

Final Evaluation Report

Your Details	
Full Name	Agriphina Cletus Machaninga
Project Title	Fostering Human-Elephants coexistence in villages surrounding Tarangire National Park
Application ID	42211-1
Date of this Report	10 th April 2025

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

Objective	Not	Partially	Fully	Comments
Implement beehive fences as a natural and effective barrier to deter elephants from entering farmlands.				<p>This objective was successfully achieved by installing 30 beehive fences around farms in the selected demonstration plots. A total of 16 have been permanently colonized by bees, while the remaining 14 hives of bees' colonies come and go. Despite the challenges encountered, the use of beehive fences demonstrated how the community can adopt a strategy to reduce elephant intrusions and minimize crop damage on their farms. Since the completion of the Hive fence installation, we have experienced only two elephant invasion attempts, and the last one was on 25th March 2025.</p> <p>The team selected Naitolia village because of the historical trend of an increase in the frequency of HEC in the village. Within the village, we conducted a baseline study to identify the area</p>

			<p>where elephants use as a route to enter the village farms and installed the hives. We followed the guide from the Beehive Fence Construction Manual by Lucy King (www.scribd.com/document/838745190/Beehive-Fence-Construction-Manual-2014-ss) to install Beehive along a 1.5 M transect.</p> <p>Since our fence is 1.5Km long, elephants are now using the ends of the fence to enter the village land, which feels like we shifted a problem somewhere else. In the second phase, we are planning at least to increase the length of the fence up to 5KM as we are heading the boundary of the village-owned forest, Landilen WMA, and TNP.</p>
Establish and strengthen Community-Based Organizations (CBOs) to manage the beehive fences and coordinate conservation efforts.			<p>Community training sessions on beekeeping, honey production, and marketing were conducted. A total of two training phases were organized. The first training phase (7 days) focused on understanding the ecological behavior of elephants, establishing the environmental link between elephants and bees, and included a hands-on session on beehive construction and the installation of beehive fences on selected boundaries. The second training (5 days) focused on beekeeping basics, honey harvesting techniques, value addition, and marketing strategies. The second training was delivered to individuals who were ready to organize themselves and form a community group. A total of 42 community members (30 individuals in Training phase I and 12 Individuals in Training phase II) participated, including both men and women, with a deliberate effort to ensure gender inclusion.</p> <p>1 Community-based organization (CBO) was established and registered to ensure the sustainability of beehive fencing initiatives. This CBO currently has 12 active members (5 Females and 7 Males), including farmers and local youth interested in conservation and income-generating activities. The additional income from</p>

			honey production has significantly improved the livelihoods of group members. Using the same CBO, members have started using the same platform to save weekly and lend to one another, supporting each other financially. Currently, they have a capital of \$800, which is enough to support their small activities and CBO sustainability.
Assess elephant behavior and distribution in the Tarangire region to inform future conservation initiatives.			<p>The elephant population study in Tarangire National Park was successfully conducted. The dry and wet season data was successfully collected and analyzed. The final study results are expected to be published in a TAWIRI conference by December 2025.</p> <p>Sampling techniques and procedures: The sampling techniques and procedure included both stratified sampling and convenience observations. Specifically, TNP was divided into 3 blocks based on the already established road network, key resources governing the distribution of the elephant's population, such as swamps and rivers, and habitats, where vehicles surveyed each block. Vehicles contained an observer, a recorder, and a driver in each, following the network of roads in the park in each of the blocks. The latter called for convenient sampling, for only the sighted elephant individuals were recorded for analysis.</p> <p>Sample size: Since this study employed a convenient sampling technique for data collection, the exact sample size was difficult to detail. However, the study covered a large portion of TNP to maximize the sample size and therefore ensure that the collected data was representative of the true elephant population currently residing in the TNP during the dry and wet seasons of the year 2022 and 2024.</p> <p>For each season, we had three teams of data collectors who surveyed one block for the entire day. This approach reduced the repetition and maximized the efficiency. Generally, we had a total of 4 days to collect data in all seasons.</p>

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

While one year is not enough to fully measure the project's long-term impact, the immediate outcomes include:

- Enhanced awareness and knowledge among community members on using beehive fences as an effective, eco-friendly method to deter problematic elephants.
- Establishment of CBOs that united community members, fostering collective responsibility and collaboration in managing beehive fences and promoting sustainable livelihoods.
- Completion of an elephant population study providing a snapshot of elephant behavior and distribution in the Tarangire region, offering valuable data to inform future conservation efforts.
- Community members have begun generating income through honey production and sales, which has contributed to income diversification and improved financial resilience at the group level. Last year, the group was able to harvest 31 kg of pure honey and 20 kg of beeswax. As part of their efforts to expand their market reach, they participated in the Kili Fair event in Arusha, where they had the opportunity to present their activities, showcase their honey products, and engage with potential buyers. This event not only highlighted their entrepreneurial spirit but also helped raise awareness about the project and its impact on both the community and elephant conservation.

For the first harvest season, the group harvested 31 kg of pure honey (1Kg was sold for 28,000 Tsh, approximately \$ 11) and 20 kg of beeswax (1 Kg was sold for 23,000 Tsh, approximately \$ 9.2 - Exchange rate of 2500). Therefore, as for the first season in which the harvest was low compared to our expectations, the group earned 868,000 Tsh for honey and 460,000 Tsh for beeswax, making a total of 1,328,000 Tsh.

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

- a) Climate Change Impact: After the installation of the beehive fences, it was anticipated that the flowering season would provide sufficient nectar for the bees. Unfortunately, the ecosystem experienced an extended dry season with minimal rainfall, leading to poor flowering and insufficient forage for bees. As a result, bee occupancy rates were low. To address this, we manually introduced bee colonies into the hives and provided artificial supplements, including sugar water. Additionally, we constructed temporary shaded areas to protect the hives from the harsh sun and ensure bee survival.
- b) Feasibility of Beehive Fence Design: The initial proposed design for beehive installation was intended for individual farms. However, it became apparent

that this design was not feasible for most community members due to the financial and logistical demands. To make the intervention more inclusive, we adopted a more strategic design. Beehives were installed in a straight line along the village boundary, particularly in areas where elephants frequently passed when entering farms. This approach allowed us to cover a total of 1.5 kilometers with beehive fencing, effectively creating a community-level barrier against elephants.

- c) Community-Based Organization (CBO) Registration: While establishing CBOs was a key part of our livelihood improvement initiative, the registration process faced bureaucratic delays. Obtaining the necessary approvals and documentation took longer than expected, causing extra costs. To mitigate this, we engaged local government officials and stakeholders to expedite the process. Additionally, we provided administrative support to community leaders, ensuring that all required paperwork was completed accurately and promptly.

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

Local communities have been actively involved throughout this project from site selection, installation of hives, and maintenance of the fences. The project established and registered Community-Based Organizations (CBOs) to manage and sustain the initiative, with community members receiving training in Elephant behavior ecology, beekeeping, bee hive fence installation & maintenance, honey harvesting, and product marketing. As a result, communities have experienced significant benefits, including gaining knowledge in using beehive fences to deter elephants from farmlands. Additionally, the sale of honey and other bee products has provided alternative income sources, contributing to economic empowerment. The project has also enhanced community cohesion by encouraging collective responsibility and strengthening local collaboration through CBO formation. Currently, through the CBO, members can save their own money, give loans to each other, and write joint projects.

5. Are there any plans to continue this work?

Looking ahead, there are plans to expand the project by seeking additional funding through opportunities like the Whitley Award and the second Rufford Small Grant. To further support the project's growth and sustainability, the team will continue to monitor and collect data to ensure the long-term impact is effectively assessed, while further capacity-building efforts will empower communities with advanced skills in sustainable beekeeping and financial management. Ultimately, the project aims to foster lasting human-elephant coexistence and contribute to community resilience.

The project team is planning to expand its efforts by training community members on additional cost-effective and locally accessible human-elephant conflict mitigation strategies. One such method is the use of chili-based deterrents, which have been proven effective in communities adjacent to Mkomazi National Park, especially when combined with beehive fencing. By incorporating these complementary techniques, the project aims to enhance community resilience, reduce crop damage, and promote sustainable coexistence with elephants.

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

The final elephant population study will be published in a TAWIRI scientific conference in December 2025 (the abstract has been submitted already). Additionally, project progress and results will be presented at conservation conferences and shared with local stakeholders through workshops and meetings.

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

a) Monitor the Long-term Effectiveness of Beehive Fences

- Continue tracking human-elephant conflict (HEC) incidents to assess the ongoing impact of the beehive fences by doing a study to assess the decline in crop damage incidents and the associated socio-economic impacts to the community.
- Implement periodic surveys and use data from camera traps to evaluate behavioural changes in elephants and other wildlife.
- Analyze data to identify any emerging patterns and adjust mitigation strategies accordingly.

b) Provide Ongoing Support and Mentorship to Community-Based Organizations (CBOs)

- Offer continuous mentorship to strengthen the capacity of CBOs in managing beehive fences and honey production.
- Conduct regular training sessions on beekeeping best practices, honey processing, and marketing strategies.
- Facilitate peer learning and knowledge exchange among CBOs to encourage collective problem-solving and innovation.

c) Publish and Disseminate Study Results

- Documented and analyzed study findings to produce scientific publications, reports, and presentations.
- Share results at conservation conferences, workshops, and through online platforms to contribute to global knowledge on human-wildlife coexistence.
- Collaborate with academic and research institutions for broader dissemination and engagement.

d) Explore Funding Opportunities to Scale Up the Project

- A review of similar implementation strategies has revealed that elephants tend to adapt to the presence of beehive fences by navigating around them, often passing through the ends and shifting conflict to other areas. To address this challenge and enhance the effectiveness of the intervention, we plan to extend the hive fence to at least 5 km. Expanding the fence will create a more continuous barrier, reducing the chances of elephants bypassing it and ensuring better protection for farms and livelihoods. We aim to secure funding to support this expansion, strengthening long-term human-elephant coexistence efforts.
- Additionally, in collaboration with TAWIRI, we will train communities on alternative mitigation measures, such as planting non-palatable crops and using chili-based deterrents to enhance protection.
- In the next phase, we will also evaluate the effectiveness of the fence in deterring other problematic wildlife, like elands and zebras. Early observations suggest that these animals may also avoid beehive fences. To investigate further, we plan to install camera traps along the fence line for monitoring and data collection.
- Continue to partner with government firms like SEED and TABEDO while also establishing new partnerships with local and international conservation organizations, such as Tanzania People and Wildlife (TPW), which is based in the project site, to support the expansion and implementation of these mitigation measures.
- Develop comprehensive funding proposals, including applications to organizations like the Whitley Fund for Nature and the second Rufford Small Grants Program, emphasizing the project's success and scalability potential.

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

Yes, the Rufford Foundation logo was used in all printed project-related materials, including training manuals, Sign boards, cards, payment sheets, T-shirts, and reports. The Foundation's contribution was acknowledged during community events and presentations.

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

- a) Agriphina Cletus Machaninga - Project Leader and Coordinator
- b) Dr. Oliver Castor Nyakunga - Senior Advisor and Academic Supervisor
- c) Dr. Ngumbang Juat - Ecological Monitoring and Data Analysis Expert
- d) Kaiza Kaganzi - Field Assistant and Data Analyst

e) Catherine Peter - Beekeeping Trainer and Community Liaison

10. Any other comments?

The beehive fencing project has demonstrated promising results within its first year, showcasing the potential of innovative, community-led solutions in addressing Human-Elephant Conflict (HEC). By empowering local communities with practical knowledge and fostering collective action through the formation of Community-Based Organizations (CBOs), the project has not only enhanced coexistence with elephants but also created economic opportunities through honey production. Additionally, the completion of the elephant population study has provided valuable insights into elephant behavior and distribution, which will guide future conservation efforts. These achievements would not have been possible without the generous support of the Rufford Foundation and the School for International Training (SIT). Their commitment has played a crucial role in turning this vision into reality. As we look forward to building upon this success, we kindly seek their continued support in the next phase to expand the project's reach, further strengthen community resilience, and contribute to long-term human- elephant coexistence.

To access the project picture, please click the link below

<https://drive.google.com/drive/folders/1C-3XLZsqSPOyRtXaJGS-RN7XDR5TzfHf?usp=sharing>