Towards mitigation of human and elephant conflict through fence line expansion – Expansion of community fencing

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Introduction

Human-elephant conflict (HEC) has emerged as the greatest threat to the survival of Asian elephants in the 21st century. Rapid changes in their local ecological settings, such as habitat loss, fragmentation and degradation, are considered to be the key drivers of conflict. Male elephants, both Asian and African, are known to display a higher propensity towards conflict than do females making them particularly vulnerable to conflict-related deaths. At the same time, farmers cultivating land close to elephant-inhabited forests suffer considerable damage to crops in addition to putting their lives at risk of being killed by raiding elephants, especially males. This creates considerable antagonism among local people towards elephants, as well as huge challenges for wildlife officials involved in elephant management. Addressing important conservation and management issues such as HEC has to be based on an in-depth understanding of the ecology and behaviour of elephants through long-term scientific monitoring.

We have been studying nearly 500 elephants, which range in a large area encompassing the states of Karnataka and Tamil Nadu and have identified nearly 500 elephants using areas in Bangalore, Kolar, Tumkur, Ramanagara, Mandya, Bannerghatta National Park, Cauvery Wildlife Sanctuary along with the adjoining forests of Krishnagiri Districts in Tamil Nadu since 2009.

This project seeks to address the critical issues of elephant conservation, management and conflict mitigation in the Ramanagara Forest Division of Karnataka, which is witnessing high levels of elephant movement and at times severe levels of elephant-human conflict. One of the main objectives of this project is to enable crop protection by the farmers, who are witnessing crop damage by elephants, in an 'elephant-friendly' and cost-effective manner. This is to address not only the issue of human-elephant conflict but also that of food security in regions where humans and elephants share space and resources.

Project Goal

The goal of this project is to build the capacities of local stakeholders in monitoring elephants and mitigating human-elephant conflict in and around high human-use areas. Our project is based in a rapidly urbanizing landscape where the land-use changes from largely forest/agrarian to peri-urban settings has occurred in the recent past, due to a spurt in economic growth and development. Implementing improved farm-based practices will help reduce the exposure of the crops at various stages of crop cultivation to elephants. One such measure in this regard is the establishment of solar-powered

'hanging-wire' electric fences that are affordable to the farmers and is designed in a way that elephants find it difficult to overcome the same.

Sivappa Gowda's mango plantation lies at the foothills of Kabbal in Kuruballi Doddi and is part of a movement corridor for elephants in the region. Damage was caused to the trees as elephants broke of branches while passing through or fed on the fruit during the harvest season. With assistance from the Forest Department and Anand he set up a hanging wire fence around his 5-acre plot and has not suffered a loss since.

As a first step towards harmonious living with elephants, it is essential that human lives are safeguarded and the crops grown by them are protected. The mitigation measure planned needs to be also affordable, easy to maintain, easy to build and easy to move. The fence that has been designed and is being implemented also takes into account the behaviour of the elephant, in which it is challenging for an elephant to bring the fence down, as there is no fixed part of the fence which is accessible to an elephant. The wires drop from a height of 15 ft and are suspended from poles. The wires are electrified using a pulsating current controlled through an energizer rigged to a rechargeable solar-powered battery. The total cost of the materials for a 1 km fence is approximately 1 lakh including the battery, energizer and solar panel. This cost, however, does not include other costs such as labour, transportation, food and accommodation.

A one-kilometre long fence would require anywhere between 4 to 5 days to set up, which is extremely fast. The cost of the fence is also 2 to 3 times lesser than any of the existing solar fences that have been used to prevent wild animals from entering crop fields. Moreover, this fence has been the most effective in keeping elephants out of the crop fields.

The hanging wire fence

The list of materials required for the fence has been provided below.

Details of materials purchased for hanging-wire fence	
Poles	70
Galvanized Wire	20 kg
Wire Rope	2.5 bundles
Nails (long and short)	1 kg
Insulators	80
Metal angles	80
Ferrule	2000
Battery and solar panel	1
Energizer	1
Earthing rods	3 rods
Cutter	2
Cutting plier	2

Ladder	2
Hammer	2
Voltmeter	1
Crow bar	1
Labour	**4 people**
Transportation	**3 trips to transport poles, materials**

Following the collaboration with the Ramanagara Forest Division, where three such fences were first set up to test the effectiveness of the fence in protecting crops, several farmers in the region stepped forward to set up these fences around their own farms. While some farmers could afford the fence on their own, others were assisted by our team and the forest department. This was done by providing them with solar sets that made up almost half the cost of the total fence. Each solar set contained a battery, energizer, solar panel and the required wiring. Anand Ramu, a farmer who was the first to set up a hanging wire fence around his farm, and is now an expert helped these farmers to set up their fences. He assisted with the setting up of 15 fences in Ramanagara and Channapatana Forest Division. Details regarding the farmers are in the appendix.

Krishna Gowda checks the wiring of the solar set before turning it on for the night. This hanging wire fence encloses a 5-acre coconut and mango plantation. Elephants, although constantly present in the region haven't entered his plantation since the fence was set up.

In dry regions, water for irrigation is stored in large tanks called Krishi Hondas. Occasionally elephants are drawn to these water bodies and damage the pipes and the lining of the tank. A Hanging wire fence was set up around a Krishi honda on Girish's farm in Arulalsandra to protect elephants from falling in as well as the irrigation system.

After hearing about the effectiveness of the hanging wire fence set up by Nagraj Gowda in Kanchenhalli, his relative, Pradeep Gowda decided to set it up to protect his mulberry crop. Mulberry is cultivated all year round, so a more permanent structure using metal poles instead of wooden ones was set up. In the absence of a crop, the hanging wire can be removed.

While most farmers switched to hanging wire fences, some still chose to set up horizontal fences or a combination of the two.

A combination fence of hanging and horizontal wires was set up to protect Kulle Gowda's 5-acre mango and horse gram plot. The hanging wire was set up only along known elephant entry and exit points.

Kantharaju set up a horizontal fence along the pre-existing bar wire fence. His uncle who cares for the farm explains how a simple horizontal fence has worked to protect the crop this season.

Not all horizontal fences were effective. Rajesh set up a horizontal fence around his tomato and banana crop. 3 elephants tried to enter it, and 1 tusker succeeded. 35-40 trees were damaged. When asked why he didn't opt for a hanging wire fence, we were informed that there was a dispute with the adjacent farm, and the land was rented out to him.

The efforts of the research teams, farmers and the forest department have been rewarding as not a single elephant intrusion has been recorded this far in any of the hanging wire fenced crop fields. The elephants have visited the crop fields but have been kept away because of the fence, as evidenced by their dung close to the crop field areas and their photographs.

Elephant dung piles were found outside the fence.

We believe that mitigation measures of this nature have the potential to be scaled up, not by our initiation but also by villagers themselves spreading awareness to neighbouring villages and to the district. The news of crop protection using temporary hanging wire

fences has gone viral and has the potential to snowball into a movement. We have now set up such fences in 7 other villages both in the state of Karnataka and Tamil Nadu and have received excellent feedback. Not a single incursion of elephants, wild pigs and deer into any of the crop fields with this fence has been reported or documented through our continued fence monitoring and elephant behaviour programme. We hope to continue to monitor these fences and the community initiatives that may help maintain and sustain such an effort.

After the removal of the fence, post-harvest of ragi, elephants do use the fallow crop fields at night, without being chased or persecuted by the farmers. In the coming years, we should build on this momentum to hopefully a future with reduced antagonism between elephants and people of this landscape.

Appendix

The following are farmers who set up their fences with assistance from Anand Ramu, our team and the Forest Department

KURUBALLI DODDI

K.L. Sivappa Gowda

Mango with horse gram.

Hanging fence (5 acres) - assisted by the forest department.

Elephants visited on the day of setup. Showed redirected aggression after touching the fence, and broke some branches of a mango tree outside, after which there have been no attempts to enter the plot.

K.C. Krishna Gowda

Plot 1:

Mango with Horse gram.

Hanging fence (2 Acres) – assisted by the forest department.

Plot 2:

Mango, Coconut.

Hanging fence on 3 sides, Horizontal line fence on 1 side (3 Acres) due to land dispute – assisted by the forest department.

Krishna Gowda in his Mango plot

K.S. Ashok

Mango, Coconut, Tomato.

Hanging fence (6 Acres) – assisted by the forest department.

Ashok shows with his hanging wire fence and tomato crop.

On the day the fence was set up, elephants visited the farm and got a shock. They showed Redirected aggression and broke coconut and neem trees that were outside the fence.

SAASLAPURA

Muthu

Tomato, beans, carrot.

Hanging fence (2½ Acres) – Assisted by forest department.

Muthu prepares his land for the next round of tomato crops.

ARLALSANDRA

Girish

Mango, Coconut, Ragi, Mulberry

Hanging fence – Krishi honda

Horizontal line fence (7 Acres) – assisted by the forest department.

The image show the Krishi Honda on the left, protected by the hanging wire fence and a 3 strand horizontal fence on the right that encloses the 7-acre plot.

Kulle Gowda

Mango, Horsegram.

Hanging fence (300mts), Horizontal line fence (12 Acres) – FEP sponsored.

Hanging wire fence with the solar panel set up.

BV HALLI

Kantharaju

Mango, Mulberry.

Horizontal line fence (14 Acres) – assisted by the forest department.

The fence has 3 lines on 2 sides, 5 lines on 1 side, and 4 lines on 1 side.

Elephants have not entered the fence since it was set up.

Sivappa

Papaya.

Horizontal line fence, 1 line (1½ Acres) – assisted by forest department.

Sivappa's papaya plantation.

BYSETPALLI

Rajesh

Banana.

Horizontal line fence (1½ Acres) – self-sponsored.

Elephants entered after setting up the fence. 3 elephants tried to enter, and 1 tusker succeeded. 35-40 trees were damaged. Due to a dispute with the adjacent farm, and because it is not their own land, but rented, a hanging wire fence could not be set up.

SINGARAJAPURA

Gopal

Corn, Mango, Ragi.

Hanging fence (14 Acres) – assisted by the forest department.

Elephants have avoided entering his land since the fence was set up.

KANCHENAHALLI

Pradeep Gowda

Mulberry.

Hanging fence (3 Acres) – Assisted by the forest department.

Pradeep Gowda replaced the wooden poles usually used with metal poles.

Nagaraj Gowda - 9008144062

Mango.

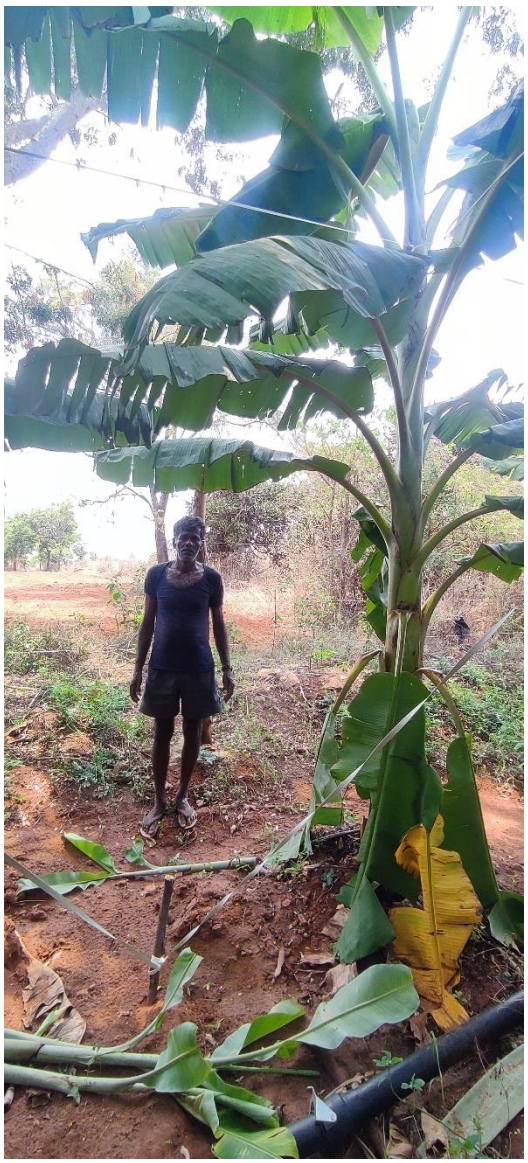
Hanging fence (850 mts) – assisted by forest department.

SAMBEGOWDANA DODDI

Swami Gowda - 8951346968

Tomato, Banana.

Horizontal 4 line fence (8 Acres) – assisted by forest department.



An elephant broke 2 poles in the fence, entered the farm, damaged crops, got shocked from inside the fence on the other side, and exited the way it came in.

Chikku Mari Gowda

Banana, Corn.

Horizontal line fence (4½ Acres) – assisted by forest department.

Chickku Mari Gowda set up a horizontal fence along the pre-existing barbed wire fence. Elephants have not attempted to enter the plot.