TRUMPET

PROJECT ELEPHANT DIVISION
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE 2021

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Wildlife Institute of India

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TRUMPET

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MESSAGE

Dr. S.P. Yadav,
ADG(FC) and Member Secretary, NTCA

For centuries, India has regarded the elephant as its cultural and heritage symbol and thus has declared the mega herbivore as the National Heritage Animal of the country. Being the home to around 60 percent of the global Asian elephant population, India has a primary duty and responsibility for ensuring their conservation. As the human population expands impinging on the habitat and the space the wildlife occupies, our involvement in conservation efforts is vital to species, such as elephants, facing the threat of extinction.

Despite the challenges, India has showcased commendable efforts in conserving the species with around 30,000 wild elephants extant in the country. For the very first time, population estimation of both elephants and tigers will be done in convergence involving standardized protocols to sample their potential habitats and provide a scientific assessment of their status and population estimates required for policy formulation and conservation management. This time "Trumpet" addresses studies on elephants in Karnataka, Tamil Nadu and Odisha. Lauding the effort of the State Forest Departments, this issue of "Trumpet" highlights on the exemplary work done by the State Governments in conserving the species as well as the research and pilot projects undertaken to understand the ecology and its behaviour as well as cost effective measures adopted to manage human – elephant conflict in synergy with the local communities.

I congratulate the Project Elephant Division and Elephant Cell team for bringing out the Sixth Edition of the newsletter "Trumpet" highlighting on the efforts undertaken by both Central and State Governments as well as the integral stakeholders in their endeavour to protecting elephants and preserve the species for the future generations to come.

The Many Ways of Managing Human–Wildlife Conflict

A Synthesis of Better Practices Followed Across India

Shri Ramesh Kumar Pandey,
IGF & Director, Project Elephant

India is one of the mega-diverse countries harboring rich biodiversity across eco-regions. Among the vertebrate diversity, India harbors the largest populations of iconic mega fauna like the Asian elephants (Elephas maximus) and tigers (Panthera tigris). Enablers of biodiversity conservation in India include cultural and religious ethos that revere nature, conservation friendly legislations, public opinion in favor of conservation, and stable institutional framework to implement conservation priorities in the field. Further to this, tolerance towards other living beings is deeply deep-seated in our culture and way of life. Sometimes this tolerance can be put to test by conflict of interest between people and animals, as exemplified in case of elephant conservation. There are several identified drivers of human–elephant conflict, which results in loss of human and elephant lives, and livelihoods and myriad other indirect impacts. 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.

Human–elephant conflict is not a new phenomenon. From evolutionary point of view, human–elephant conflict is very ancient and became acute during the last 12,000 years with the advent of settled agriculture by early human beings. In the ancient texts and even scriptures available in India, approaches followed in managing human–elephant conflict were passingly dealt with. Scientific management and elephant habitats, populations and aspects of conflict are relatively recent, but India still remains one of the pioneers in the field among the Asian countries. There are various case studies from across India on successful interventions that resulted in mitigating human–elephant conflict. 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 endeavors 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.

Synthesis of the knowledge gained on experimenting a variety of conflict management strategies can provide wealth of information and future directions for contemporary management of human–elephant conflict. Therefore, an attempt is made to collate details on different approaches used for mitigating human–elephant conflict management in a lucid and descriptive manner so that end users and frontline staff handling the field situations can get to know about these strategies. For somebody who is new to managing human–elephant conflict, knowledge on variety of tools and approaches to mitigate conflict would enable information-based choice/decision making. The best practices on human–elephant conflict management are those that had met with some level of field success in minimizing the impact on both people and elephants. A lot of these best practices can be highly influenced by site-specific conditions and thus, prior experimentation and subsequent suitable modifications, as appropriate may be required before large-scale implementation.

Captive Elephants

Definition of human–elephant conflict:
From human perspective, human–elephant conflict includes direct costs like loss of crops, property and human lives, and also the indirect costs like living in constant fear, loss of opportunities and other impacts. It must be noted that elephants have large home ranges and conflict can thus be geographically widespread. The broad overview of different approaches followed for mitigating HEC are as follows:

1. Confining elephants in natural habitats:
One of the primary approaches to mitigating HEC entail containing elephants within their natural habitats. This is achieved through active and passive barriers. The passive barriers that have met with some level of success includes the following:

Elephant-proof trench (EPT): The elephant-proof trenches of dimension 3m (width at top) x 2m (height) and 1-m width in the bottom. EPT works well in areas where soil is hard and rainfall is less. There are several examples of well-maintained EPTs effectively deterring elephants from crossing into crop fields.

Solar powered fences (SF): Electric power fences are the most widely used barriers to deter elephants. The power fences work with an energizer that boosts 12-volt battery to deliver a powerful, but non-lethal shock of 6 – 9 KV at very low pulses of 1/3000 seconds. Power fences work in all terrain provided they are well maintained and there are good examples of working fences from across the country.
Walls: Stone, rubble and cement walls are also used for deterring elephants from entering into crop fields from the forests. Use of walls has met with mixed level of successes. Walls are extensively used in Uttarakhand and proved effective in select stretches.

Other novel physical barriers: Numerous states have come up with ingenuous designs extensions to physical barriers to make them work effectively against elephants. Karnataka Forest Department had experimented "Railway Fences" fences, which proved to be effective to a large extent. Similarly, Tamil Nadu Forest Department experimented "Steel-rope Fence" fence in Hosur Forest Department and found it to be effective. Many state Forest Departments have also come up with "Tentacle Fences" or the hanging fences that are found to be quite effective in stopping elephants from passing through.

2. Reducing human impact on elephant habitats:
As incompatible human use of elephant habitats can lead to forest loss, degradation and fragmentation reducing their carrying capacity, minimizing negative impacts of people on elephant habitats after duly recognizing and considering local communities' livelihood interests have been attempted in fruition across different sites. The approaches used in minimizing human impacts included:
Habitat consolidation: In areas where human settlements were scattered resulting in reduced access for elephants, in few sites temporary settlements were consolidated creating undisturbed foraging grounds for elephants.
Voluntary resettlement of village communities: In select areas where human–elephant conflict was high, select villages from vulnerable areas were resettled to minimize conflict and increase habitats for elephants. There are good examples from Rajaji tiger reserve in Uttarakhand, Nagarahole tiger reserve from Karnataka and others.
Promotion of alternative livelihood: To minimize dependence on forests, alternative livelihood schemes like apiculture, ecotourism etc were implemented across many different elephant habitats. This resulted in reduction in firewood collection and other pressures on habitats and allowed forests to naturally recover so that the habitat can sustain elephant populations.

3. Monitoring HEC for taking informed decisions
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. Well-maintained database can provide wealth of information including directions on prioritizing mitigation strategies. Additionally, the Project Elephant and the State Forest Departments have encouraged site-specific research programs that helped in systematically monitoring human–elephant conflict.

4. Habitat improvement
Containing elephants inside forested habitats would be conditional on improving the habitat

Tentacle Fences Muduamali

conditions in the first place. Recognizing the importance of maintaining and restoring habitat quality, host of habitat improvement activities aimed at improving the forage, water and other essential resource requirements have been carried out across different elephant habitats in India.

This includes removal of invasive weed plants like Lantana camara, Chromolaena spp, Opuntia spp, Parthenium hysterophorus etc.

Further to this, in areas where water sources dry up during summer forcing elephants into human-use areas, water conservation, soil percolation and water augmentation are prioritized.

Furthermore, in landscapes where forest fires continue to pose threats, fire control strategies including cool burning, and maintenance of fire lines, fire watchtower etc are taken up.

Furthermore, to improve fodder base for elephants, fodder plots and effective grassland management have resulted in improving habitat condition for elephants.

5. Ex-gratia payment to affected families

Until long-term conflict mitigation strategies reap benefits, it is important to minimize the losses incurred by stakeholders, as most of them are marginal farmers. The State Forest Departments often backed by central assistance providing ex gratia amount aimed to providing some level of financial assistance to affected families. The State Forest Departments have increased the rate of ex gratia considerably during the last few years. Quite recently, 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.

6. Use of trained captive elephants in conflict management

Use of trained captive elephants called Kumkis is a time-tested conflict mitigation strategy widely used in states like Tamil Nadu, Karnataka, Assam and West Bengal. Kumki elephants have proven to be safe and indispensible asset in managing conflict situations involving guiding elephants back into forests, capturing elephants in conflict situations etc. Recognizing the importance of kumki elephants, many states like Chhattisgarh, Madhya Pradesh and Uttarakhand have recently developed good kumki units. The Project Elephant in coordination with WII and State Forest Departments had been conducting on-field capacity building programs aimed at improving captive elephant management.

7. Development of rapid-response teams

Well-trained response teams are critical to address emergency conflict situations. Numerous elephant ranging states in India have created state-of-the art rapid response teams comprising of trained scouts that can track and monitor elephants in conflict situations. These RRT units also have been well equipped in most cases with facilities to rescue people during emergency situations, providing first aid for exigencies, and others. RRT units often comprise of village volunteers too to act as a bridge between forest department and village communities to collectively address the problem of HEC.

8. Use of early-warning system

Averting negative interactions between elephants and people is perhaps the best way of mitigating conflict in human–dominated landscapes where elephants frequently occur in human–use areas. Well designed early-warning system will go a long way in averting close interactions between elephants and people.

- The Valparai model involving collaborative efforts of Tamil Nadu Forest Department and Nature Conservation Foundation in alerting tea estate workers through bulk sms, alert messages and beacon lights in strategic locations helped in minimizing human deaths in Valparai plateau of Anamalai Tiger Reseve in Tamil Nadu.
- In Hassan and Kodagu districts of Karnataka, bulk SMS and display boards are being effectively used to minimize negative interactions between people and elephants in coffee plantations.
- In Odisha, use of mobile application and watsup to disseminate messages on elephant occurrence in a locality had proven to be

effective. Many other states have initiated mobile-app based close monitoring and dissemination of information on elephant occurrence.

9. Monitoring elephants with radio and satellite collars

To understand behavioral underpinnings of human–elephant conflict and to gain a perspective on habitat influences on conflict behavior by elephants, many states across India have started monitoring elephants using real-time satellite collars. The satellite collars also serve as early-warning tools. The data generated by collared elephants have provided important perspectives on inter-state elephant movement reemphasizing the need for landscape-level elephant conservation.

10. Virtual fences

Virtual fences involve creating no-go areas in the topographic maps in areas of high intensity of conflict. Virtual fences can work using satellite/GPRS collars when elephants cross into demarcated no-go areas, alert would be triggered. There are examples demonstrating use of virtual fences for monitoring satellite-collared elephants. Virtual fences have been tried with other conflict-prone animals like leopards. Its use has potential to be explored further in case of elephants.

11. Experimentation of beehive fences

Beehive fences involve suspension of hives of honeybees, which were shown to be good deterrents for African elephants. The African rock bees, which are known to be very aggressive and territorial, offer a good resistance for elephants when the hives are perceived to be under threat by bees when elephants try to cross across beehive fences. Encouraged by successful experiments in Africa, in India too beehive fences were experimented in multiple different sites like Assam, Maharashtra, Chhattisgarh and other elephant range states. The preliminary results were encouraging and this motivates further experimentations.

The KVIC (Khadi Village and Industries Commission of Government of India) along with Karnataka Forest Department and Ponnampet Forestry College, Kodagu had conducted preliminary trials to assess efficacy of beehive fences in Kodagu District, Karnataka. In the next phase, with technical support from Project Elephant and field support from State Forest Departments, KVIC has planned to

Conservation Resort in corridor/ Puthubeerkadavu Sathy

experiment beehive fences in six states namely Odisha, Maharashtra, Karnataka (other sites), Uttarakhand, Assam and West Bengal.

12. Use of Aniders and other non-lethal scare tactics

A simple and widespread deterrent for elephants is use of local scare tactics such as noise-making drums etc. The idea behind use of scare tactics like sound making equipment is to make crop raiding elephants aware the humans are around and active too. Human active presence itself can be a main psychological deterrent to elephants in most cases. Aniders are noise-making hooters with visual effort of penetrating light that have shown to have a deterrent effect on a variety of wildlife like bears, jackals, and even elephants. Unlike conventional drums, Aniders require no human effort, but can automatically be set-up in the trails that elephants frequent. Aniders have in-built sensors that can detect elephant movement and trigger sound and light emission to scare elephants away. Wildlife Institute of India, Dehradun had experimented Aniders for many animals and is currently testing the efficacy for elephants.

13. Experimentation with thermal and seismic sensors

Project Elephant along with Wildlife Institute of India, Uttarakhand Forest Department and WWF-India had collaborated with Central Scientific Instruments Organization (CSIO), a CSIR institute and experimented use of thermal and seismic sensors in detecting elephants. The seismic sensors augmented with visual and thermal sensors were able to detect elephant movement in the forested environments of Rajaji Tiger Reserve, Uttarakhand along with Railway lines. Now the team is working in developing sensor based alert system to prevent rail-induced elephant collisions. As the experiments were very encouraging and the sensors were able to work properly in forest conditions without any concerns, the use of sensors for conflict mitigation is being actively pursued.

Elephant Proof Walls Rajaji

14. Use of drones for surveillance

Unmanned Arial vehicles (UAV) including portable drones are now being used for a variety of forestry and wildlife surveillance and research purposes. In relatively open habitats, particularly in the human–dominated areas, drones can be very helpful in locating elephant presence so that their movement can be tracked. Drones are now used actively by many State Forest Departments in elephant conflict mitigation efforts as drone tracking has an edge over manual tracking in some situations. In fact, use of drones actively compliments manual field tracking in locating elephants and issuing early warning alerts.

15. Restoration of elephant corridors

Corridors are narrow strip of lands connecting the otherwise disjunct forest habitats. In the absence of corridors, elephants would be forced to use human-dominated areas perpetuating human–elephant conflict. Recognizing the importance of corridors for both elephant conservation and conflict management, the Ministry of Environment, Forests and Climate Change in collaboration with research institutions and the State Forest Departments have identified elephant corridors in India. Recently, the Project Elephant Division has started embarking on ground-truthing corridors across India.

DriveTeam/ Sanamavu

Penny for a Thought: Administrators of Odisha Elephant Reserves on Elephant Conservation

Bikash Ranjan Dash, IFS,

CF (WL), Odisha

Chittaranjan Mishra IFS,

RCCF, Sambalpur

Elephants have remained an integral part of our cultural heritage since time immemorial. They are long ranging and show high adaptability in diet and behaviour. However, due to rapid urbanization, population growth and other human factors, vast ranges for their migration have become extremely rare. Large infrastructure development on their migratory path have pushed elephants to smaller landscapes and less suitable remnants of forests and the coexistence situation of the past has turned into conflicts. Habitat fragmentation also divides elephant populations into small, isolated groups at the risk of inbreeding. While the elephants are struggling for their survival in a human dominated landscape, the conservation effort being made at government level through public participation have raised high hope on existence of this mega animal.

Elephants are our Heritage Animals and people in western Odisha worship elephants as part of their tradition. Earlier, elephants in Sambalpur Elephant Reserve were limited to Badrama and Khalasuni wildlife sanctuaries and instances of crop depredation were sporadic in the region. However, in due course of time, elephant habitat in Sambalpur Elephant Reserve has got fragmented and there is constant conflict between humans and elephants in this landscape. I wish this endeavour of Project Elephant Division of MoEF&CC would facilitate the process for peaceful coexistence of elephants and local inhabitants.
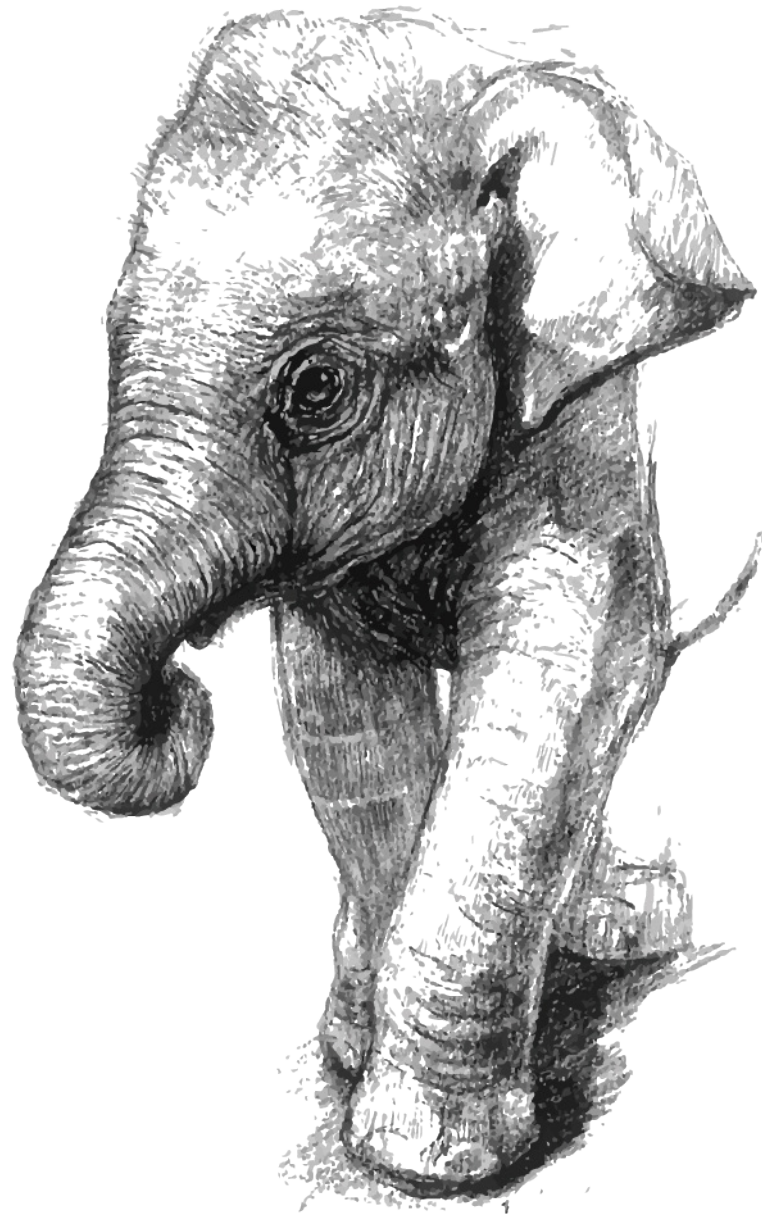
Shri Samyak, Samantara ,IFS,

Samanatara, DCF, PCCF HQs, Odisha

Elephant conservation and their habitat safety needs more of our absence than our vociferous indulgence. Need based, well calibrated and focussed site specific habitat ameliorative interventions with adequate connectivity amongst them holds the key to all long term sustenance programmes intended for the conservation of these majestic pachyderms.

Shri Samrat Gowda,

DFO, Baripada

Odisha is one of the states in the country having a substantial number of elephants. Mayurbhanj Elephant Reserve itself accounted for more than 600 elephants during both the 2015 and 2017 census, out of which, more than 50% are residing in Similipal Tiger Reserve. Human elephant conflict is one of the major management issues in the district. The Odisha Forest department is implementing many innovative methods to safeguard interest of both people and elephants. Remote controlled light alert systems have been installed in sensitive locations which can be operated using mobile phone devices of a designated forest office, such that, whenever the concerned officer receives any message from the control room with information on elephant movement, he can switch on a light alert system by dialing a number specific to that location. More than 6000 people's mobile numbers have been registered in the district, so that they can be alerted through a voice message, whenever there is elephant movement in a particular area. An application called Anukampa has been released recently through which compensation for crop raiding will be provided in minimum possible time. Regular meetings to coordinate between railway and electricity department officials are being conducted to reduce mortality due to train hits and electrocution. These approaches are giving encouraging results in managing human elephant conflicts and setting an example.

Fun fact: Elephants communicate through viberations.

A fence between keeps a friendship green

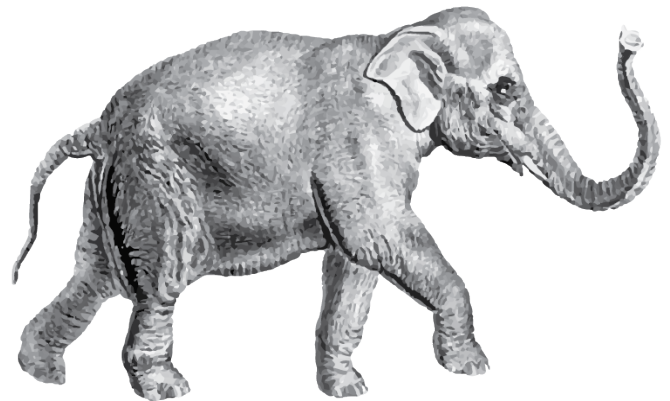**Deepak S Bilgi, IFS., & Sanjeev Kumar S. R.**

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.

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 adequately examined. It is suggested that HEC not only amplifies pre-existing mental illnesses but may give rise to new psychiatric and social pathologies. 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.



1 - Kumki elephant tests 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.

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.
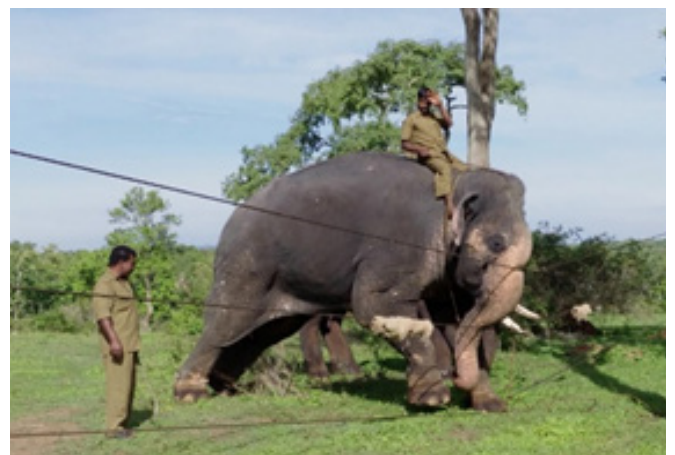
2 - Kumki makhna tests steel wire rope
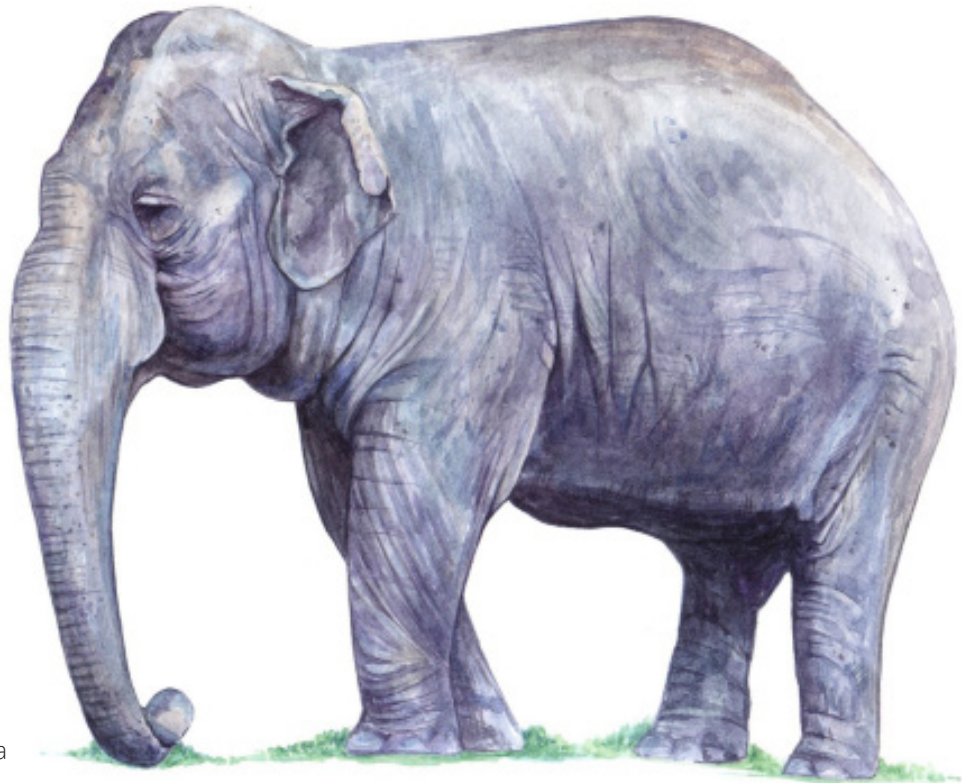
©Raiva Singh/WWF India

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.

3 - Wild elephant attempts to break the wire rope

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

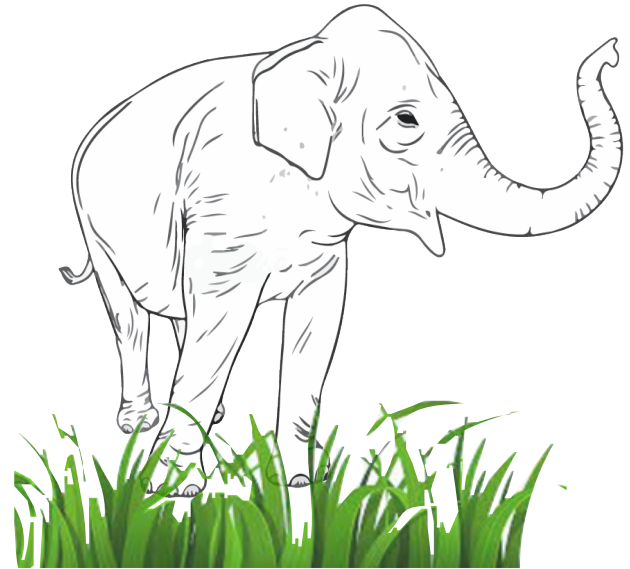4 - A wild makhna climbs over the wire rope fence

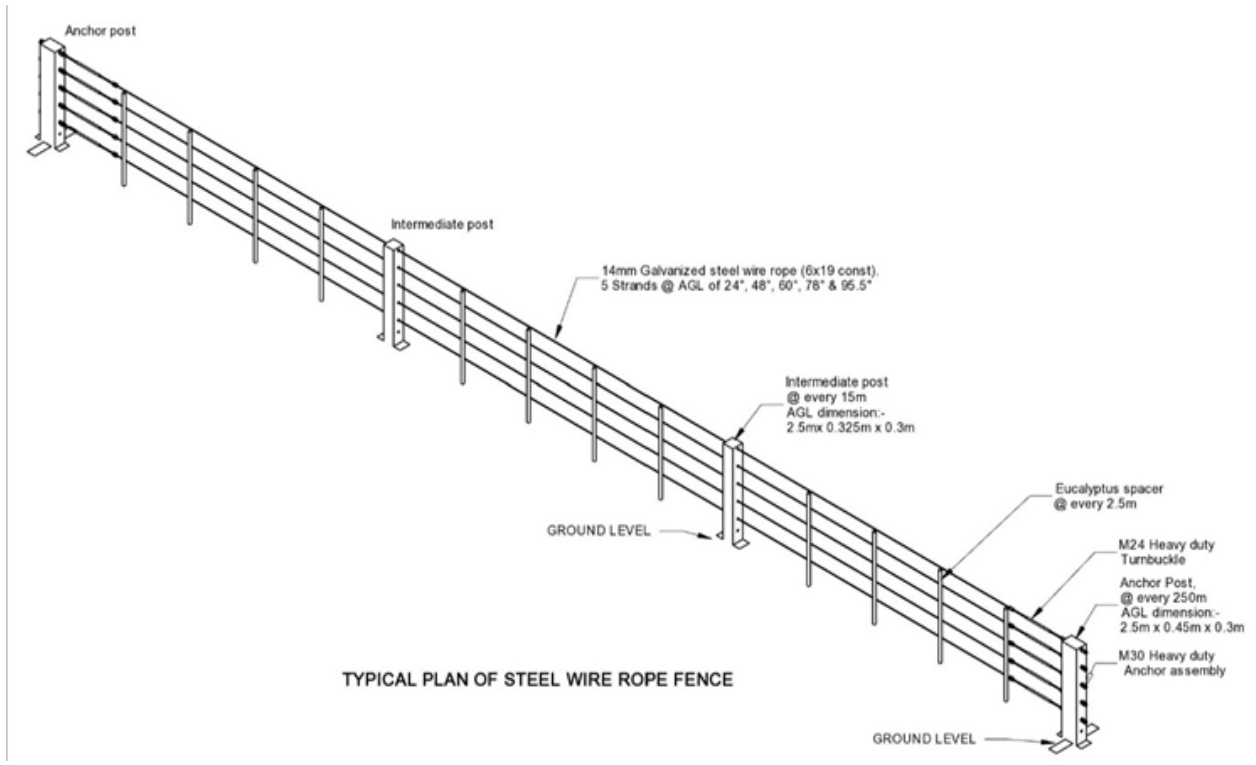5 - A wild elephant pushes against precast RCC post

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

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.

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.

Anchor post

Intermediate post

14mm Galvanized steel wire rope (6x19 const).
5 Strands @ AGL of 24", 48", 60", 78" & 95.5"

Intermediate post
@ every 15m
AGL dimension:-
2.5mx 0.325m x 0.3m

GROUND LEVEL

Eucalyptus spacer
@ every 2.5m

M24 Heavy duty
Turnbuckle

Anchor Post,
@ every 250m
AGL dimension:-
2.5m x 0.45m x 0.3m

M30 Heavy duty
Anchor assembly

TYPICAL PLAN OF STEEL WIRE ROPE FENCE

GROUND LEVEL

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.

7 - Melagiri elephant fence showing precast RCC posts, steel wire rope and eucalyptus spacers

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.

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.

8 - A tusker feeding in a grassy swamp at Nagarhole Tiger Reserve

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

**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.
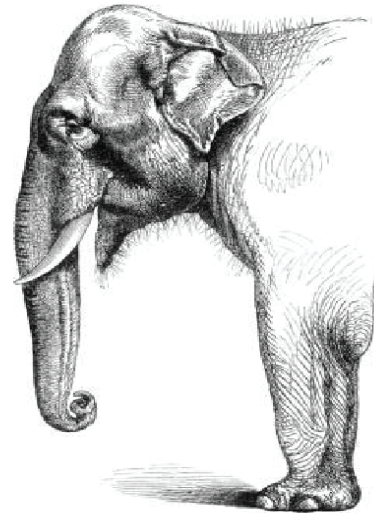
Cause for Conflict

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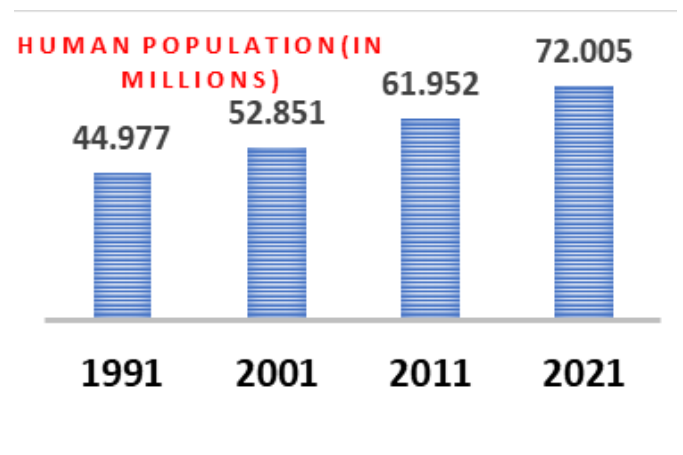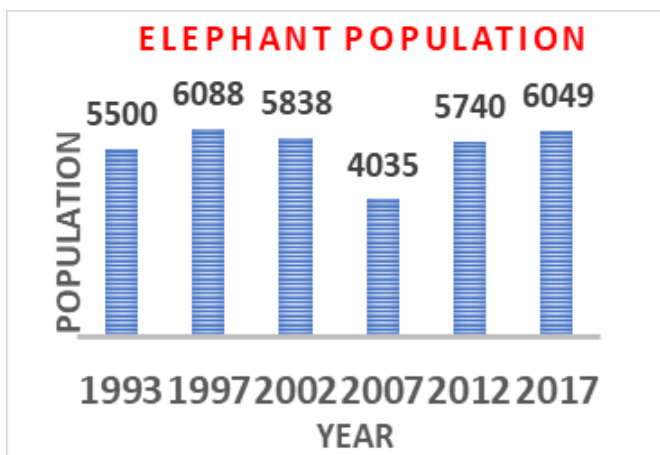
about the reason for such conflicts. The charts above show that though elephant population has slightly increased, human population has grown exponentially. This has resulted in drastic change of land use pattern, large scale encroachment of government lands and forests, leading to fragmentation of corridors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

Hassan-Kodagu Landscape
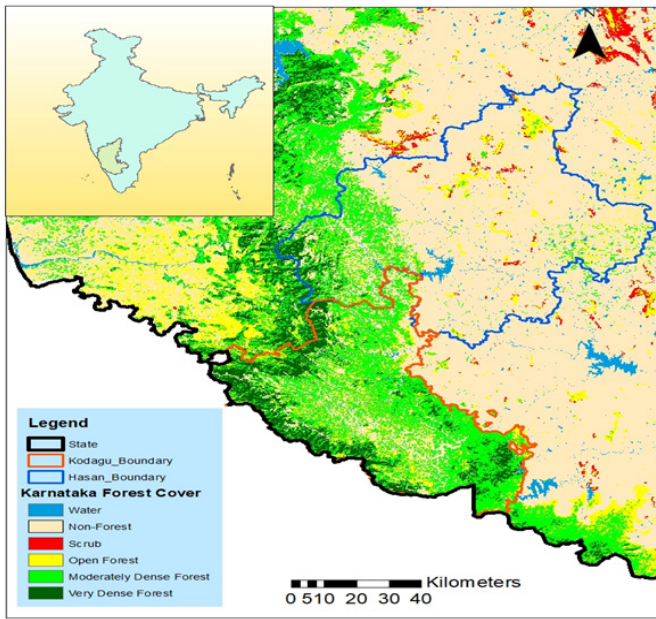
Map of Kodagu and Hassan with various forest types. The land under Moderately dense forest (light green) is mostly the coffee estates with native tree cover, interspersed with some protected areas.

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.
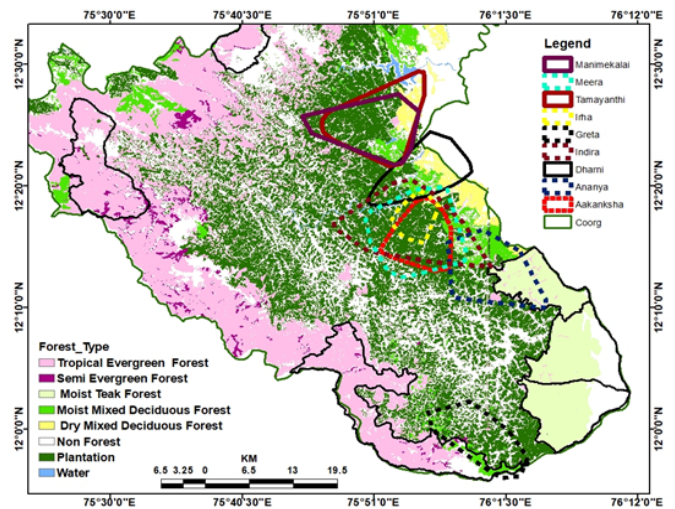
Comparison of home range area (km2) for nine collared elephants in Kodagu from 2018 - 2020. It can be noted that most of them have core home ranges in coffee plantations, rather than adjacent protected areas like Nagarahole Tiger Reserve or Brahmagiri/Pushpagiri/Talakaveri Wildlife Sanctuaries

Severity of conflict across land-scape

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.

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.

Involving Communities

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

Discussing and hearing the local communities about elephant depredation

RRT and ADC members along with RFO and Forest guard

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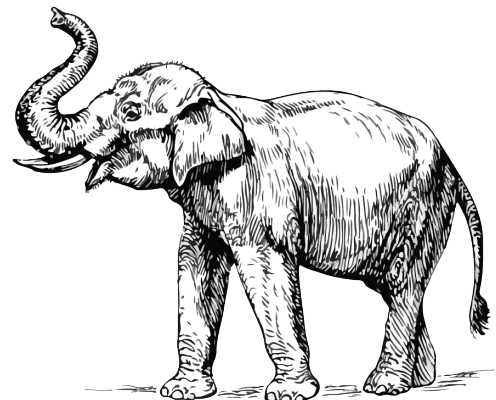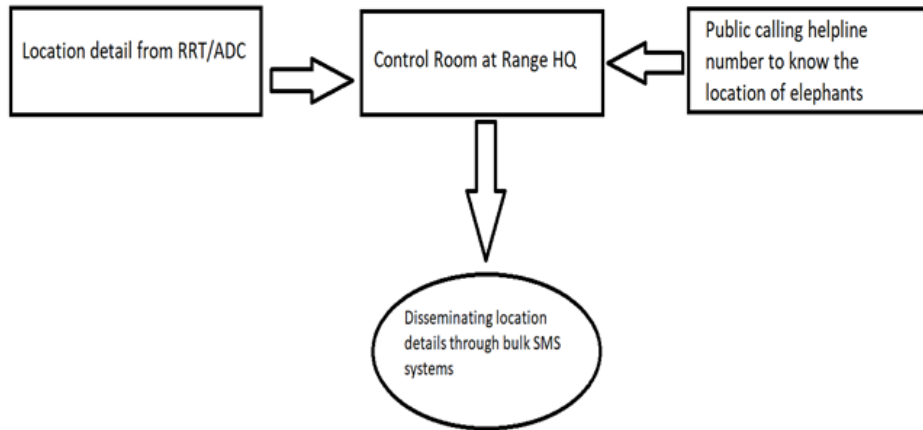
Flowchart depicting flow of information
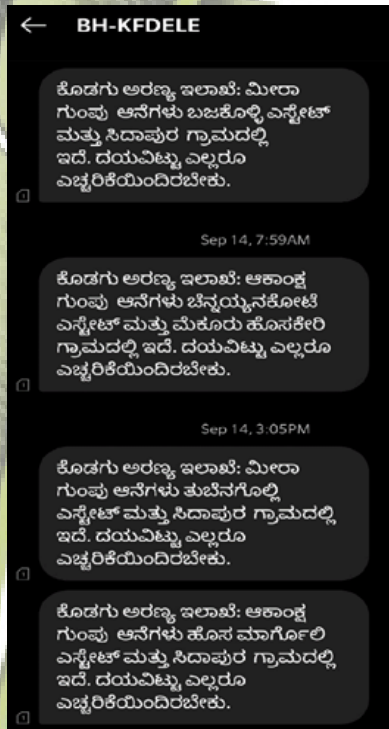
Left: Bulk SMS sent to villagers about location of elephant in Kannada Language
Right: Elephant location displayed in GSM enabled LED boards along a village road to alert the motorists and passerby.

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

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

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

Tracking Translocated elephants through Radio collar

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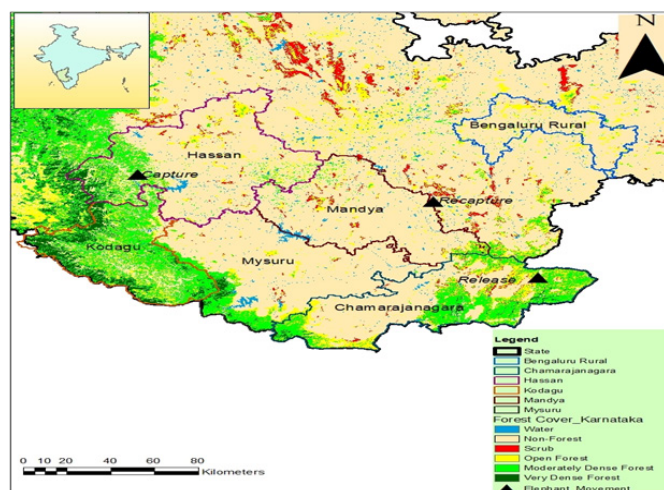
This map clearly depicts the point of capture, release and recapture of Tusker Mountain

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

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.
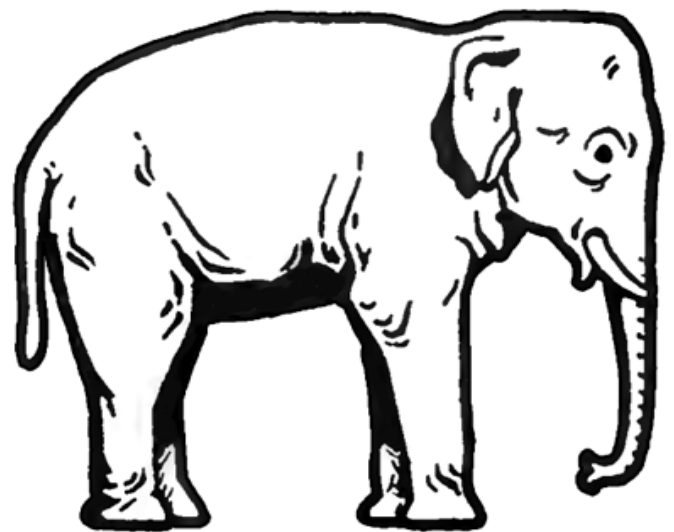
Hanging solar fence

Kharsel – A Killer Turns Protector

S.K.Patnaik, Former CWLW, Odisha

It is said that in early seventies a massive domesticated elephant from Bihar or Eastern Uttar Pradesh came to the western parts of Odisha for begging purpose as usual. He was reported to have been tied in a mango grove around Bolangir. The Mahut of the elephant was reported to have been involved in some criminal case and hence was arrested and convicted. The elephant was kept tied there in the grove with none to feed or care for him. When he was kept starving for days, he broke his chain and became feral. He kept on raiding crop fields, gardens and even broke houses in Bolangir district which had no wild elephants those days. In the process he was confronted with people who tried to drive him away. This infuriated him and he attacked people either injuring or killing them. It was reported to have killed seven persons. Even orders were issued to eliminate him thrice. But he was illusive.

But after these failures, it was decided to capture him and try to make use of him. He was a huge animal. Finally, after several attempts he was captured through chemical immobilization by team of late Sri Bittanath Nayak, the then ACF in Similipal Tiger Reserve, Dr LAK Singh, Research Officer and others in a forest block named 'Kharsel R.F'. Sri S. K. Acharya, D.F.O. and his field functionaries provided full support for this operation. Hence, he was renamed as 'Kharsel'. He was kept chained there inside a Sal Forests of Bolangir Forest Division in Western Odisha for some time as transporting him elsewhere immediately was not possible. He kept on trying to break the chains to escape. This obviously resulted in wounds on his legs. Some local and national level voluntary organizations kept on publishing these stories and criticized the state government for not treating him properly. The senior officials of the state were very worried about the adverse publicity. I, as Director of Nandankanan Zoological Park assured the senior officers and the Chief Minister that we are doing our best to alleviate his suffering and the situation shall improve soon. I thought that

it will be difficult to monitor him regularly being kept more than 300 Kms away. We decided to get him close to Bhubaneswar. As he was full of vigour, getting him to Bhubaneswar and even to board a truck shall be difficult. Hence a cage like frame was welded on a truck, with very stout iron bars. Sri K.L.Purohit, then forest Ranger guided to design this.

I went to Bolangir to personally monitor the operation of transferring him. As we observed that the frame was touching power lines at few places along the road, we had to reduce its height, high enough to accommodate Kharsel. This was quite a cumbersome process.

Thousands of people kept visiting Kharsel with coconuts and other delicacies like banana. He was enjoying this and the company of two cow elephants from NandanKanan, in the shades of Sal Forest. A ramp was created in close vicinity to facilitate his boarding the retrofitted truck.

©Raiva Singh/WWF India

The process of loading commenced after the visitors had left the place after darkness. The truck was stuffed with delicacies for him, so that Kharsel could be lured into the vehicle by these eatables. His moves were very cautious, one step at a time with long pauses. But with each step, the steel chain as tightened by people placed under the truck. We didn't force his pace till his front portion got into the truck's body till he reached a point from where he can't turn back as his huge head could not be turned to escape from the truck. This was very tricky operation when rest of the staff were asleep in their tents. No one awake was visible in the complete darkness of night. I was observing his every movement, sitting at a place that was not visible to him.

Our strategy was to deploy the two domestic elephants to force Kharsel into the truck after he reached the point of no return. After he reached that point, I ordered our zoo elephants to apply force. That worked and he fully entered the truck, when the frame was closed with steel bars from behind. The vet Dr K. C. Patro who was present injected sedative drugs in to his rump to calm him down. This was also a very risky operation and had to be completed fast.

It was 4.am, when the DFO, Sri P.K.Mohan and all the field staff of the division, who had tense evening before, got up to see with disbelieving eyes that Kharsel had been successfully boarded. I did not want to delay the departure of Kharsel and other two cow elephants, as with the dawn approaching, the movement of the convoy carrying Kharsel would be difficult through the Bolangir town. I asked the staff in the convoy to cross Bolangir town and stop near a rice meal about 20 Kms away and take bath and breakfast and feed the animals too before moving further. It worked. In the entire operation the role of Sri K. L. Purohit, Forest Ranger and Sri P. R. K. Nair, Forester was commendable, as they stayed below the truck the entire night to secure Kharsel They moved slowly, stopping on the way for their food and feed the, sprinkle them with water and check their health condition and if required, to sedate Kharsel again as it was getting quite hot as the day advanced.

The convoy reached the pre-planned site near the main gate of Chandaka Sanctuary, where he was housed in a pre-constructed shed after alighting through a ramp without much tantrum as he knew that he couldn't escape.

The national and local press lost no time to rush there and write on the entire rescue operation and care taken in Bolangir and our plans to treat and manage him. It was surprising that after positive report published about his capture and care, there no voice was raised as they knew that all these efforts on the part of the Forest Dept. was to save his life, though he had killed at least 7 persons and had been ordered to be eliminated thrice.

All court cases were withdrawn or dismissed after this, though one lingered for some years to end in failure. He was retrained by Sri Dudul Choudhary from Assam and his team who admired him due to his size and strength.After training we tried to take him to Sambalpur to deploy him in Debrigarh W.L. Sanctuary of Western Odisha. But he Simply refused to board the truck.We had to make him walk more than 300 Kms with many night halts in camps and Nila the young boy from Bolangir who dared to endear him, though he had no past experience of handling any elephant. He was trained about commands by the zoo mahouts. After some days when zoo mahouts watched him, Nila took care of him and is still doing so. Just patrolling by his majestic animal scared the encroachers, bamboo and timber smugglers and poachers. He continues to patrol Debrigarh till now on and people see him can't believe that he had trampled at least 7 people to death is now helping to save the Sanctuary. With its excellent location on the shore of Hirakud Dam reservoir and with Nila's care, Kharsel is in pink of health even in his ripe old age.

Difference between Asian and African elephants

There are at least 10 physical characteristics that differentiate the Asian elephant and African elephant. The most noticeable physical differences between the elephants can be seen in the head and ear shapes, and the size of the elephants. Let's look at all 10 physical differences in detail:

1
Head Shape
Asian and African elephants have distinctly different head shapes. Asian elephants have a twin-domed head with an indent running up the center of their head. African elephants have fuller, more rounded heads, and the top of their head is a single dome shape.

2
Size & shape of ears
Asian elephant have much smaller and more semi-circular ears. Ears of African elephants are much larger, shaped a little like the continent of Africa. Both elephant species use their ears to dissipate body heat, and as African elephants live in hotter climates with more direct sunlight than Asian elephants they need to dissipate more heat.

3
Size & weight
The African elephant is the larger of the two elephants, with bulls growing up to 4 meters tall. By contrast, the biggest Asian males generally reach a height no more than 3.5 meters. One interesting note on elephant height – the African elephant is tallest at the shoulder, while the Asian elephant's tallest point is its back.

4
Appearance & size of tusks
Not all elephants have tusks. Both male and female African elephants can have tusks, but only male Asian elephants have tusks. Female Asian elephants have rudimentary tusks called tushes, which can be also found in some males. However, not all male Asian elephants grow tusks. The tuskless males are called Makhnas. The tusks of African elephant are bigger than Asian elephant tusks. Makhnas. The tusks of African elephant are bigger than Asian elephant tusks. Makhnas. The tusks of African elephant are bigger than Asian elephant tusks.

5
The Trunk
The trunk of the Asian elephant is hard to touch whereas an African elephant's trunk has more visible rings on it and is not as hard as the trunk of Asian elephant. The end of the trunks in both the species are different. The Asian elephant has only one 'finger' at the end of its trunk whereas the African elephants have two distinct 'fingers' at the end of the trunk.

6

Lower lip shape
Asian elephants have long, tapered lower lips whereas an African elephant has short and round lower lips.

7

Skin texture
Asian elephants have smoother skin than that of African elephant.

8

Teeth shape
All elephant teeth are pre-molars or molars. Asian elephant teeth have a compressed diamond-shaped tooth profile while African elephant teeth are 'loxadont' (or sloping), a term which gives them their scientific name Africana Loxadonta.

9

Number of ribs
The number of ribs an individual elephant has varies from animal to animal, but Asian elephants tend to have less ribs than the African species, with up to 20 pairs of ribs vs the African elephants average of 21 pairs of ribs.

10

Toes
All elephants have 5 toes on each foot, but not every toe has a nail. The number of toenails varies between the Asian elephant, African forest elephant and African bush elephant:
Asian elephants: 5 toenails on the front feet and 4 on the back feet
African forest elephants: 5 toenails on the front feet and 4 on the back feet
African bush elephants: 4 toenails on the front feet and 3 on the back feet.

Conservation News

CPEMC meeting

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.

Elephant corridor identification and groundtruthing- UP and Odisha

The Gajah report of MoEF&CC (2010) highlights 88 elephant corridors categorized as priority I and II. In 2017, the 'Right of Passage' document published by WTI elucidates 101 elephant corridors. To update the current status of elephant corridors, a Committee has been constituted by this Ministry and four regional workshops have been completed. The groundtruthing of elephant corridors were initiated in the states of Odisha in November, 2021. The groundtruthing of elephant corridors were completed in Uttar Pradesh in December 2021.

Amendment of HEC Guideline:

In 2017, Ministry has circulated a Guideline on mitigation of human – elephant conflict. The Guideline is currently being revisited by the Ministry in collaboration with GIZ and the amended Guideline shall be prepared and circulated to all stakeholders for mitigation of HEC.

Preparation of field manual on HEC having Recommended Operating Procedure

PE Division has drafted a Recommended Operating Procedure for managing human-elephant conflict. A field a manual on dealing with different scenario of HEC is being prepared by WWF-India. PE Division


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.
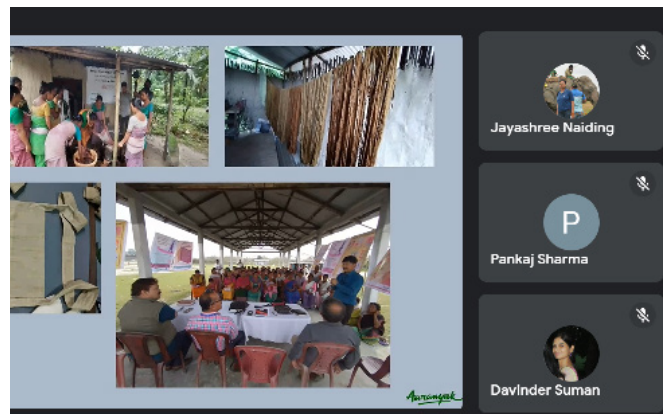
CITES, MIKE, ETIS:

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. Deliberations with MIKE and ETIS headquarters were held under the Chairmanship of IGF (PE) to look into various issues of compliances and implementation of MIKE and ETIS in India.

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. management of wild and captive elephants.

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.

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.

Captive elephant DNA profiling:

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. Pilot testing of the project shall be done in the states of Delhi, Uttarakhand, Tamil Nadu and Chhattisgarh.