Final Evaluation Report

Your Details	
Full Name	Anoop Nadukkalathil Ravi
Project Title	Conservation of Asian elephants through community awareness and identification of crop-raiding elephants to mitigate conflict situation in Wayanad, Western Ghats, India.
Application ID	34159-2
Date of this Report	29-07-2022

1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Identification of crop-raiding elephants in Wayanad				The project found that bull elephants are mostly involved in crop raiding. More individuals are involved in conflict in Chethalayam Range (11.785871, 76.110213) because of poor mitigation strategies and fragmentation. Several bull groups (size ranges from 2 to 12) were found in this forest range. Most of the raiding happens during the jackfruit and mango seasons (May to August). Some bull groups move more than 5 km away from the forest boundary. The project developed a protocol for the identification and monitoring of elephants based on their body features and created a photo library of bull elephants in the landscape. We also trained forest officers, and local NGOs to collect and analyse data. More manpower, financial investment, extensive camera trapping, and non-invasive methods are required to identify all individuals involved in the conflict and to understand their behaviour for a better conflict mitigation strategy.
Develop a mitigation plan for the mitigation of HEC in Wayanad				The project team developed a conflict mitigation strategy for the landscape based on the findings from the current and previous project.
Conservation education program and academic presentations				We initiated an education programme in collaboration with Ferns Nature Conservation Society, Wayanad. We developed materials for awareness creation in local languages and which are published in leading magazines. We are currently working on materials (text and video) to create more awareness programs in the future. We also conducted awareness

				programmes for students, NGOs, and forest department officials. Unfortunately, because of the Covid-19 pandemic, we were unable to execute the awareness programmes in villages and educational institutions in an expected way. This component will be continued in the next phase of the project. The output of the project was presented at two conferences *viz.* International Conference for Conservation Biology (ICCB) and Students Conference on Conservation Science (SCCS), Cambridge.
Mapping of conflict hotspots, and eco-restoration with community participation				Thirunelli - Kudrakote (11.898296, 76.033736) is a key functional elephant corridor in the study area. The corridor is degrading rapidly due to cattle grazing, spread of the invasive tree *Senna spectabilis,* and forest fires. During this project, we initiated an eco-restoration programme along this corridor in collaboration with the state forest department, Ferns Nature Conservation Society. Local people, students, and forest department officials are involved in the restoration programmes. Species for eco-restoration was selected based on the requirement of local people and elephants. We have conducted three awareness and planting programmes during the project. A total of 3000 seeds and saplings were planted.
Submission of manuscripts to the journals				We have published a manuscript within the project period. Other papers are in the process of submission.

2. Describe the three most important outcomes of your project.

a). The project identified most of the crop raiders in Wayanad. This information will be useful for mitigating conflict through the removal of persistent crop raiders or by studying their behaviour through radiotelemetry in the future. Also, crop raiding is a learned behaviour; hence the identification and management of persistent crop-raiders will prevent the recruitment of new crop raiders in the future. It was a short-term study; hence, more studies are required to identify all crop raiders and their movement in the landscape for better conflict mitigation in the future. We found several wounded elephants in the field during the project. These wounds are formed while attempting to scare these animals away from settlements and farms. However,

this issue is completely ignored in the landscape and the effect of these injuries on elephant health, population viability, and behaviour needs further investigation. It is important to assess the stress levels and injury of elephants in the landscape for the better management of elephants. The current project also identified the hotspots of conflict in the landscape for future management.

b). We initiated awareness and conservation education for various stakeholders in Wayanad. We partially achieved this component due to Covid 19 pandemic. It is very important to scale up the awareness programme for the long-term impact of our project. Hence, we are planning to give more importance to the awareness programme in the next phase of the project. Field assistants, interns, and forest department officials from Wayanad gained knowledge on various field techniques and handling of field equipment such as GPS, binoculars, camera traps, and cameras. Two field assistants (tribal) who worked on the current and previous projects are now expert elephant trackers in the landscape. This experience helps them to get better job opportunities in the future. Community awareness towards elephants increased in the study area.

c). Eco-restoration of Thirunelli - Kudrakote elephant corridor – This corridor connects the Brahmagiri hills and Tholpetty Range of Wayanad sanctuary. The project identified 15 bull elephants using the corridor, of which four of them were found involved in the conflict. This corridor and adjacent areas are a hotspot of conflict. Currently, this corridor is under immense anthropogenic threats viz. livestock grazing, man-made fire, and the spread of invasive plants. If the degradation continues the conflict will increase in the future. To reduce the conflict and to aware the public, we initiated an eco-restoration programme in the corridor. The eco-restoration programme is led and coordinated by a local boy from the same area. It is a collaborative effort between the forest department and Ferns Nature Conservation society. During this project, we planted 3000 seeds and saplings of several resident plant varieties. Around 100 people were involved in the restoration programme. We found that the eco-restoration programme is a good opportunity to raise awareness about elephant conservation. Hence, we are planning to continue the eco-restoration programme as one of the major activities in the next phase of the project.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

We encountered some unforeseen situations during the project due to the Covid-19 pandemic. There were restrictions on public gatherings and entry to the forest hamlets was barred by the state government to avoid the spread of Covid-19. It affected our awareness programmes. We wanted to try the efficacy of beehives in deterring crop raiders, but we couldn't do this because farmers were not willing to share the hives (box and hive) due to expected damage from elephants. We used only six camera traps during the project, which was insufficient for a large area like Wayanad, also it was difficult to deploy camera traps during the heavy rainy days. Also, we couldn't deploy cameras in certain places because of high chances of getting them stolen.

4. Describe the involvement of local communities and how they have benefitted from the project.

Youth from tribal communities and rural areas were engaged in assisting the field sampling and eco-restoration activities. This work provided them monetary benefits and they learned various field techniques and handling of equipment such as GPS, binoculars, and cameras. This benefits them to participate in future nature conservation activities. Most of the community members and forest department officials are continuously in contact with our team. We initiated an eco-restoration programme to attract more people to the project and raise awareness. People involved in the eco-restoration programmes got knowledge about elephants and their conservation importance. Around 100 people (students, local people, local NGOs, politicians, and forest department officials) are involved in the eco-restoration programme. We are planning to continue the restoration initiative in a detailed manner to attract more people in the next project. We have identified and created a team of passionate youth during the project who can lead the eco-restoration and nature education programmes which is important to take further conservation commitment.

5. Are there any plans to continue this work?

Yes, I would like to apply for the 3rd grant to further support this project to obtain a deeper understanding of human-elephant conflict and conservation issues in Wayanad. During this project, we were not able to identify all crop raiders in the study area because it needs long-term fieldwork (at least 2 more years). The forest department wants us to continue the study for a detailed understanding of conflict, especially the identification of persistent crop raiders and their movement in the area because bulls are mostly involved in the conflict. During this project, we found that the invasive tree *Senna spectabilis* is spreading rapidly in Wayanad forests including swamps and riparian forests which are key micro-habitats of elephants during summer. Once it is established, *S. spectabilis* supports poor ground-level primary productivity, hence its spread might lead to a high level of human-elephant conflict in the future. Hence, it is important to understand the impact of the spread of *S. spectabilis* on elephant distribution patterns and forage availability. We were unable to conduct awareness programmes as expected due to Covid 19 pandemic. But it is important to continue the awareness programme to different stakeholders to generate awareness about elephants and the threats they face. Also, all stakeholders believe that eco-restoration is an important initiative in the landscape to improve the health of the forest and wildlife and to raise awareness among the people. In the next phase of the project, we have plans to continue the identification of persistent crop raiders in the landscape and their behaviour to develop better models for conflict mitigation and continue education and awareness programmes. We are also planning to study the impact of the spread of *S. spectabilis* on elephants, especially how its spread affects the forage availability of elephants and develop a detailed management plan for the eradication of *S. spectabilis* from Wayanad forests. We will also continue the eco-restoration programme in the Thirunelli - Kudrakote elephant with community participation.

6. How do you plan to share the results of your work with others?

We have already shared the output of the project with the forest department, various experts, and local communities. We published one scientific manuscript in the journal Biotropica about the role of elephants in spreading the seeds of *S. spectabilis* in the landscape. Three more publications from the project in peer-reviewed international journals are under preparation. The published works will be forwarded to the forest department and NGOs. Also, we presented the work at two prestigious conferences viz. International Conference for Conservation Biology (ICCB) and Students Conference on Conservation Science (SCCS), Cambridge. The recorded presentation is available on the website of SCCS Cambridge for 6 months. I am planning to present the work at more conferences in the future. The current project is a part of my ongoing PhD work. Hence, a thesis will be the output of the projects supported by Rufford.

7. Looking ahead, what do you feel are the important next steps?

Promoting human-elephant coexistence in the landscape is important for the long-term survival of elephants. It is important to continue the project in Wayanad to provide advice to the forest department and NGOs to continue developing elephant and their habitat conservation strategies based on the best available scientific knowledge. Radio collaring of persistent crop raiders and testing the efficacy of early warning systems are important for effectively managing the conflict in the future. Managing the spread of *S. spectabilis* is important because it can affect the forage availability of elephants and hence it can lead to conflict. Initiating an eco-restoration program is also an important step toward improving the 'health' of Wayanad forests.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

Yes, The Rufford Foundation had received publicity during the project. The logo was used on data collection tools (questionnaires). Also, we acknowledged the support of the foundation in the published articles and used the logo in all the presentations. Meanwhile, we are finalising two manuscripts from the project. This will soon be submitted to popular conservation journals. The logo will also be used in the documentary film which we are going to release soon.

9. Provide a full list of all the members of your team and their role in the project.

Name	**Role**
Mr. Anoop NR	Principal Investigator (PI), Ph.D. student, ATREE
Dr. T. Ganesh	Co-Principal Investigator, Senior Fellow at ATREE. Thesis supervisor.
Mr. Ajayan PA	Research Assistants (RA). Helped PI with data collection and coordination of fieldwork.

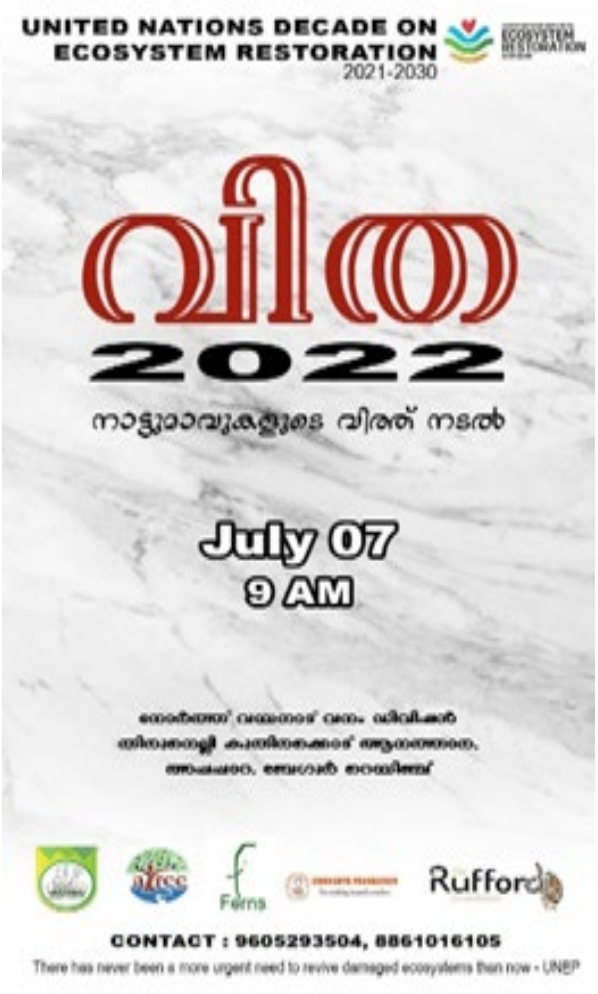
Mr. Chandran, and Mr Rajan	Field assistants. Helped PI and RA with field data collection.
Mr. Anurag	He worked as an intern in the project, and he helped in initiating the eco-restoration program based on his previous experience. We trained Anurag during this project to use equipment, and coordinate fieldwork, and education programs because he will be joining as a research assistant in the next phase of the project.
Mr. Muneer PK	He is part of Ferns Nature conservation society, Wayanad. He accompanied the field teams on most of the days to photograph elephants and deploy camera traps. He is now an expert to photograph and identify elephants from their external body features and studying their behaviour.

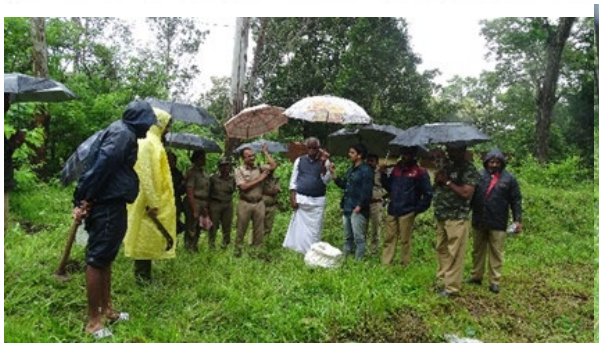
10. Any other comments?

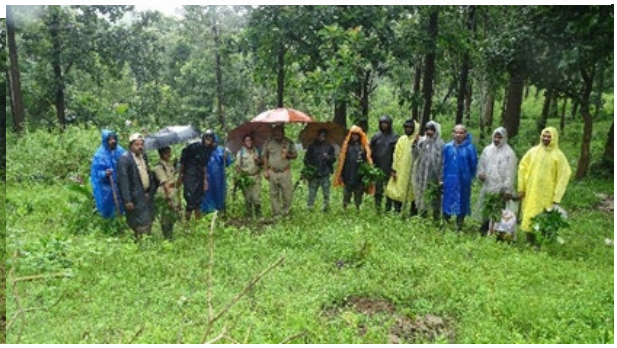
We would like to thank The Rufford Foundation for providing the funding support to work on this project and help to continue the conservation of elephants and their habitat in Wayanad. This important project could never happen without your support. We hope that the output of the project will be the baseline information for elephant and their habitat conservation in Wayanad in the future. This project was a great learning experience for the entire team. We also want to thank the officials in Wayanad Sanctuary, and the North and South Wayanad divisions for their hospitality and support during the project. We are also grateful to our referees for their support and encouragement. RF logo was used in all printed materials and presentations.

Field photographs

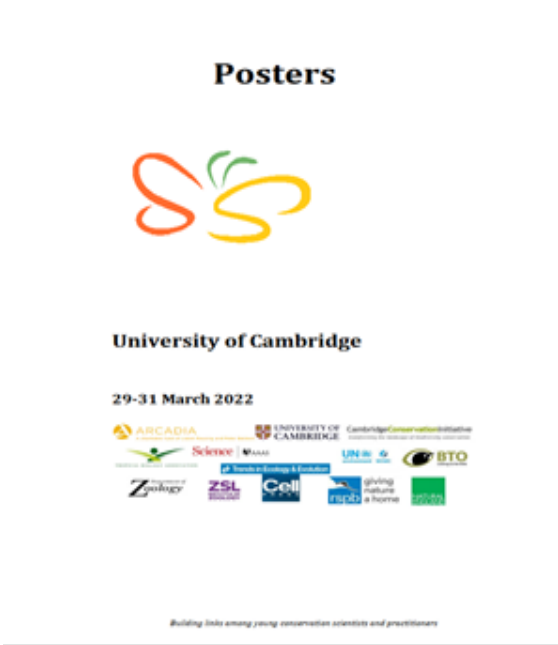
ECO-RESTORATION OF THIRUNELLI-KUDRAKOTE ELEPHANT CORRIDOR
Conducted two eco-restoration and awareness programs named 'Vitha' along the Thirunelli - Kudrakote elephant corridor during the project in collaboration with the Kerala Forests and wildlife department, and Ferns Nature Conservation society. Around 3000 seeds and saplings of mango and jackfruit trees, Olea dioica, Caryota urens, Syzygium cumini, and Cinnamomum malabatrum, Persia macrantha were planted. A total of 80 people participated in the program.

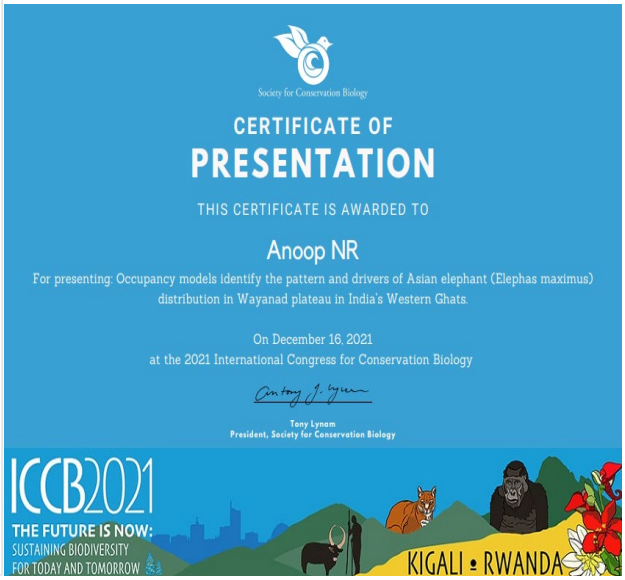




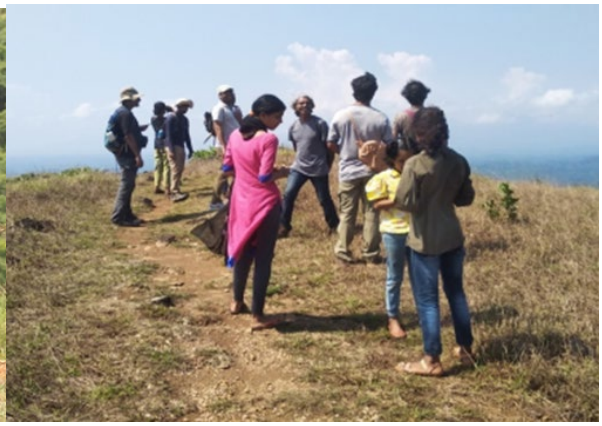


CERTIFICATES OF PARTICIPATION IN CONFERENCES

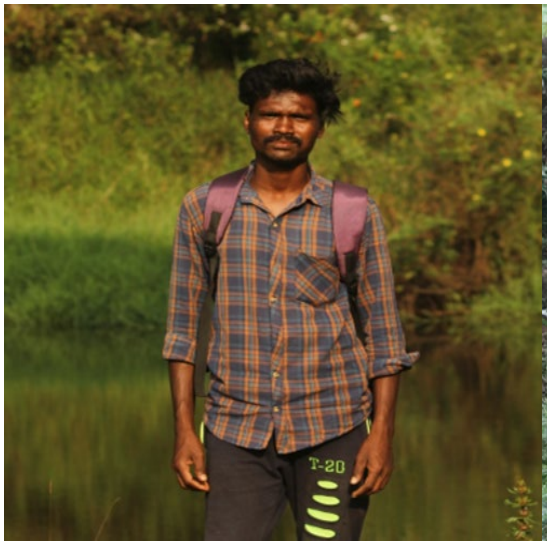


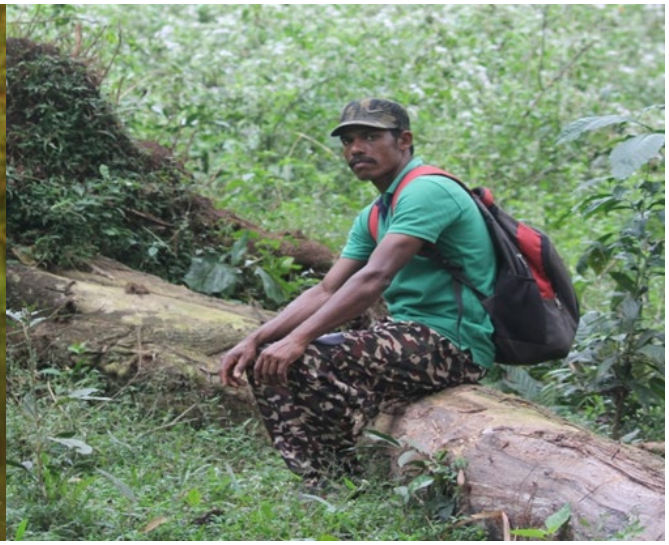


The outputs of the current and previous projects are presented at two prestigious conferences viz. International Conference for Conservation Biology (ICCB) and Students Conference on Conservation Science (SCCS), Cambridge.

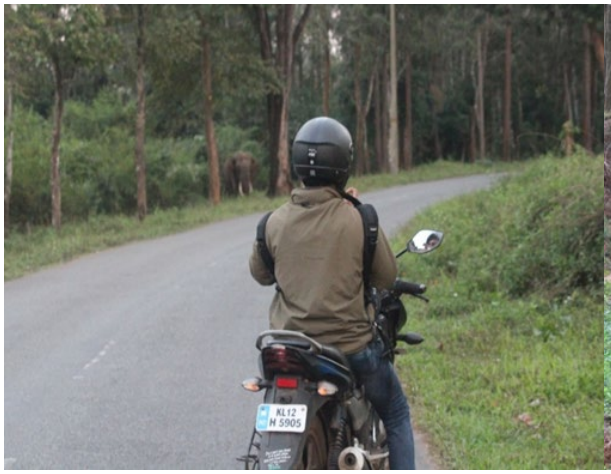


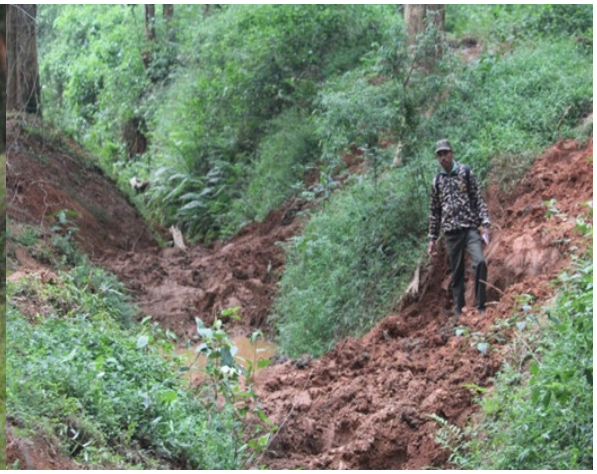
Left: Field visit by Dr. T Ganesh and researchers from ATREE and Ferns Nature Conservation Society. Right: Field visit with residents and persons from local NGO.



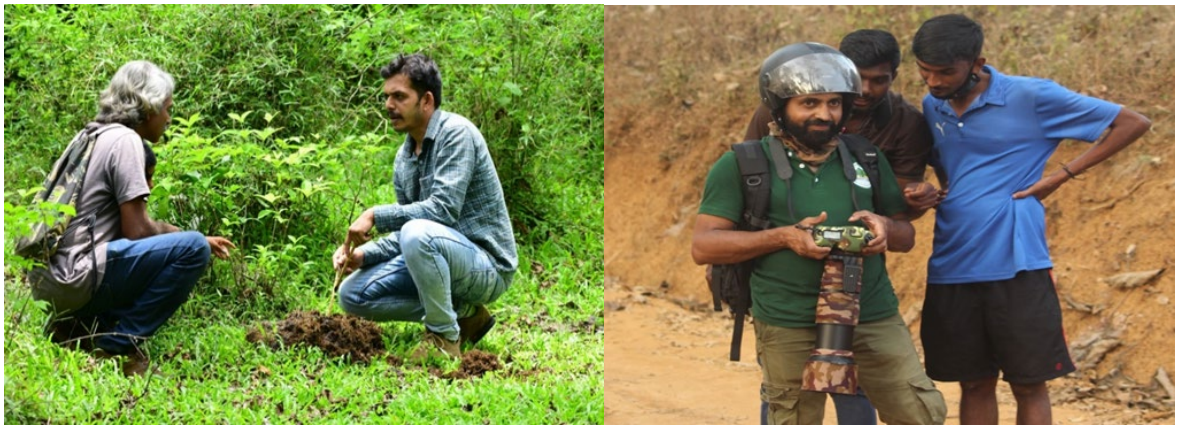


Chandran (Wayanad sanctuary and Begur area) and Rajan (Chethalayam Range) are two tribal youths working as field assistants in the project. They are trained to use field equipment and systematic field data collection. They are now well-known elephant trackers in the landscape, which will bring better employment opportunities to them in the future.

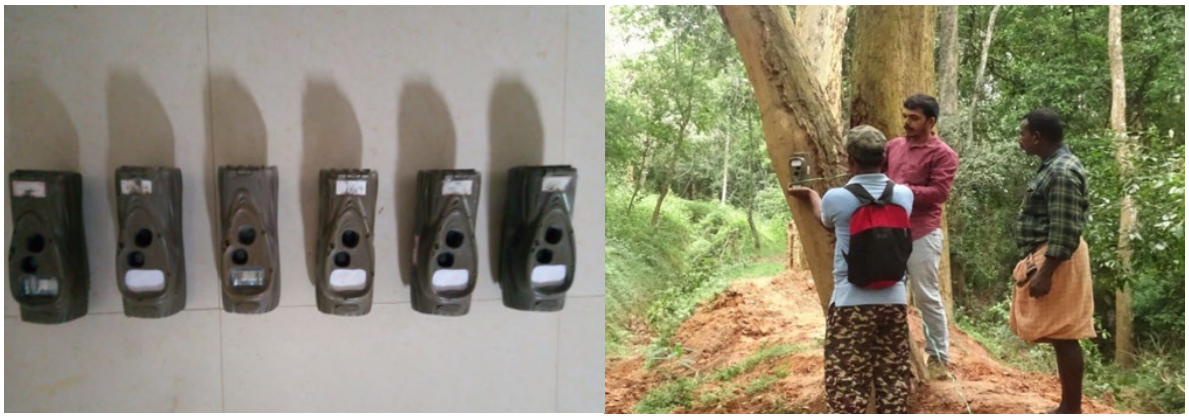




Road survey to photograph elephants along the Brahmagiri - Thirunelli elephant corridor & identifying paths through which elephants enter villages to deploy camera traps.

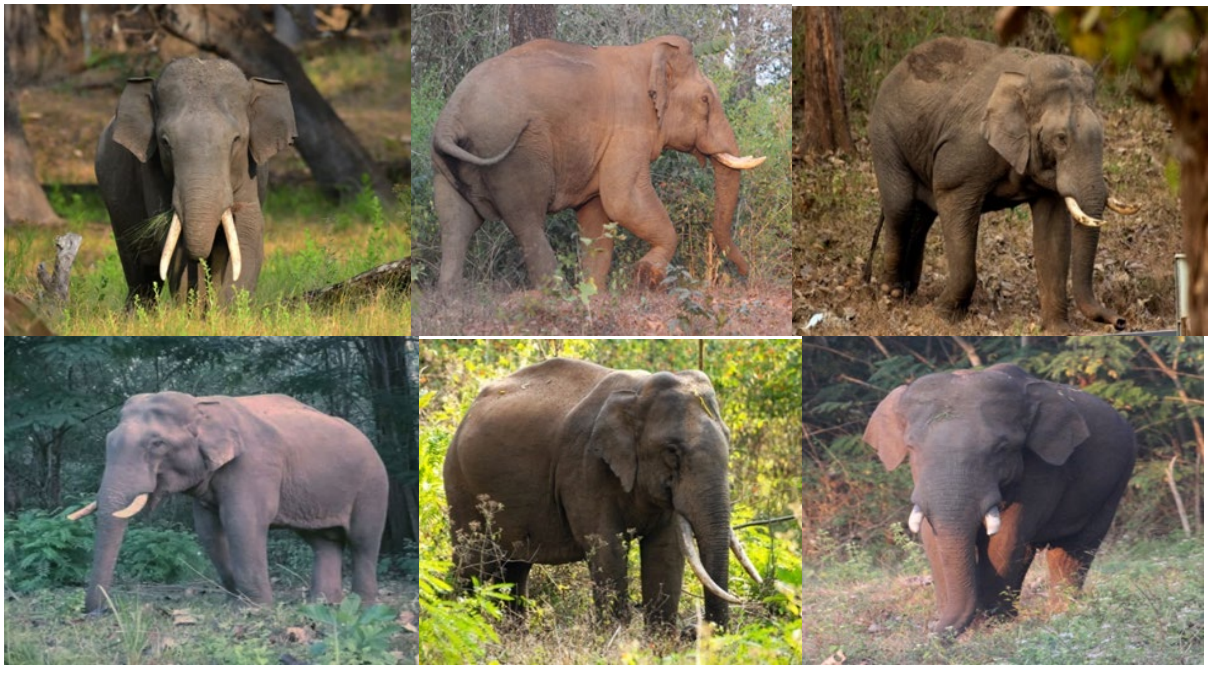


Surveying elephant dungs in forest areas & research team photographing elephants in North Wayanad division.



Deploying camera traps in forest farmland interface to capture images of crop-raiding elephants.

BULL ELEPHANTS IDENTIFIED DURING THE PROJECT

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