fence (MEF) is a steel wire rope fence based on the Armstrong fence. It is a result of the joint efforts of Hosur Forest Division of Tamil Nadu and Kenneth Anderson Nature Society, a wildlife conservation NGO.

The development process began with an effort to assess the strength of an elephant using Kumki elephants and the results provided a starting point for the design.

Fig 4,Wild Makhna climbs over the wire rope fence

Fig 5,Wild elephant pushes against precast rcc post

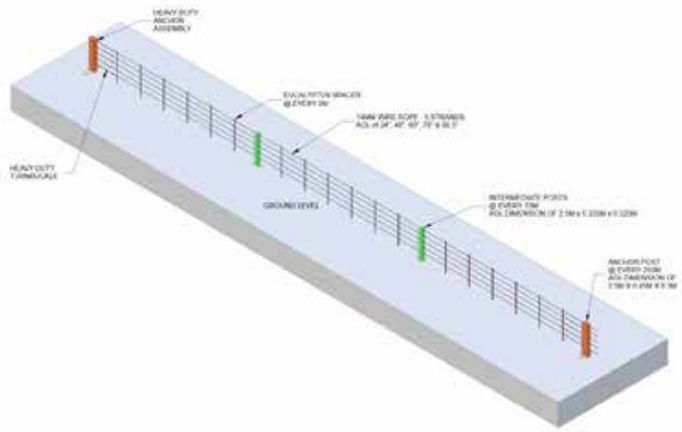
Fig 6 Wild makhna is unable to climb over fence after fixing eucalyptus spacers

The design was then tested against wild elephants under natural conditions and closely monitored using camera traps.

While the fence completely stopped herds from venturing into the fields, some large males continued get across, although the fence itself did not suffer any damage.

These incidents were closely examined and the lessons helped to refine and perfect of the design.

Fig 6 Melagiri elephant fence showing precast RCC, steel wire rope and eucalyptus spacers



The result is a maintenance-free, reasonable cost, physical elephant barrier that has successfully held back even the largest and persistent bull elephants in Hosur Division.

Specially designed precast steel reinforce concrete posts are embedded in the ground every 15m and five strands of high strength galvanized steel wire rope are threaded through the posts.

Suitable fixing arrangement enable tensioning of the wire ropes. Free standing spacers made of eucalyptus or

similar wooden poles are fixed to the wire rope strands every 2m to stiffen the fence strands and prevent the steel wire rope from sagging under the weight an elephant.

All steel components are galvanized to prevent corrosion. The fence post cannot be broken or uprooted by elephants and the steel wire rope have a minimum breaking force of 12 tons.

The fence has been safe and no injuries to elephants, humans or other animals have been reported in the 3 years that it has been in the field. The fence is expected to have a service life of around 20 - 25 years which is long enough to alter the crop raiding behaviour of the elephants. Where the Melagiri Elephant Fence has been installed in Hosur Forest Division, elephant crop depredation incidents have come down drastically making agriculture viable once again.

The Way Forward

While the MEF offers a practical and effective barrier mechanism to keep elephants out of agricultural fields, it is important to understand the issue from the elephant's perspective in order to ensure its successful conservation.
Even though elephants have a broad diet of leaves, fruits and bark of various different species of plants and trees, they are constrained by seasonal availability. Studies have shown that though fruits, bark, leaves etc may sustain them in the lean season, they are dependent upon grasses for a bulk of their diet in the productive season, especially in the dry deciduous habitats that they tend favour overwhelmingly (Baskaran et al., 2010).

Unfortunately, the open patches of the elephant's natural forest habitat are choked with alien invasives such as Lantana camara, Parthenium hysterophorus and Chromolaena odorata etc., reducing the forage availability for elephants (Wilson et al., 2013). Even plantation of eucalyptus and phyllode acacia have allelopathic effects which suppress the growth of grasses.

Livestock grazing inside the forests quickly deplete any usable grazing areas and displace wildlife. Under these circumstances, crops, which, after all are just domesticated grasses become an irresistible resource for the elephants. It is food rather than water that drives human elephant conflict.

Wild elephant diet now includes alien horticultural plants such as cabbage, cauliflower, tomato etc., which they would never encounter in their natural habitat.

When we curtail elephant's access to crops, we are bound by an ethical duty to address the issues of deterioration and disturbance inside their natural habitat.

Large scale habitat restoration by controlling alien invasive species is required on an urgent basis. This is best done after landscape level occupancy planning so that restoration resources are deployed effectively to make a meaningful change in the levels of habitat degradation.

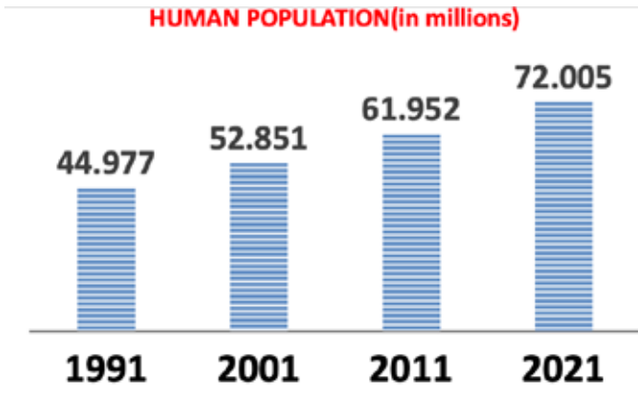
Co-existence of humans and elephants is a laudable ideal, but it is clear that they cannot share the same space. There is much truth in the adage "A hedge between keeps a friendship green" and let that hedge not be of Lantana.

Mitigating Human Elephant Conflict in Hassan-Kodagu Landscape Through Information & Communication Technology

Shri Shivram Babu
DFO, Hasan, Karnataka

Human Elephant conflict has been on the rise in recent years and it is becoming a grave cause of concern in the conservation and management of the species in Elephant range states like Karnataka, Tamilnadu, Kerala, West Bengal, Assam etc. Recent data shows nearly 400 persons are killed by elephants and nearly 100 elephants are killed annually due to retaliatory killings by people.

According to recent Elephant estimation 2017. India has around 27312 elephants, out of which 6049 elephants are present in Karnataka and the state stands first in Elephant population. This is owing to the conservation strategies followed in protection of Forests across the state. Along with this there has been huge increase in Human elephant conflict incidents during the last two decades throughout the state.



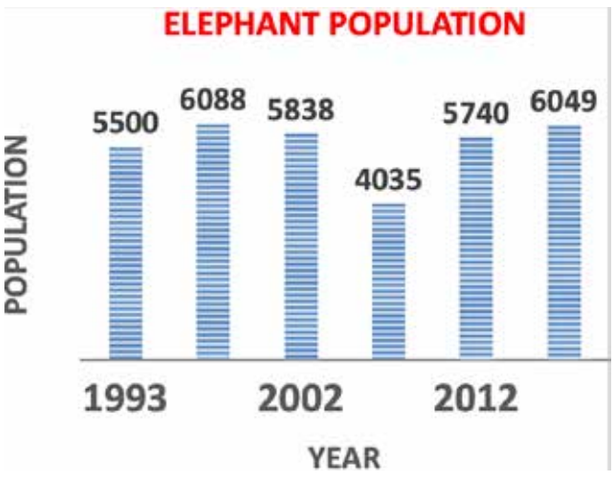
Cause for Conflict

The major causes for such conflicts are Land use and land cover changes outside forests, loss of corridors, migratory paths of Long ranging mammals like elephant, proliferation of Invasive Alien Species like Lantana camara, Eupatorium, Parthenium and Senna spectabilis etc. A comparison between population of Elephants and Human in Karnataka will show a clear picture about the reason for such conflicts

The charts above show that though elephant population has slightly increased, human population has grown exponentially. This has resulted in drastic change of land use pattern, large scale encroachment of government lands and forests, leading to fragmentation of corridors and increase in Human elephant conflict.

Hassan-Kodagu Landscape

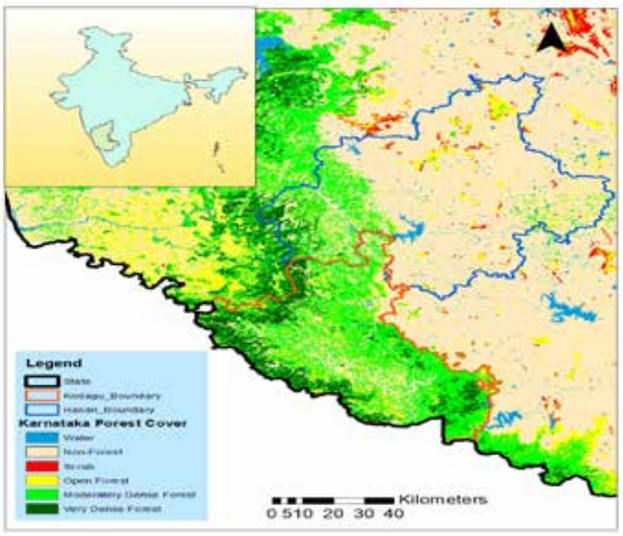
Map of Kodagu and Hassan with various forest types. The land under Moderately dense forest (light green) is mostly the coffee estates with



native tree cover, interspersed with some protected areas.

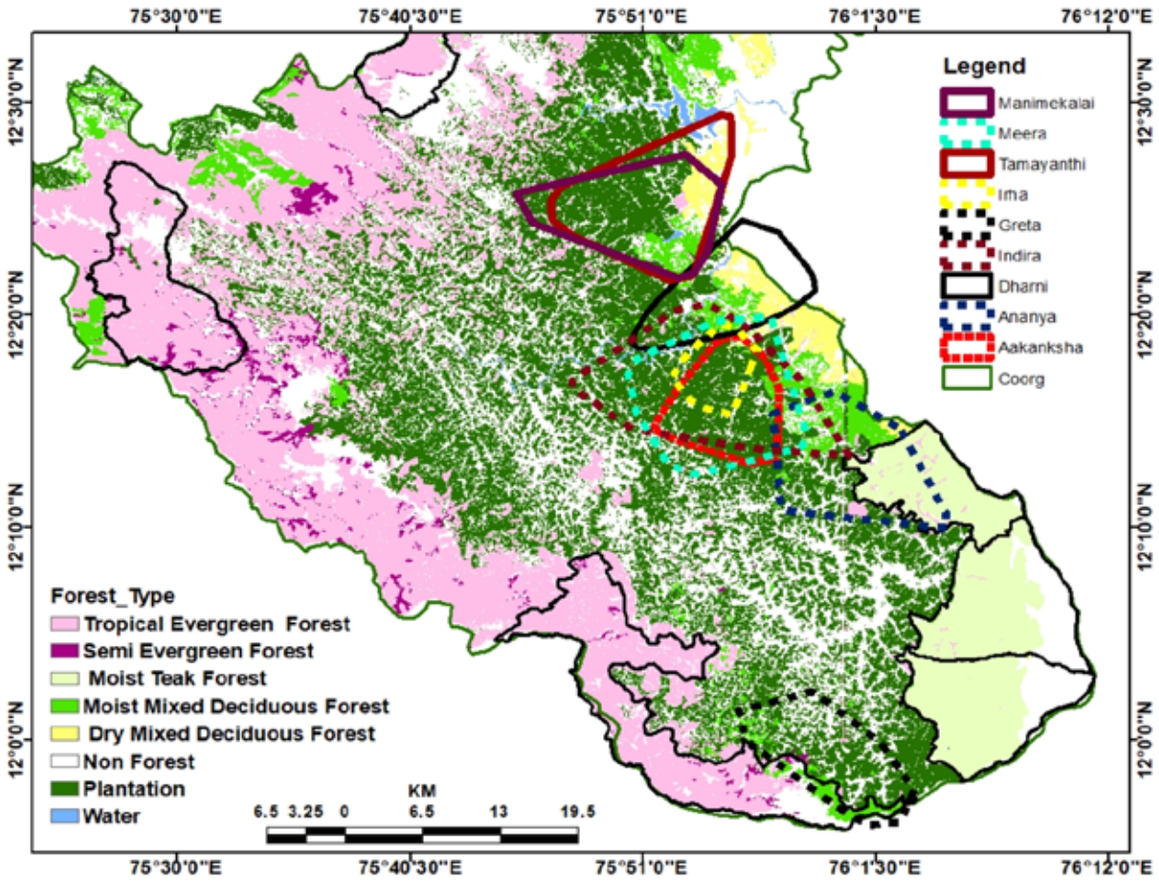
Though the Human elephant conflict is on the rise across the state, it is more pronounced in the Hassan-Kodagu landscape. Hassan district is a gateway to western ghats region and Kodagu district is located in the western ghats region. Both the districts have good forest cover and are well known for their coffee plantations. Owing to this advantage the coffee plantations acts as havens for elephant herds. Nagarhole Tiger Reserve and Brahmagiri wildlife sanctuary also falls within the Kodagu district, which acts as the elephant source population.

River Hemavathi acts as a border between Kodagu and Hassan district. The elephants from Kodagu district crosses the Hemavathi river during lean season enters Hassan district and stays in and around the coffee plantations of Alur, Sakleshpur, Yeslur and Belur Taluks of Hassan District. The main disadvantage in the conflict areas of Hassan district is that large



forest tracts are located as far as 40km from the conflict zone. All the elephants stay and roam only in the coffee plantations which is a cause of concern for local public on a daily basis.

Comparison of home range area (km^2) for nine collared elephants in Kodagu from 2018 - 2020. It can be noted that most of them have core home ranges in coffee plantations, rather than



adjacent protected areas like Nagarahole Tiger Reserve or Brahmagiri/Pushpagiri/Talakaveri Wildlife Sanctuaries

Severity of conflict across landscape

Every year there used to be around 5 to 6 Human deaths and more than 10 Human injury cases due to Human elephant conflicts in Hassan district. Crop depredation happens on a daily basis in coffee plantations and paddy fields. Frequent retaliatory killings of elephants were also not uncommon. Local public, public representatives and other stakeholders were very much antagonized and anxious about the increasing conflict.

Involving Communities

Discussing and hearing the local communities about elephant depredation in the locality

In order to regain the lost confidence in the Forest department from the public, series of measures were taken across the landscape. First and foremost, aim was to reduce Human death and injury in the conflict. On analyzing the data on human deaths and injuries many such cases where either between 6am to 8am (Early morning) or 5pm to 7pm (Late evening). Most of the deaths were due to accidental encounters between people and elephants, had they known the about the presence of elephants, people would be more cautious about their movement and lives wouldn't been lost.

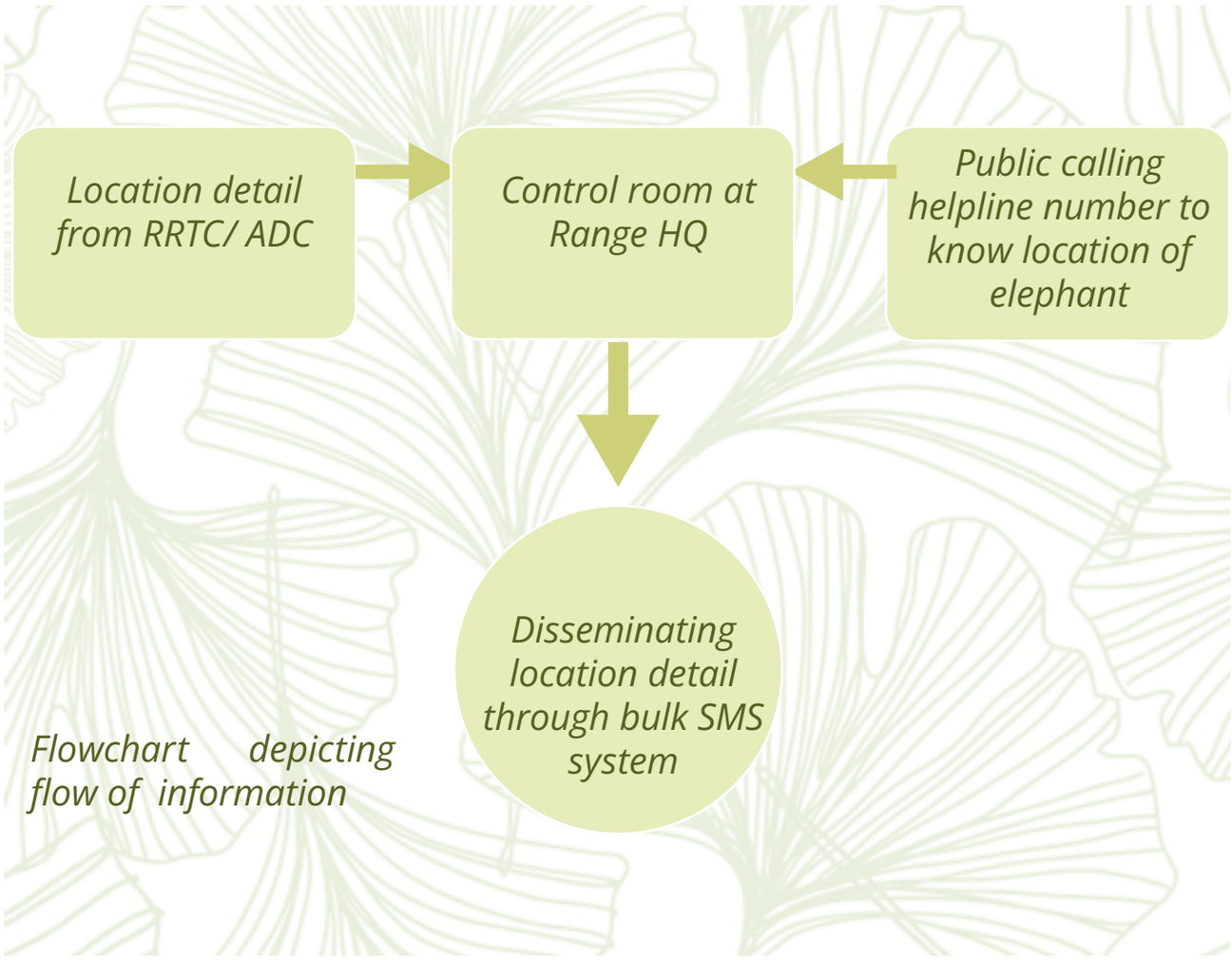
RRT and ADC members along with RFO and Forest guard

Keeping this basic facet behind all these deaths, Anti Depredation camps (ADC), Rapid Response Teams (RRT) were formed at village level across the landscape. ADC and RRT members were recruited from the same village which was affected by the Elephants. This served dual purpose of providing employment opportunity to local community and the members are aware of the local landscape. RRT and ADC members acted as ears and eyes of the forest department. Their primary responsibility is to locate elephant herds as early as 6am in the morning, disseminate the information among the local people of the village and to keep following the herd throughout the day.

Solution driven through Information & Communication Technology:-

Though this system which was put in place was working well, there was an inherent lag in dissemination of information to all the people in and around the village. Improvising on the solution early warning system and bulk SMS system was introduced. A control room was established at range level. The message received from ADC and RRT members was sent to the

control room. The control room operator had already collected the phone numbers of villagers in the conflict zone. On receiving the location of elephants, the operator sends bulk SMS to all the phone numbers of the villagers in kannada language. Also, the SMS is sent to GSM based LED boards which are installed at strategic location along the arterial roads and major junctions in the affected villages, the SMS is scrolled on the LED boards thereby alerting motorists to be aware about the movement of elephants in the vicinity. A helpline was also opened where people can call to know about the location of elephants.



Flowchart depicting flow of information

Left: Bulk SMS sent to villagers about location of elephant in Kannada Language
Right: Elephant location displayed in GSM enabled LED boards along a village road to alert the motorists and passerby.

GSM based LED light installed at strategic location in a village.

Fitting Radio collar on the elephant by tranquilizing the animal with the help of kumki elephants

Radio Collaring Elephants

Early warning systems and bulk SMS systems was helpful and there was good positive response from the public. But locating the elephant herds became a difficult task and there were days when the RRT located the elephant as late as 10am in the morning which was defeating the purpose of tracking the herds as early as possible. A real time monitoring of the elephants was the need of the hour so as to eliminate the delay in locating elephants and tracking them throughout the day. Hence GSM based radio collar was used to locate the elephants.

Usually a Herd of elephants is headed by a Matriarch elephant and all elephants in the group follow the matriarch. So, in order to locate a herd, we need to just locate the Female Matriarch of the group. Karnataka already has kumki elephants which are in various elephant camps and are used in many capture and rescue operations across the state and the country as well. Using the kumki elephants, the matriarch of the herd was tranquilized and the radio collar was tied around its neck on a standing sedation posture. After the radio collar is fitted on the matriarch, it is released to join the herd. The movement of the herds will be tracked on near real time basis on an app. Since real time monitoring was done, dissemination of information was also very fast and accurate. Later Satellite based Radio collars were fitted to increase accuracy of the location detail.

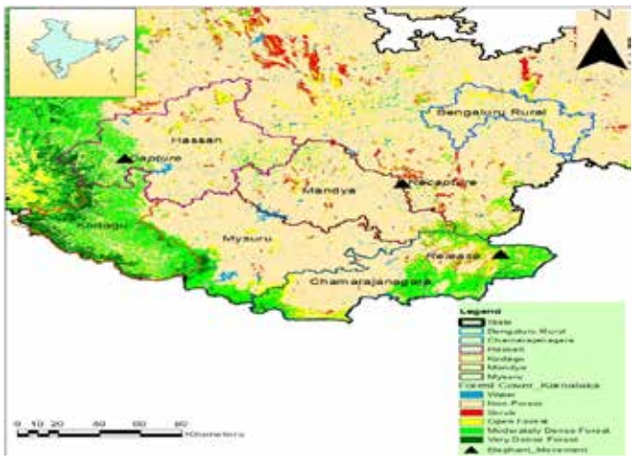
This system has been of immense help to the forest department in reducing human deaths and injuries significantly due to elephant attacks. This system was beneficial across the landscape reducing sudden human-elephant encounters as people are the conflict zone are aware of the presence of elephants in their villages and people are extra cautious about their own movements. Owing to the success of the system similar setup was being planned to implement in various districts of Karnataka and also across the country as well.

Radio collared elephant left to join the herd

Tracking Translocated elephants through Radio collar

This system has been instrumental in saving many lives, but also was helpful in tracking translocated elephants. Few elephants which had killed two or more people had to be captured and translocated to deep interior forests. But due to deep sense of direction ingrained in the genes of elephants, many a times these elephants try to return to the place of origin. One such case happened in Hassan, where an elephant named "Mountain" was captured at Sakleshpur, radio collared and released in Male Mahadeshwara wildlife sanctuary, Kollegal, Chamarajnangar District which are 300 kms apart. This elephant after its release in MM Hills sanctuary started its return journey to Sakleshpur and it almost reached Ramnagara district. Since it was radio collared local officers were monitoring the movement and before it could cause any further Human attacks on its return journey, it was captured at Ramnagara and was put under captivity in one of the elephant camps. Had there been no radio collar, it would have definitely attacked people and created chaos on its return journey.

Tusker Mountain's movement from Release to Re-capture (each individual dot depicts his exact GPS location obtained through radio-collar). As it is visible, the animal started moving almost in a straight line towards Hassan, clearly showing the homing instinct. A brief period between 19/06/2021 to 24/06/2021 animal showed circling movement, basically trying to navigate human habitation after crossing Shimsha river on 19/06/2021.



This map clearly depicts the point of capture, release and recapture of Tusker Mountain

Physical barriers

By adapting various Information and communication technologies Karnataka forest department has been able to reduce Human deaths and injuries in Human Elephant conflict. But the larger issue of crop depredation is also being addressed using implementation of various barriers like Elephant proof trench, Solar fencing etc. to restrain movement of elephants outside the forest area. Karnataka forest department has been a pioneer in introducing Railway barricade and Hanging solar fencing as barrier to contain elephants inside forests. Though these barriers are costly they have proven to be foolproof method so far.

Railway barricade

Hanging solar fence

Information Communication Technology has been an useful tool in mitigating Human elephant conflict in Hassan Kodagu Landscape. These tools have been a life saver many a times and was well received by public. Owing to the success in this landscape, it is being in tried out in other landscapes of the state as well in other states like West Bengal etc. Managing Human Elephant conflict is an ever-evolving concept because we are dealing with an intelligent giant which evolves various strategies to evade all these barriers. There is no one-size-fits all solution for this problem. Solutions has to be locally driven and involving community as part of the solution will ensure sustainability of the solution.

Being Humane to the Elephants

Prachi Mehta
Senior Scientist and Director Research
Wildlife Research and Conservation Society

Conflict is Costly...

We have always been awed by the elephants and they feature prominently in our life, right from the cave paintings to nursery rhymes, history, epics, religion and culture. However, since last few decades, elephants have got a new identity: they top the list of 'Problem Animals' in all its range countries, posing serious challenge for its conservation. Like all other wildlife, elephants are facing the brunt of fragmentation and habitat loss. Living in the transformed landscapes brings them closer to the human habitation, and thus begins the challenge of sharing of resources between people and elephants, leading to the inevitable altercation between the two.

Human-elephant co-existence, in simple terms is a conflict of interest between the two species. Local communities have to pay a huge price for living in proximity to the elephant habitat. A close encounter with elephants can result in any of this: death, injury, crop damage, destruction of property and a scare for life. Either way, there is a loss of social and economic security for the people. On the other hand, elephants face the grave consequences of trespassing in to "now what is human-dominated habitat". It is not uncommon to witness elephant herds passing through towns, railway tracks and highways to reach their original habitat. However, situation often turn hostile when elephants get teased and chased by the mob and then the elephants retaliate in self-defence resulting in unfortunate outcomes on human lives. As a consequence, elephants are either killed or declared rogue and kept in captivity for life.

Cause of the Conflict...

The main reason for increasing HEC is attributed to fragmentation of the forests. The forests that the elephants once frequented are lost but the movement paths are retained in their memory so the elephants visit the same area and get in to close proximity to the people. Also, elephants weigh over 4 tonnes and to maintain their large body, elephants need to feed through the day. Each elephant requires about 150 kg of food in the form of herbs, shrubs, grass, tree leaves, bark, roots and fruits. They obtain this by travelling through the forests over an expanse of 500 to 1000 km2 in their home range. While traveling they come across crop fields with attractive crops like paddy, sugarcane, maize, banana where they get ample food without spending much energy. Being intelligent animals, elephants are known to carry out a rapid survey to check the status of crops in the area so they know when to return! However, each visit by the elephant invites economic and social implications to the farmers, which ultimately gets reflected in retaliatory killing or capture of the elephants.

What is the solution to deal with the HEC? Many feel that a permanent solution would be to capture and domesticate the elephants from high intensity HEC region. This has been tried and has not solved the issue. Also capturing elephants from their native habitat is not justified. The forests are there because elephants are there. Elephants are landscape animals and traverse through vast stretches of forests, feeding and dispersing the seeds. The seeds dispersed through elephants regenerates the forests naturally and thereby support the rich biodiversity. Anyone who has experienced the efforts and resources in raising the forests by artificial regeneration, would appreciate that elephants can achieve this feat effortlessly and at no cost! Elephants have a pivotal role in conservation of biodiversity thus survival of elephant population in wild and in its range countries is very crucial.

The Case of North Canara Elephants

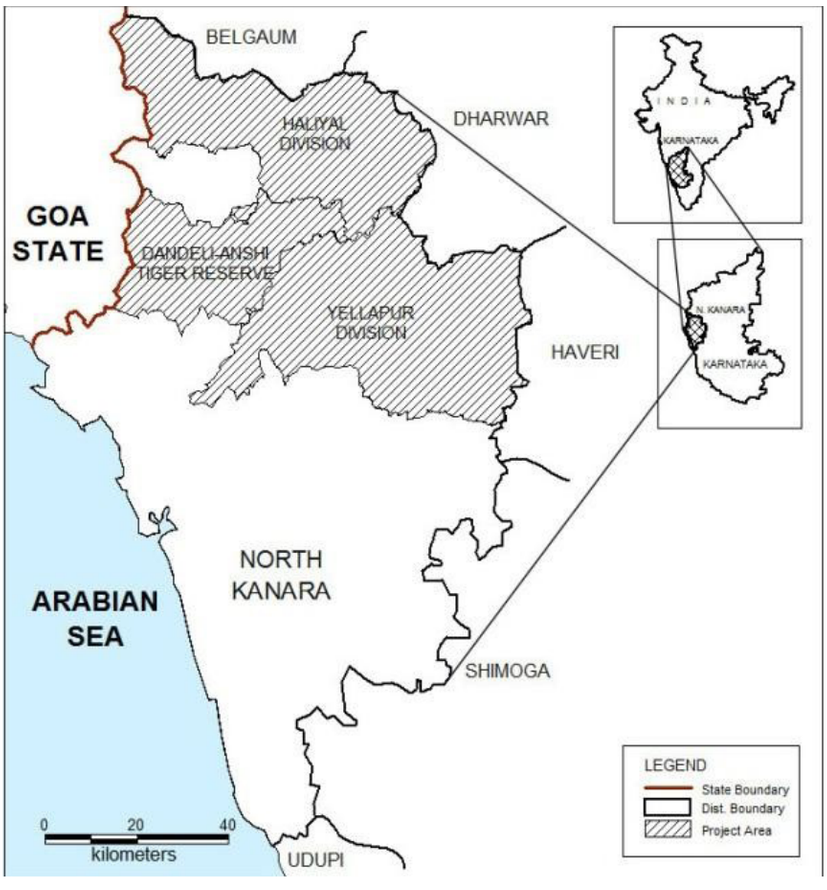
In India, the onus of HEC mitigation is considered as the task of the State Forest Department. The strategies focus on elephant drives, installing physical barriers such as elephant trenches, solar and railway fences, providing monetary compensation for human death, and for crop and property damage, and if the situation demands, then exclusion of elephants by way of capture and translocation. A detailed discussion on the efficacy of various measures is beyond the scope of this article and is available in a manual titled "There's Many a way to Keep the Elephants Away" available at

Location of North Canara district in Karnataka State

https://www.wrcsindia.org/publications-1.

However, just as one size does not fit all, each site needs to have different HEC mitigation strategy. North Canara, also known as Uttar Kanara, located on the crestline of Western Ghats, shares its border with Belgaum and Dharwad districts. The North Canara district supports a population of approximately 60 to 80 elephants, which represents the northern-most range of elephants in the Western Ghats. During 19th century, the elephant herds from South Karnataka, especially from the Malnad-Mysore region would locally migrate northwards for a few months and return to Mysore region through the same route. During mid-1960s, the construction of Lingamakki dam on Sharavati river disrupted their movement corridor and a few elephant herds got stranded in North Canara district. Unable to move Southwards, they made their residence in the Forests of Kali Tiger Reserve (KTR), earlier known as the Dandeli-Anshi Tiger Reserve (DATR).

Each year between September to February, the elephant herds from KTR come out of the forests, distribute themselves in smaller groups and visit the crop fields of Yellapur and Haliyal divisions for feeding on paddy, sugarcane, banana, coconut and other crops. In March they return to Kali Tiger Reserve and stay there till the onset of next cropping season.



HEC mitigation by the People, for the People

The North Canara district reports about 1000 cases of crop damage by elephants every year. After having studied the pattern of HEC in Kodagu, Maharashtra, Assam, West Bengal, and Chhattisgarh, we understand that the cause of HEC mitigation is unique in each site. Accordingly, conflict management strategies need to be based on the historical, geographical and cultural context. Based on this learning, we are implementing Community-based Elephant Conflict Management Model (CBCM) in North Canara district. The central concept of CBCM is to empower the local communities in protecting their own crop fields from elephants. Traditionally, farmers are used to guarding their crop fields but with increasing area of crop fields, they are unable to detect the elephants coming inside from various entry points.

Through our project, we are renewing the interest of the farmers in protecting their own crop fields by introducing a combination of crop protection measures. This includes a mix of

traditional methods, farm-based deterrents, and some technology-driven deterrents. We work in close association with the Forest Department and many initiatives are being supported by Village Forest Committees (VFC) and Eco-Development Committees (EDC) of the Forest Department. This way it helps in institutionalizing CBCM model so it can sustain itself. The measures used by us are briefly described below

1

• Night guarding coupled with trip alarms: First line of defence which is useful in alerting the farmers as soon as the elephants enter the crop field, so that the farmers can take timely action to protect their crops.

2

• Chilly-based Deterrents: Different types of deterrents can be prepared in advance using chilly seeds and other ingredients to generate pungent smoke that elephants find irritating. This helps in preventing elephant entry in the crop fields.

3

• Solar flicker lights and infra-red trip alarms: These devices are useful in protecting large extent of crop fields.

4

• Honey-bee Fence: Wood logs are used for making bee hive fences. Also, the honey generated from the bee-hive is an additional incentive for the farmers.

5

• Livelihood program: We are training local communities in making elephant-themed handicraft products. This initiative is helping in generating income for communities and offsetting some of their losses due to elephants.

Trip Alarm for Early Alert

Tree watchtowers for safe guarding


01


04


02


Fig 05


03


06

01. Ground Chilly Smoke
02. Chilly Chudi
03. Chilly Brick
04. Chilly Smoke,
05. Tree log used as bee hive fence,
06. Log colonised with bee hives

01. Light and sound ball.
02. Infra-red unit.
03. With Forest Officers and staff in the Project Area.
04. Workshop on elephant monttoring methods.
05. Training local communities in elephant themed handicraft.
06. Handicraft prepared by the women.

Achievements of CBCM

To assess the impact of CBCM, we are regularly monitoring the effectiveness of crop damage cases in CBCM villages and non-CBCM villages. Our findings indicate that the crop fields that are regularly guarded by the farmers reported almost nil or reduced crop loss by elephants compared to the villages that are not practicing any type of crop guarding. Encouraged by the outcome of our ongoing work, more farmers and villages are coming forward to participate in the CBCM model.

The CBCM model is successful in areas where the farmers participate in crop guarding willingly and regularly. This model is slow to implement but quick to show results. The success of CBCM relies on implementation at various levels. In our project latest technological innovations has been introduced by Jayant Kulkarni and rigorous field implementation has been done by Ravi and Sharath. This has helped in establishing a trustful rapport with the field staff and local farmers, which is the most important ingredient of CBCM. Our constant presence in the project area for last ten years is possible because of the continued financial support from the Asian Elephant Conservation Fund (AECF), US Fish and Wildlife Service. The unstinted support from Karnataka Forest Department has contributed most significantly to the success of this project. We are glad that we have been able to demonstrate way forward for HEC mitigation through a collaborative model with the Forest Department and local people.

Evolution helped survival of the fittest of the elephants! Now the onus is on us. We have to learn to live with the last three species of elephants. Because elephants arrived on the earth before we did, and therefore, they have the right of passage and the right of living as they are the first citizens of this planet. Now is the time to be humane to elephants.

The Status of Human-Elephant Conflict (HEC) and Their Mitigation Measures at Bandipur Tiger Reserve, Karnataka, India

Dr. Ramesh Kumar P, Mrs. Saswati Mishra, Mr. Jagat Ram
Mr. Kumar Pushkar and Mr. Vijayakumar Gogi
CF & FD, Bandipur TR, APCCF (PE), Bengaluru, APCCF &
FD (PT), APCCF (WL) and PCCF (WL) & CWLW

Bandipur Tiger Reserve:

Bandipur Tiger Reserve (TR) declared under Project Tiger in the year 1973 is situated in the contiguous landscape spread over two revenue districts of Southern Karnataka namely the Mysore (Nanjangud, Sargur & H.D. Kote Taluks) and Chamarajanagara (Gundlupet & Chamarajanagara taluk).

Bandipur TR forms part of the Mudumalai-Sathyamangalam-Wayanad-Nagarahole Tiger Conservation Landscape, having the single largest population of Tigers in India i.e. about an estimated population of 981 (871 - 1,093) tigers. Bandipur forms part of the Mysore Elephant Reserve (MER).

Historically, about an area of 90 Sq. Km. was declared as "Venugopala Wildlife Sanctuary" by the Princely State of Mysore in 1941. Currently, the Core/Critical Tiger habitat of the Reserve is 872.24 Sq. Km and 118.27 Sq. Km. areas as Buffer. Apart from this, it also has 42.62 Sq. Km. area notified under section 4 (Reserved Forests) of KFA, 1963 and 417.19 Sq. Km. area as Eco-Sensitive Zone around the TR. Administratively, Bandipur TR consist of 3 sub-divisions, 13 wildlife ranges, 19 sections and 113 beats.
Threats in Bandipur TR:

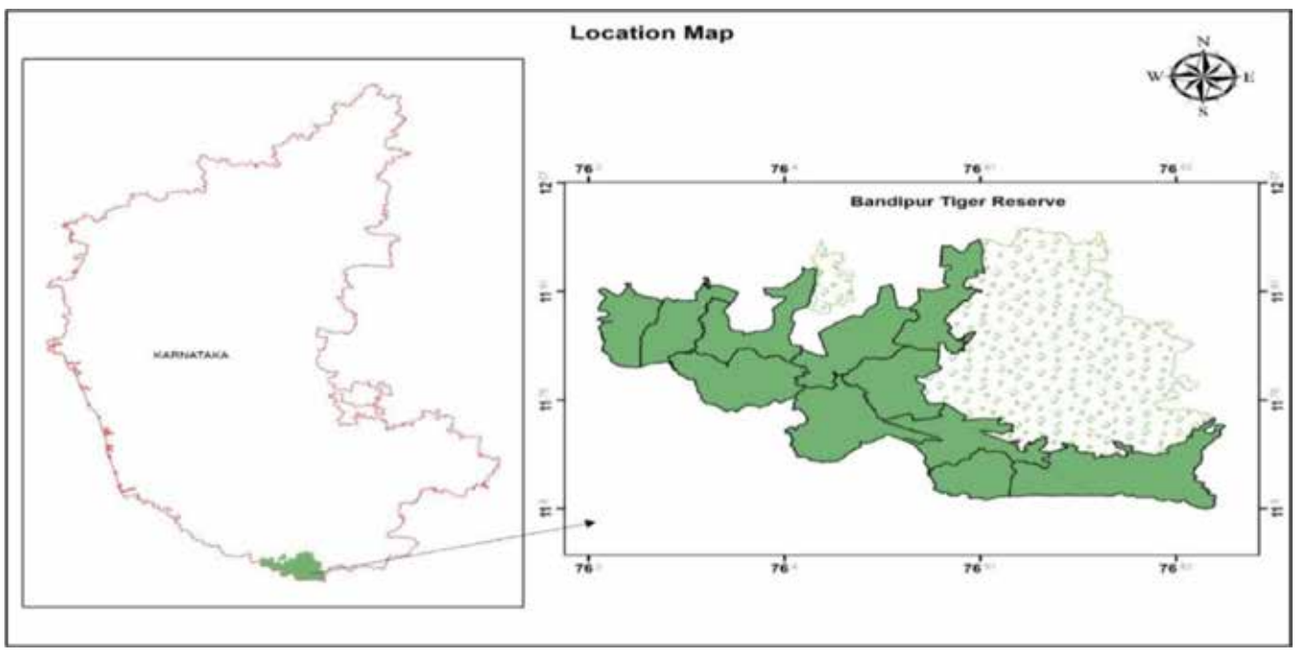


Figure 1: Location of Bandipur TR within the state of Karnataka

Figure 2: Bandipur TR along with other Protected Areas in the Western Ghats landscape

i. Poaching and other illegal activities.

ii. High level of Human-Wildlife Conflict.

iii. National Highways passing through the TR.

iv. Changing land use pattern in the Buffer or Eco-Sensitive Zone.

v. Livestock grazing.

vi. Forest Fire.

vii. Invasive Alien Species.

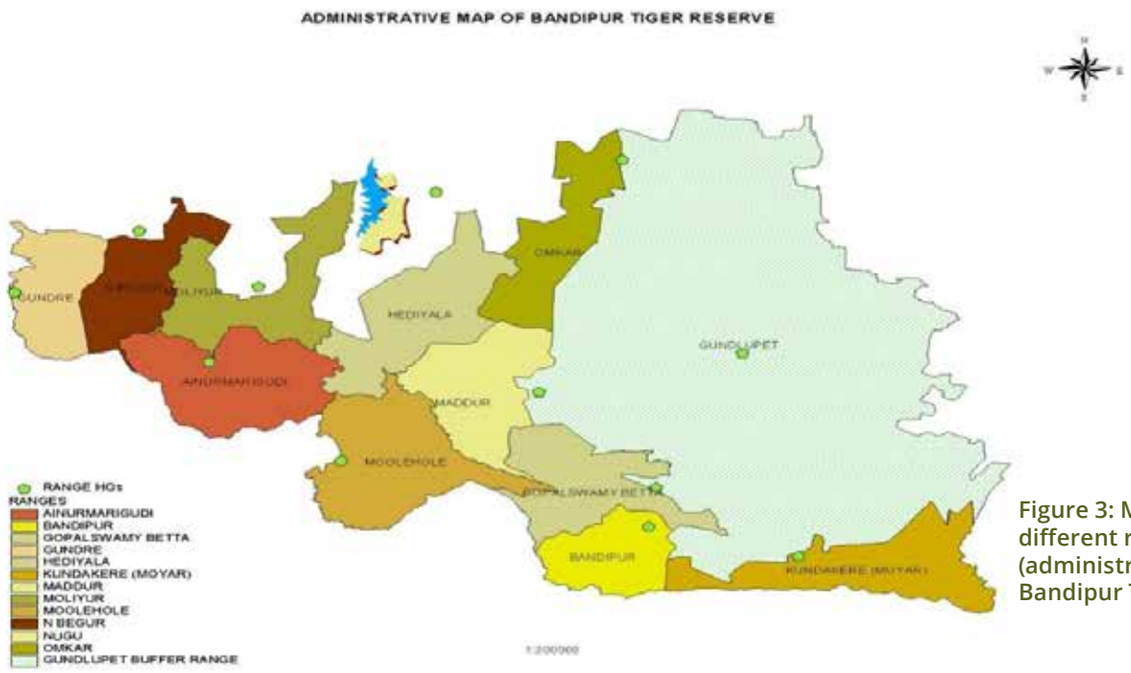


Figure 3: Map showing different ranges (administrative units) of Bandipur TR

Elephant population at Bandipur TR:

Elephant Population: As per the elephant census conducted in 2017, Karnataka hosts 6049 wild elephants, the largest population of elephants in the country. Bandipur TR holds one of the highest populations of elephant, with an estimated elephant population of 1167 and density of 1.13 elephants per sq.km. Though elephants are distributed throughout the Tiger Reserve, the species is largely concentrated near Ainurmadigudi and Moolehole ranges.

Sl.No.	Year	Estimated elephant population in Karnataka	Estimated elephant population at Bandipur TR	Elephant density/ sq.km of Bandipur TR
1	2002	5800	1975	2.26
2	2005	4347	1217	1.34
3	2007	4035	1005	1.10
4	2010	5740	1622	2.4
5	2012	6072	1697	1.9
6	2017	6049	1167	1.13

Table 1: Estimated elephant population of Karnataka and Bandipur TR from 2002 to 2017 (as per block count)

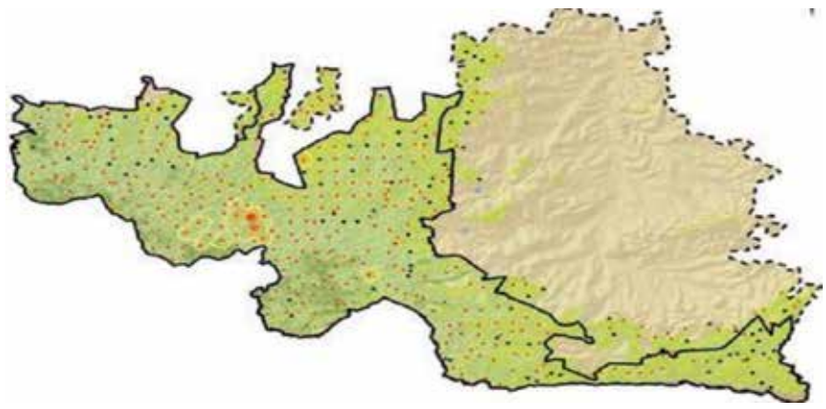


Figure 4: Distribution and relative spatial abundance of elephant in Bandipur TR. Red dots represent photo-captures in camera traps while contour lines depict intensity of photo-captures

Elephant Habitat: Bandipur TR supports both resident population as well as migratory elephants from the adjoining Protected Areas like Mudumalai, Sathyamangalam and Wayanad. The Kaniyanpura-Moyar elephant corridor of Bandipur TR connecting Bandipur with Sathyamangalam TR and Mudumalai TR is one of the important connectivity for movement of elephants in the landscape.

Human-Elephant Conflict (HEC) at Bandipur TR:

HEC is a major challenge in Bandipur and with increasing loss of human lives and damage to crops and properties, a substantial amount of Govt. funding is apportioned towards compensatory or ex gratia payments. However, the intolerance of people towards elephants among the local communities has substantially increased.

Reasons for HEC at Bandipur TR:

Extent of forest areas, length of the forest boundary (perimeters) and density of elephants in a Protected Area also determine the severity of HEC. Bandipur TR is a linear patch of forest with a perimeter of 314.6 km juxtaposed with private and revenue lands on the northern side (Figure 5). The demographic pressures along with destruction of elephant habitats, periodic drought, bamboo flowering and mortality and forest fires etc., have necessitated the pachyderms to move out in search of fodder and water. Another important factor, which aggravates the HEC at Bandipur TR, is the marked shift in the cropping pattern in the eco-sensitive zone. The current cropping pattern of cash crops like, Banana, Sugarcane, and Coconut etc., attracts elephants into agricultural fields adjoining forests.

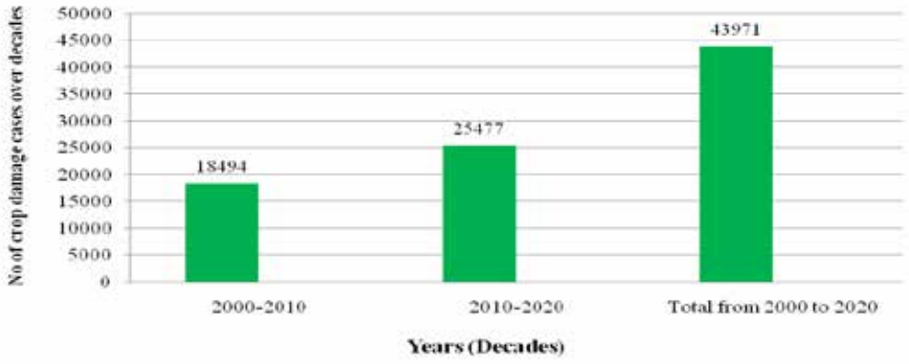


Figure 6: Graph showing the number of crop damage or crop depredation cases recorded at Bandipur TR, over the last two decades (from 2000 to 2020).

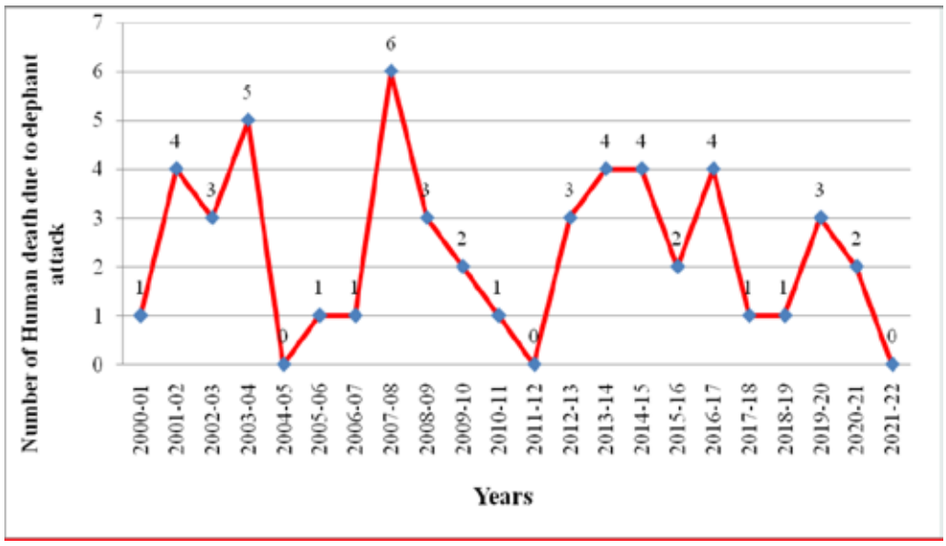


Figure 7: Number of Human deaths due to elephant attacks at Bandipur between 2000 to 2022

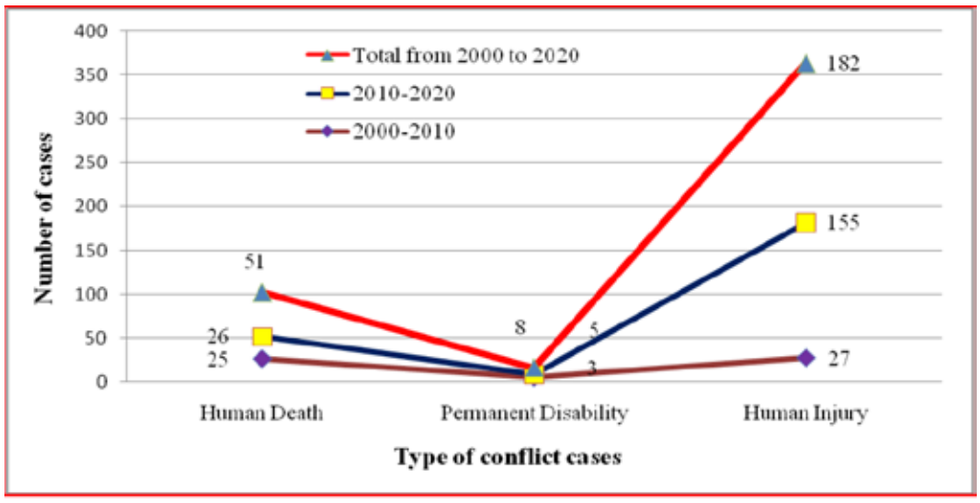


Figure 8: Number of human death, human injuries and human permanent disabilities cases reported from Bandipur TR between 2000 to 2020

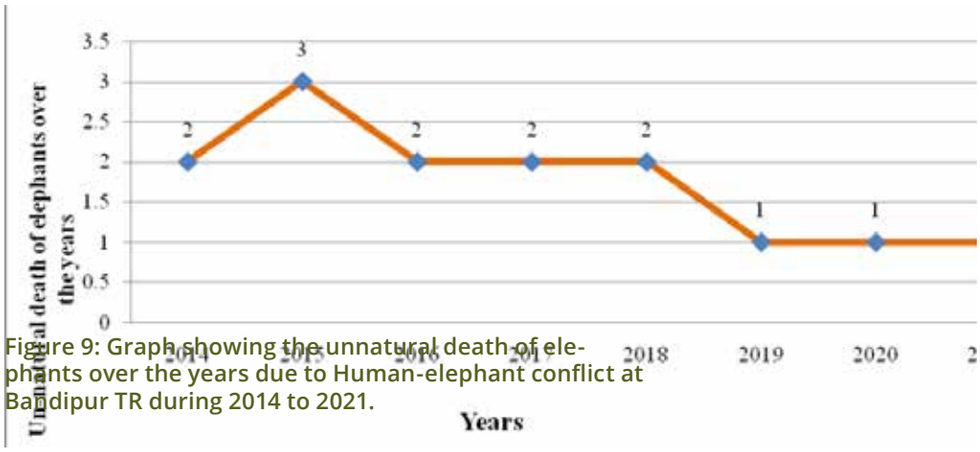


Figure 9: Graph showing the unnatural death of elephants over the years due to Human-elephant conflict at Bandipur TR during 2014 to 2021.

Figure 9: Graph showing the unnatural death of elephants over the years due to Human-elephant conflict at Bandipur TR during 2014 to 2021.

Year (Decades)	Crop Damage cases	Cattle killed cases	Human Death cases	Permanent Disability cases	Human Injury cases	Property Loss cases	Total Cases
2000-2010	18494	632	26	5	27	1	19185
2010-2020	25477	1901	25	3	155	70	27631
Total cases over two decades (2000-2020)	43971	2533	51	8	182	71	46816
Average Annual cases	2198.55	126.65	2.55	0.4	9.1	3.55	2340.8

Table 2: Number human-animal conflict cases recorded at Bandipur TR over two decades from 2000 to 2020.

Year	Crop Damage (Rs)	Cattle killed (Rs)	Human Death (Rs)	Permanent Disability (Rs)	Human Injury (Rs)	Property Loss (Rs)	Total Amount (Rs)
2000-2020	82557537	10091820	13855000	385000	4209397	305940	111456694
Annual average of money spent over two decades.	4127877	504591	692750	19250	210470	15297	5572835

Table 3: Amount disbursed (in lakhs) for human-animal conflict cases at Bandipur TR over two decades from 2000 to 2020.

i. Crop depredation: One of the most common forms of human-elephant conflict is the depredation of crop at farmer's field by the elephants and loss of yield to the farmers. Between 2000 to 2020, there were 43971 crop depredation cases recorded at Bandipur.

ii. Human death, human injuries and permanent disability to human body parts: One of the serious consequences of human-elephant conflict is the loss of human life, injuries and permanent disability.

iii. Elephant death due to human-elephant conflict: HEC also affects elephants and during the year 2014 to 2021, 14 elephants died due to human retaliation.

Mitigation measures taken up towards Human-elephant conflict at Bandipur TR:

Some of the traditional techniques employed to mitigate the HEC at Bandipur, ranges from chasing elephants by shouting, drum-beating, noise-making, use of fire crackers, lights and torches, Chilli-tobacco rope fences, barbed wires fence, honeybee fences, to Rapid Responds Team (RRT) with specially trained and equipped teams of people, deployment of alarms and development of communication systems etc. Further, capture and translocation of problem animals, use of highly sophisticated technology such as satellite telemetry and insurance schemes etc., were also employed.

A. Human-elephant conflict mitigation measures taken till the year 2012:

1. Elephant Proof Trench (E.P.T) of 3x2x1 meter dimensions.

2. Seven strand Horizontal Solar Power Fencing (SPF).

3. Rubble Stone Walls (RSW), Masonry wall & RCC pillars at site specific locations.

4. Anti-depredation camps with the deployment of temporary watchers.

5. Providing crackers to farmers for scaring the elephants.

6. Exgratia payment for the victim who lost their crop, property and life.

B. Human-elephant conflict mitigation measures taken after the year 2012:

1. Elephant Proof Trench (E.P.T) of 3x3x1.5 meter dimensions.

2. Used Railway line barricades

3. Tentacle solar powered fences

4. Steel wire rope fences

5. Financial assistance to farmers on 50:50 sharing for solar fencing around their farm lands.

Table 4: Range wise details of Man-Animal Conflict in the periphery length and HEC mitigation measures undertaken at Bandipur TR

Sl.No.	Wildlife Range	Man-Animal Conflict (MAC) Periphery	Human-Elephant Conflict Mitigation Measures				
			Upgraded E.P.T of dimension (3x3x1.5 m)	7 strand Horizontal Solar Powered Fencing	Tentacle Solar Fencing	Rail Barricade	Steel Rope Wire Fence
1	Hediyala	27.00	26.00	26.25	0.00	13.38	0.00
2	Nugu WL	26.00	21.71	23.00	0.00	5.14	0.00
3	Moliyur	38.00	38.00	35.60	12.75	13.12	0.00
4	N.Begur	16.00	14.75	15.00	11.00	4.70	0.00
5	Gundre	6.30	6.30	6.30	6.30	0.00	0.00
6	Omkara	64.00	49.00	65.50	39.00	13.39	1.57
7	Maddur	14.50	16.96	12.00	10.00	2.25	0.00
8	Kundukere	80.80	32.40	24.00	26.10	0.00	0.00
9	G.S. Betta	42.00	21.50	34.20	20.50	0.70	0.00
	Total	**314.60**	**226.62**	**241.85**	**125.65**	**52.68**	**1.57**

HEC mitigation measures taken up at Bandipur TR are:

A. Elephant Proof Trench (EPT): Elephant Proof Trench (EPT) is a trapezoidal trench/moat of different dimension established all along the boundary of the TR to prevent crossing of elephants from forest into the farmer's field/ revenue villages.

a) Elephant Proof Trench (EPT) of 3x2x1 meter dimension: Initially, EPT with dimension of 3 meters top width, 2 meters depth and 1 meter of bottom width was dug and maintained to prevent straying of elephant from the forest area. Totally, 240.35 km of EPT was created.

Photos 1: Elephant Proof Trench (EPT) of 3x2x1 meter dimension at Bolegowdana Katte Beat of Omkara Range.

b) Elephant Proof Trench of 3x3x1.5m dimension: Since 2013-14, the dimension of the EPT was increased to 3 meter top width x3 meter depth and 1.5 meters bottom width. This new dimension of EPT is found to be effective in preventing elephant from straying out of forest. Till now, about 226.62 km of EPT was upgraded to new dimension.

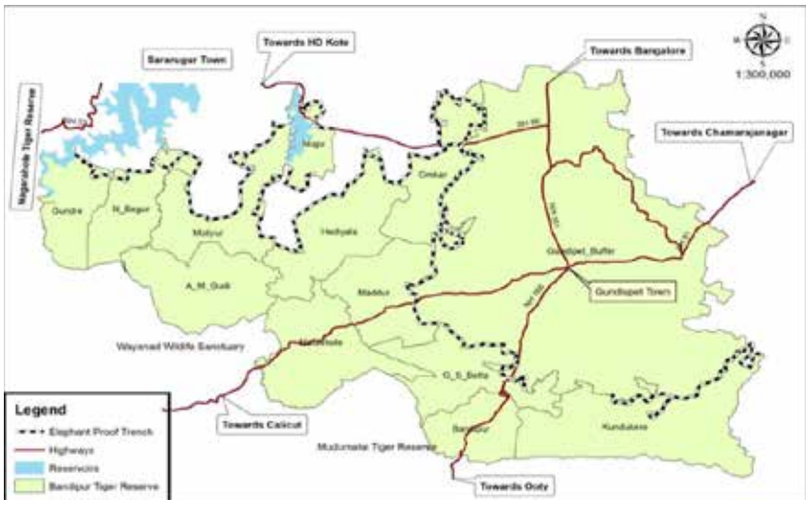


Figure 2: Map showing the Elephant Proof Trench (EPT) established all along the boundary of the Bandipur TR.

Photos 3: Upgraded Elephant Proof Trench (EPT) with dimension of 3x3x1.5 meters at

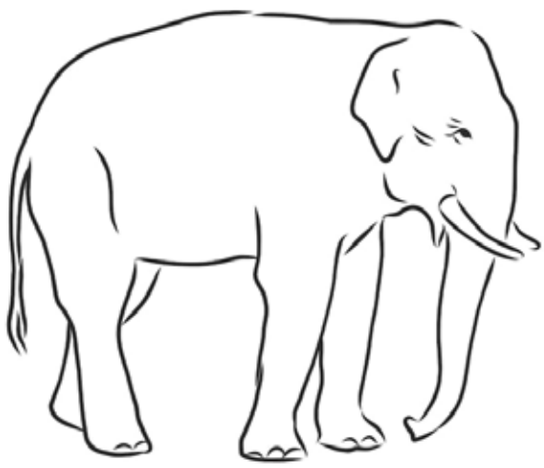
B. Solar Powered Fence (SPF):

a. Seven strands horizontal solar powered fencing (SPF): SPF was erected all along the boundary of the TR on the outer side of the EPT. It consists of vertical poles and horizontal 7 strands of steel wire (vary from 5 to 7 strands). It requires batteries and energisers for every 2 to 2.5 km for constant power supply and to maintain the voltage at around 9 KV (pulse) for its effectiveness. A total of 240.35 km of horizontal solar powered fence was erected at Bandipur TR.

Photos 4: Seven Strand Solar Powered Fence at Kalasur D-Line of N. Begur Range.

b. Tentacle hanging solar powered fence: This is a recently designed barricade that was first erected in 2017. It is the modification of earlier version of horizontal solar fences. It includes vertical solar powered wires rather than horizontal wiring. The solar-powered energiser is connected to the fence and the voltage is maintained at around 9 KV (pulse) for effectiveness. Bandipur has erected 125.65 km of tentacle hanging solar fence

Photos 5: Tentacle hanging solar Powered Fence at Ganeshanagudi-Budikatte to Upakaragate of Kundukere Range.



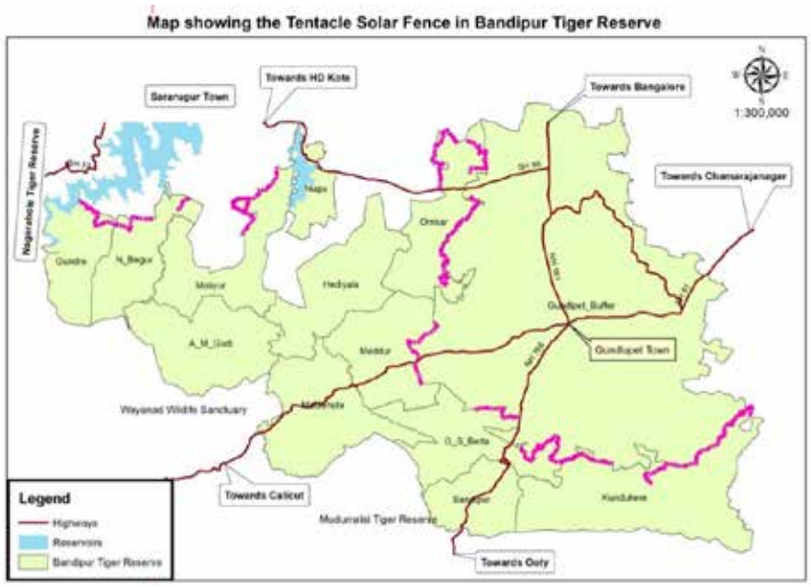


Figure 6: Map showing the locations of Tentacle hanging solar pwered fence (SPF) established along the boundary of the Bandipur TR.

Figure 6: Map showing the locations of Tentacle hanging solar pwered fence (SPF) established along the boundary of the Bandipur TR.

Photos 8: Railway Barricade Maddur Range and at Paladalla to Tottilu Bavi Halla of Omkara Range.

C. Railway Barricades:

Based on the success story of Addo National Park of South Africa (designed by Graham Armstrong), Government of Karnataka has developed this barricade using railway sleepers in 2014-15. It has both vertical post and 2 lines of horizontal lines. The vertical posts are of 3.45m height, with 1.35m buried inside the ground and 2.10m above the ground. The distance between 2 vertical posts is about 3.20 to 3.25m, whereas the gap between 2 horizontal railings is 85cm. Two horizontal bars are connected to vertical bars by four nuts and bolts. The initial cost involved is Rs. 154 lakhs to 170 lakhs per km. Since 2014-15, about 52.68 kilometers of railway barricade has been erected at Bandipur.

D. Steel Rope Wire Fence:

It is also new type of elephant proof barrier, based on the African model that was tried on a trial basis over a distance of 1.57 km at Bandipur TR in 2021-22. It consists of RCC anchor post at every 250m distance (with the above ground level dimension of 2.5mx0.45mx-0.3m), intermediate posts (precast RCC post) at every 15m (with AGL dimension of 2.5 m x 0.325m x 0.325m) and 14 mm steel wire rope of 5 strands. Further, there is a free standing eucalyptus pole/spacer at every 2m so as to keep all the 5 strands of steel wire rope intact. This fence costs around 45 to 55 lakhs per km and is cheaper than the railway barricade.

Fig. 9: Steel Rope Wire Fence erected on trial basis at Omkara Range.

E. Special Structures to prevent elephant crossing:

a. Rubble Stone Wall (RSW): It is a special structures established at a specific sites having problem in establishment of EPT/SPF. They can be built over a small stretch, using locally available materials.

b. Masonry Wall (MW): It is a special structure established at specific sites to prevent elephants from straying out. They are more stable and durable than rubble structures and are multipurpose as openings can be provided at bottom for passage of water in case of small streams.

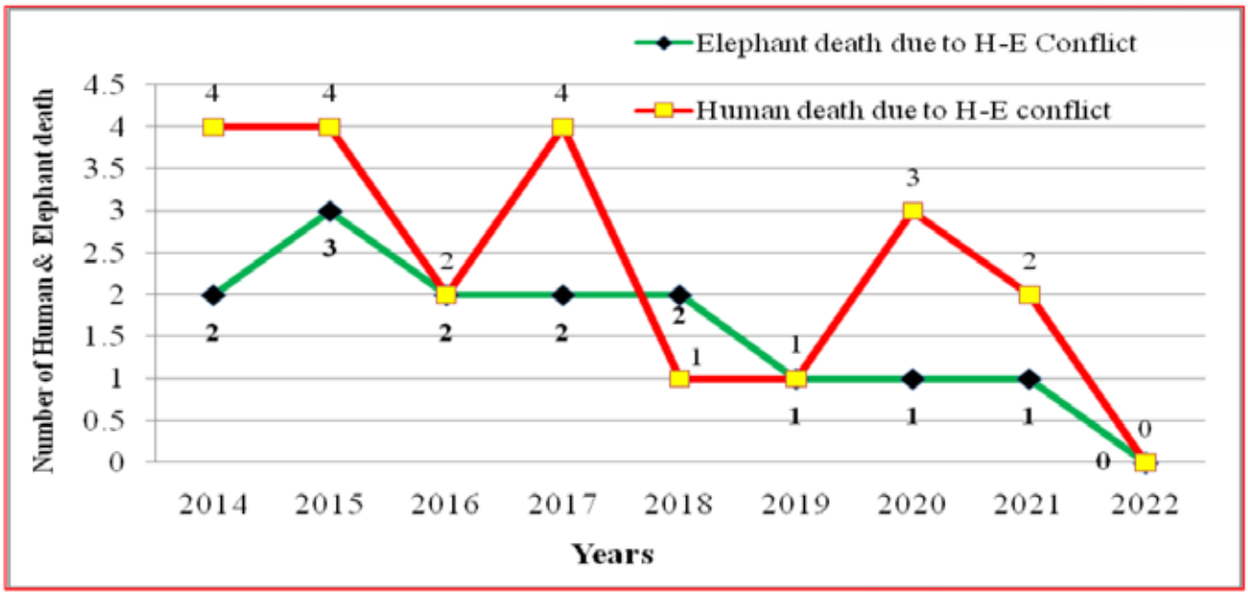
c. RCC Pillars: RCC pillars can be built only of vertical pillars or in combination of horizontal rails to make it more effective in case of longer spacing between pillars.

Fig. 10: Rubble Stone Wall at Sundanapalyana thittu-1 area of Kundukere Range and Ramegowdra Halla D-Line of N.Begur Range.

Fig. 12: RCC Pillars at Aladamarada Halla of Omkara Range and Masakallidarihalla of Kundukere Range.

Conclusion:

Human-elephant conflict is not a new phenomenon but the intensity of HEC has increased o er years and so has the perception of human towards elephant conservation. Though multitude of traditional methods have been developed and implemented, elephants learn to circumvent and overcome many of the methods used for mitigation of HEC. Some of the HEC mitigation methods that were initially successful have lost their effectiveness over time. Therefore, continuous monitoring and adaptive management strategies based on results is critical for successful HEC mitigation. A multiple elephant proof barricades and strategies as per the local site condition are required. Further, one of the innovative and long-term mitigation strategies for the HEC is changing the cropping pattern i.e. growing non palatable crops such as chilies, sunflower, chrysanthemum flower and cotton etc, in the crop fields adjoining forests. With concerted efforts, there is a significant decline in the number of deaths of both humans and elephants (Fig. 13).



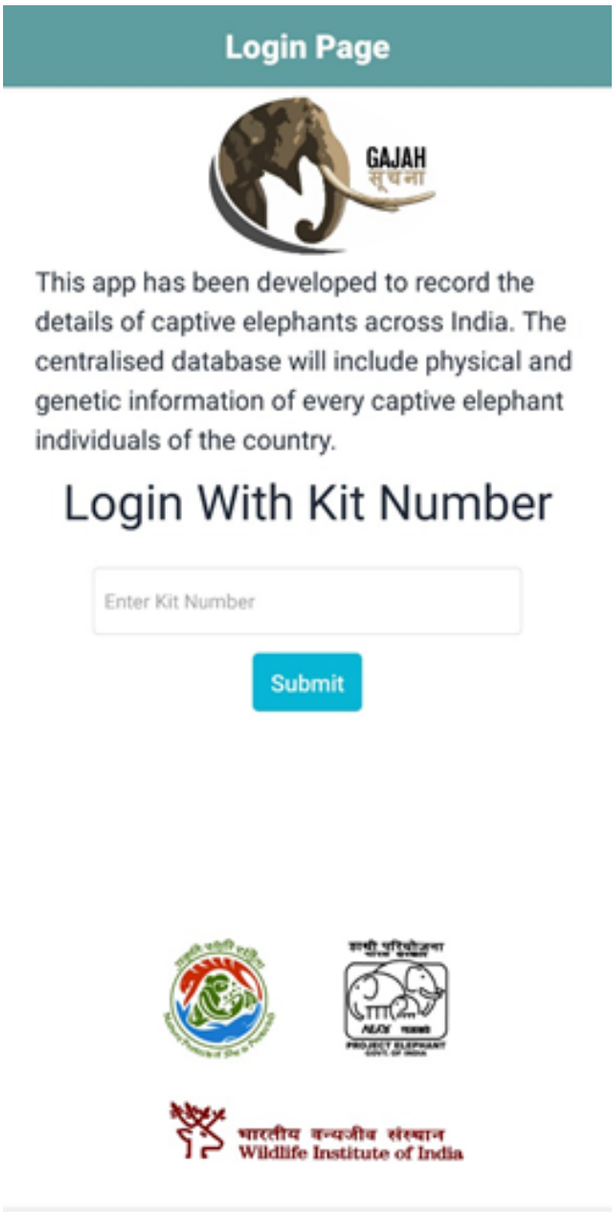
Conservation News

Health survey and DNA profiling of captive elephants

To prevent the inclusion of elephants from wild, PE Division with Elephant Cell has embarked on the collation of information of captive elephants of the country and conducting captive elephant DNA profiling. An app called "Gajah Soochna" has been developed by Elephant Cell and the blood sample collection kits are being prepared by WII. The details of the captive elephants shall be fed into the App which would provide a unique Id to each captive elephant and this shall ensure cross verification of each elephant and prevent current malpractices being adopted to include wild elephants from wild into the captive stock.

Orientation workshop on "Biological sampling for developing a genetic database of captive elephants across India" was held under the Chairmanship of IGF & Director (PE) on 10th February, 2022. A Gajah Suchana App was developed in for collation of data on captive elephants and their owners.

The sample collection from captive elephants has been completed in the states of Haryana, Delhi, Uttarkhand, Chhattisgarh and ongoing in Tamil Nadu.



Identification and Ground-truthing of Elephant Corridors

With the increasing instances of Human-Elephant Conflict, it is essential to provide safe passage for elephants from habitat to habitat. The Gajah report of MoEF&CC (2010) highlights 88 elephant corridors categorized as priority I and II. To update the current status of elephant corridors, a Committee has been constituted by this Ministry and four regional workshops have been completed. Field groundtruthing of

Training of forest officers

IGF & Director (PE) presented on "Challenges in elephant conservation in forest management perspective" during the mid-career training (MCT) phase III on 29th November, 2021 at IGNFA. Various issues related to elephant conservation were deliberated in details with the forest officers.

Protection of elephant corridors

Based on the direction of the Hon'ble High Court, Tamil Nadu has notified elephant corridors. The Hon'ble Supreme Court has upheld the decisions of the Hon'ble High Court by emphasizing the importance of protection of elephant corridors and directed states to ensure uninterrupted movement of elephants between different elephant habitats. The judgement of the Hon'ble Supreme Court has been circulated to all States/UTs for taking appropriate measures for protecting elephant corridors.

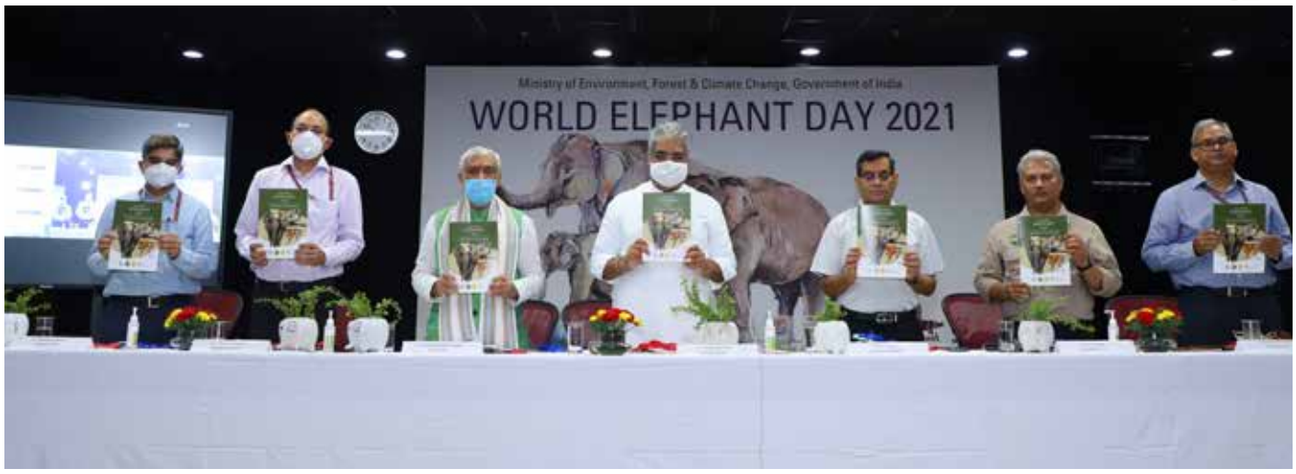
elephant corridors completed in Uttar Pradesh, Assam, Arunachal Pradesh and Tamil Nadu. A total of 46 elephant corridors (52%) have been groundtruthed.

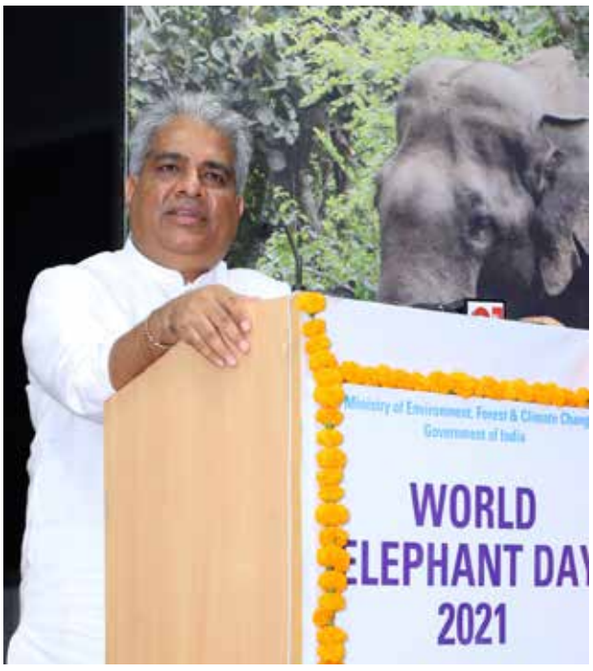
Central Project Elephant Monitoring Committee

The Central Project Elephant Monitoring Committee was constituted by Hon'ble Supreme Court to look into the issue of elephant conservation including that of Human-Elephant Conflict. Following the line, the Hon'ble NGT requested the Committee to look into the death of elephants due to train hits with railways, States of Tamil Nadu, Kerala and WII and suggest mitigative strategies to prevent death of elephants due to train hits. The second meeting of the CPEMC along with Southern Railways, Kerala and Tamil Nadu Forest Department was organised on 28th July, 2021 to review the steps taken by Railways and Forest Department and evaluate the mitigative approaches that can be undertaken to prevent train accidents. The third meeting of the Central Project Elephant Monitoring Committee was conducted on 24th December, 2021 under the Chairmanship of Dr. S. P. Yadav, ADG (WL) to deliberate on various issues related to elephant conservation. The Committee has now been reconstituted by the Hon'ble MEF in March, 2022 and the fourth meeting of the CPEMC is scheduled on 13th August, 2022.

Addressing Conservation Issues Related to Elephants

A total of 741 elephants have died due to electrocution while a total of 186 elephants had died due to train hit during the last 11 years (2009-2020) across India. Intelligence during cyber patrolling reveals the emergence of digital middlemen working between buyer and seller for trade in ivory. Addressing these concerns, a meeting was oragnised with all elephant range states on 02.09.2021 to discuss various issues related to conservation and management of elephants.





World Elephant Day 2021

World Elephant Day dedicated to the preservation and protection of the world's elephants aims to create awareness on elephant conservation, and to share knowledge and positive solutions for the better protection and management of wild and captive elephants.

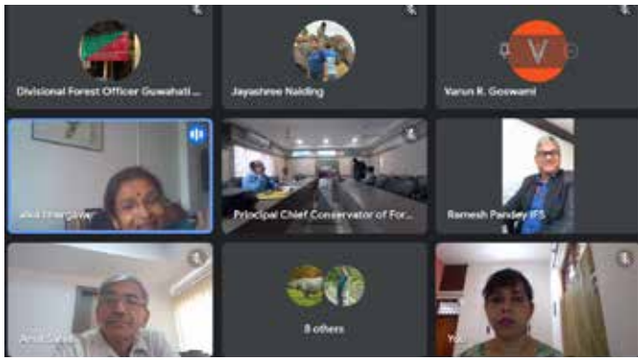
World Elephant day was celebrated by Project Elephant Division and Elephant Cell of WII at Indira Paryavaran Bhawan, New Delhi on 12th August, 2021. The programme involved releasing the booklet on "All India Elephant, Tiger and Leopard Estimation" and the fourth edition of the quarterly newsletter of Project Elephant Division and Elephant Cell. A video on measures for encouraging human – elephant co-existence through HEC mitigative approaches was also screened. The announcements of prize winners of the painting competition and essay competition organised on occasion of Baharat ki Aazadi Mahotsav were announced in the presence of the august gathering. The event was oragnised with the esteemed presence of Shri Bhupender Yadav, Hon'ble Minister EF&CC, Shri Ashwini Kumar Choubey, Hon'ble MoS, EF&CC, Shri Subhash Chandra, DGF&SS, MoEF&CC; Dr. S. P. Yadav, ADG (NTCA), Shri Ramesh Kumar Pandey, IGF & Director Project Elephant, MoEF&CC and other senior officers of MoEF&CC. The State Forest Departments, WII and other stake holder organizations joined the celebrations on the virtual mode. Shri Bhupendra Yadav, Hon'ble Minister, EF&CC emphasized public participation and local knowledge are necessary tools for elephant conservation and addressing man-animal conflicts. There is a need to identify areas where man-animal conflicts exist and visit local areas while framing a policy to address these issues. He also stressed that a bottom up approach towards conservation, involving local communities is the way forward towards wildlife conservation. Shri Ashwini Kumar Choubey, Hon'ble Minister of State, EF&CC highlighted that elephant conservation is intricately linked to ecosystem conservation. He also stressed that saving elephants was like saving forests, and saving forests led to saving the entire ecosystem.

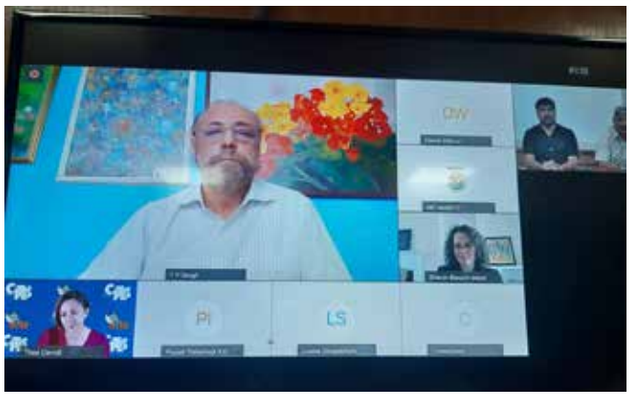
Azadi ka Amrit Mahotsav

Bharat ka Amrit Mahotsav was launched across the country beginning March 12 as part of celebrations to mark 75 years of Independence. The padyatra was flagged off by the Hon'ble Prime Minister of India, Shri Narendra Modi from Sabarmati Ashram to celebrate and showcase a progressive India and the glorious history of its people, culture, heritage and achievements. The celebrations marks the anniversary of "Dandi

March" led by Mahatma Gandhi on 12th March 1930 with 81 marchers from Sabarmati to Dandi. The commemorations include 75 events for 75 weeks involving 75 species of conservation priority in the 10 biogeographic zones of India with one prominent event every week. A week long programme was celebrated by the Project Elephant Division and Elephant Cell as a precursor to World Elephant Day, 2021.

Date	Programme
3rd August, 2021	Workshop on problem management of captive elephants
5th August, 2021	Painting competition for school children oraginsed in collaboration National Museum of Natural History
6th August, 2021	Essay writing competition of college students oragnised with WWF-India
7th August, 2021	Film shows for children oraginsed in collaboration Wildlife Trust of India
9th August, 2021	Workshop on role of technology in mitigation of human-elephant conflict
10th August, 2021	Webinar on elephant conservation vis-à-vis ecological security of the country
12th August, 2021	World Elephant Day Celebration





Interface with State Forest Departments:

The state FDs are seeking inputs from the PE Division on technical matters related to elephant conservation. The first such request was made by Odisha FD and accordingly a concept note on HEC management was prepared and shared with Odisha FD in September, 2021.

A two days workshop on 'Holistic management of HEC" was organized by Assam FD and PE Division on 22nd and 23rd November, 2021 aiming to formulate a pilot project to tackle HEC.

CITES, MIKE, ETIS:

Project Elephant Division has interface with multilateral environmental agreements and in the last CoP of CMS at Gandhinagar held in February 2020, Indian elephant was included as Appendix I species of the Convention. Based on the importance of elephants as a flagship species, Project Elephant Division on 14th October, 2021 was designated as the "Focal Point" under the CITES Management Authority, India.

MIKE and ETIS data of Govt. of India submitted to CITES and TRAFFIC respectively.

Capacity building workshops

Two workshops have been conducted by PE Division and Elephant Cell, WII on 'HEC mitigation' and on 'Controlling illegal, trade and other crimes on elephants' from 22nd to 26th November, 2021 at WII.

To document best practices in managing captive elephants with emphasis for providing appropriate veterinary care, Project Elephant Division, MoEF&CC, GoI and the Elephant Cell along with Uttar Pradesh FD and Wildlife S.O.S. conducted a three-days residential workshop in

Agra from 12th to 14th February 2022.

Elephants in the SC74 meeting of CITES

In the 74th Meeting of Standing Committee of CITES, India highlighted on the stringent protection accorded to Asian elephants to prevent the commercial trade of elephant ivory and other parts and derivatives in the country. India also called upon attention on measures embarked by the country to better manage elephants in wild and captivity.

16th Steering Committee Meeting of project Elephant

The 16th meeting of the Steering Committee of Project Elephant was held under the Chairmanship of Shri Bhupender Yadav, Hon'ble MEF&CC with 26 members participating from different parts of the country. Hon'ble Minister and the esteemed dignitaries released a report on Human – Elephant Conflict, Field manual for managing HEC and the Newsletter Trumpet.

Release of Publications

Fourth issue of "Trumpet" was released by Hon'ble MEF during the World Elephant Day, 2021.

The protocol on synchronized elephant census was released by Hon'ble MEF during the World Elephant Day, 2021.

On International Day of Forests on 21st March, 2022, the fifth issue of the newsletter Trumpet was released by the Hon'ble MEF and Hon'ble MoS in the presence of Secretary, MoEF&CC and DGF&SS, MoEF&CC.

"Human – elephant conflict in select states of India: A preliminary report" was released by Hon'ble MEF during the 16th meeting of the Steering Committee on 29th April, 2022.

Field manual for managing HEC" by Hon'ble MEF during the 16th meeting of the Steering Committee on 29th April, 2022.

The sixth issue of the newsletter "Trumpet" was released by Hon'ble MEF during the 16th meeting of the Steering Committee on 29th April, 2022

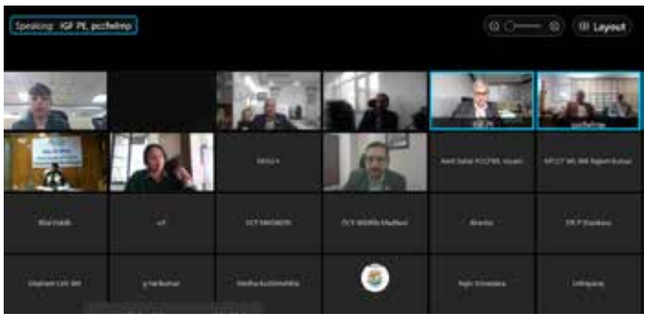
Inter-Ministerial meeting with Railways

An Inter-Ministerial meeting with Railways was held under the Chairmanship of Shri C. P. Goyal, DGF&SS on 1st June, 2022 to discuss the issues related to implementation of projects and policies in Railways. The issue of elephant deaths due to train hits was deliberated in the meeting. A detailed presentation on this issue was given by Shri Ramesh Kumar Pandey, IGF & Director (PE) and Dr. Bilal Habib, Scientist E, WII. The way ahead to avois deaths due to train hit was also discussed.

Management Effectiveness Evaluation (MEE):

Based on the decisions of the 16th Meeting of the Steering Committee, a Committee has been constituted by Project Elephant to develop the criteria and indicators to develop MEE. The first meeting of the Committee was held on

29th June, 2022 under the Chairmanship of Dr. S. P. Yadav, ADG (PT) to deliberate on the way forward to develop criteria and indicators for MEE of Elephant Reserves of India.



Recommended Operating Procedure (ROP) for "Post mortem of elephants including procedures for carcass disposal"

Based on the decision taken in the 16th Meeting of Steering Committee of Project Elephant a Subcommittee under the Captive Elephant Healthcare and Welfare Committee to develop a uniform guideline to be followed for wild animal carcass disposal. The first meeting of the Subcommittee was held on 8th June, 2022 and the second meeting of the Subcommittee was held on 29th June, 2022 to deliberate on the contents for drafting of the ROP.

Participation in the 3rd Asian elephant range states meeting

IGF & Director (PE) participated as the Head of Delegation of India in the third Asian elephant range states meeting held from 27th to 29th April, 2022 at Kathmandu, Nepal and presented the country report on conservation regime adopted by India to protect elephants.