Enhancing Human-Elephant Co-existence through Livelihood Projects and Education Programs in Communities around Nyerere National Park, Tanzania

Detailed Final Report

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Executive Summary

Human-Wildlife Conflict (HWC) has become a pressing conservation and poverty issue in recent years in Africa. Among the most severe HWC is Human-Elephant Conflict (HEC). HEC threatens elephant populations through retaliatory killings and increased hostility towards elephants, leading to tolerance of poaching. It harms the livelihoods of farmers, as crop-raiding results into reduced food security. It also deteriorates relations between communities and wildlife authorities. This project aimed at enhancing human-elephant co-existence in communities around Nyerere National Park through facilitation of community-led projects that increase and diversify incomes, reduce crop losses from elephants, and conserve biodiversity. Successful long-term management of HEC requires solid support from all levels of government, strong commitment from wildlife management authorities and communities, and the informed use of available tools and methods. Continuing research and active monitoring are also essential. Experience from other countries suggests that it is unrealistic to expect total prevention of conflict, and therefore the strategy must be one of mitigation and integrated management to reduce the problem to levels that are tolerable by communities (Mduma et al., 2010). However, farm-based crop-raiding reduction methods such as beehive fencing have found to be socially and economically suitable in a range of contexts. In addition, we believe that coexistence in the long-term will involve conservation education and outreach programs as well as formation of community banks that can be used to buffer the financial losses from elephant crop-raiding.

ii. Acknowledgments

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1.0 Introduction

Human elephant interaction is a complex and prevalent issue that occurs throughout the range of the African elephant whenever elephants and people share the same habitat, often competing for the same resources. The interaction can be direct or indirect, as well as resulting in positive or negative impacts towards each other. Human-elephant co-existence entails both indirect and opportunity costs (Barua, 2013).The economic cost can be substantial for people who invest in crop farming, guarding their farms. The time required for farm protection limits the amount of time available for other activities; additionally people also feel unsafe during the day and night as they walk to and from schools, accessing shops and collecting firewood, potentially affecting the socio economic development of communities (Alcamo, 2003). Elephants tend to move outside the Protected Areas when crops are ripening, attracted by crop sugar content and palatability (Gubi, 2012), (Blair, 2017). Frequent crop damaging causes farmers to develop negative attitudes towards the conservation of elephants (Hariohay, 2018).

The challenge of managing the co-existence between elephants and people arises because different stakeholders have different views or interests, and also because elephants are viewed as dangerous and destructive animals (Dublin, 2004). Research on human elephant interactions can therefore improve knowledge of the costs associated with land-sharing between people and elephants (Barua, 2013) Understanding the dynamics of these interactions can help identify management strategies to protect both humans and elephants (Graham, 1973).

The baseline information obtained from the Rufford first round grant of this project showed that elephants are threatening lives of communities and destroying crops in the former Selous Game Reserve (SGR) regions (Mkuburo et al., 2020, Rufford report). These results was used for participatory design of crop mitigation measures (beehive fencing) with farmers that diversify income, reduce crop losses from elephants, and conserve biodiversity.

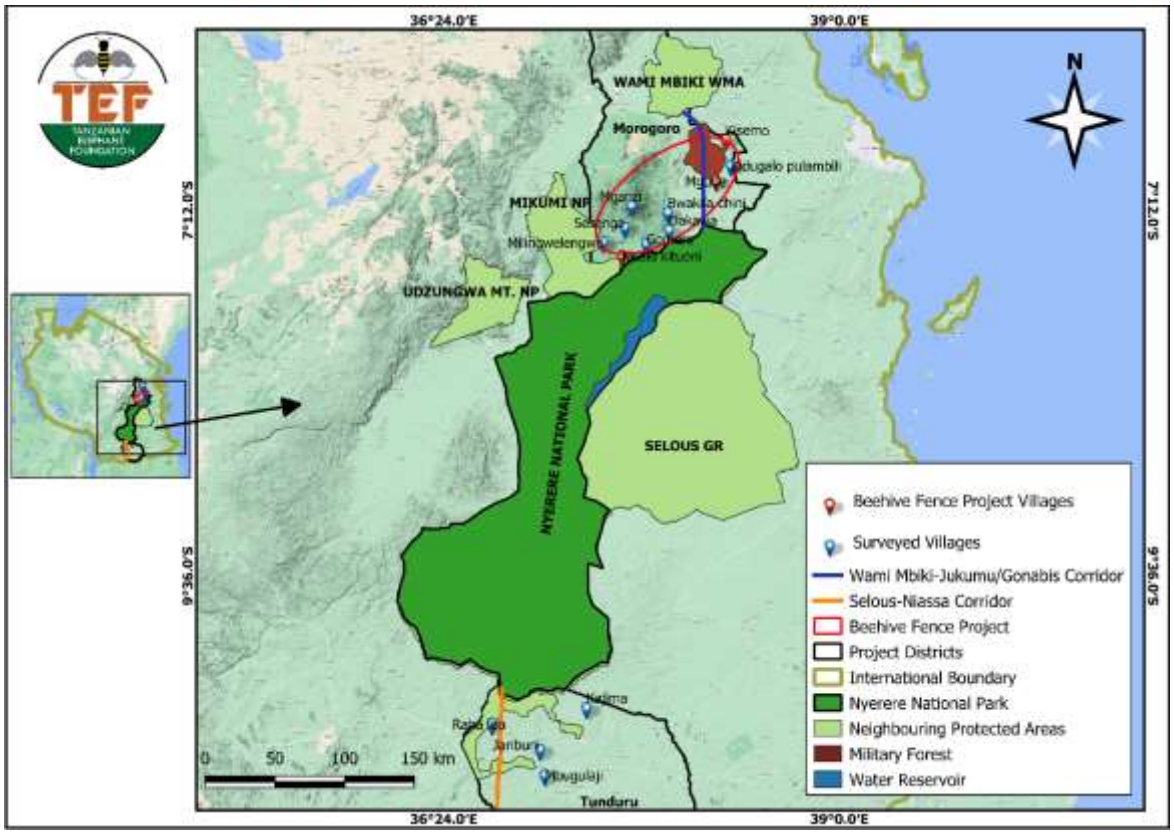

Figure 1: Project location map

2.0 Project purpose and activities

2.1 General objective

The general objective of this project was to foster human-elephant co-existence in communities around Nyerere National Park, Tanzania through participatory design of crop loss mitigation project, generation of additional income to communities living alongside elephants, including through beekeeping and village saving and loans programs, and education.

Activity 1: Trialing elephant deterrent methods with registered farmers groups and constructing beehive fences in three villages

In her thesis, Lucy King developed a solution to this dilemma, which earned her the 2011 UNEP/CMS Thesis Award. Her discovery that elephants instinctively avoid the African Honeybee gave birth to the Beehive Fence concept. Consisting of hanging beehives hung seven meters apart and linked by wire, the fence repels elephants as follows: When an animal touches the fence

(often at night), the resulting vibration of the wire alerts the bees in their hives. Their buzzing suffices to send the elephants off into a different direction. The honey bee sting elephants around their sensitive parts such as eyes and inside their trunks, and they can also pierce the skin of young calves. Moreover, elephants tend to avoid places in future where they have encountered danger before. The Beehive Fence not only serves to effectively protect elephants from angry farmers and villagers and thus from Ivory poachers, it also symbolizes a change from trading ivory to selling locally sourced honey for the people around these communities.

Three beehive fences were built around Nyerere National Park in three villages (Kisaki Kituoni, Kisemo, and Mgude). Each village has 1km-long beehive fence with 50 beehives and 50 dummy hives.

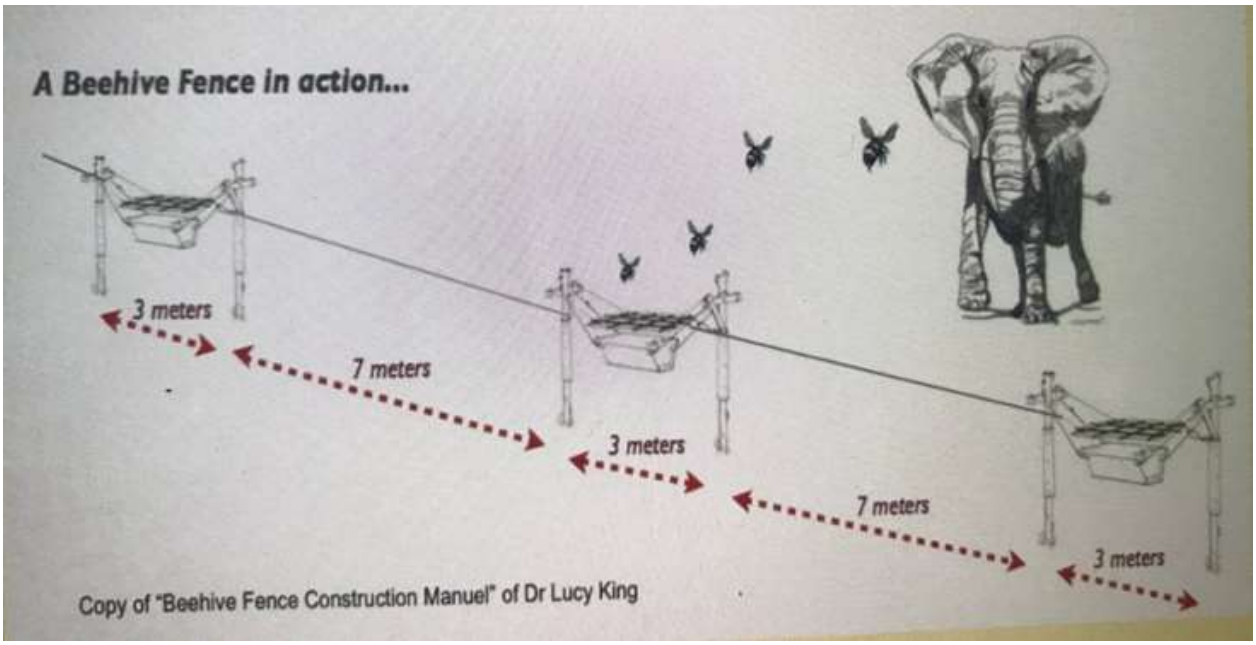

Fig. 2: A beehive fence construction illustration

Figure 3: Kenyan top bars beehives, with project leader (Lameck Mkuburo)

Figure 4: Metal posts prepared to hung the beehives

Figure 5: Metal poles installation by farmers groups

Figure 6: Beehive fence construction by farmers groups

Figure 7: A beehive with a thatched grass to keep the hive cool

Activity 2: Developing beekeeping industry through training of farmers groups in three villages and honey market links

In collaboration with local government (District government) we have provided beekeeping training, collaborate with farmers in three villages to develop and monitor beehive fences, honey production and business plans and honey market links.

Figure 8: Beekeeping and monitoring trainings

2.2 Fence monitoring and hives occupancy

Local monitors from farmer groups inspect the hives for bee occupancy, general condition of the hives (insects, dust, hive faults/leakages, thatched roof, presence or absence of bee wax, as well as the condition of the top bars), recording elephant activities around the fence, any fence damage caused by elephants, and any other reasons. On the other hand, we conduct monthly monitoring, which includes our bee specialist visiting the hives, providing honey harvest projections, and providing beekeeping training as needed.

The number of occupied hives increased with time from September 2020 to June 2021, as shown in the bar graphs below (Fig. 9-11). The gradual growth in the number of occupied hives is owing to the fact that this period (buildup phase), which runs from December to June, is accompanied by plenty of water and bee fodder due to rainfall in the surrounding areas. Because of honey harvesting in July 2021, which coincided with the death period (July-November) marked by insufficient water and bee fodder, and a spike in bee enemies as a result of bee colonies absconding to find suitable sites, the number of occupied hives fell. Another explanation for the decline in the number of occupied hives is that the queen bees in the hives have stopped laying eggs, and the bee colonies have shrunk in size and cannot be divided into different colonies.

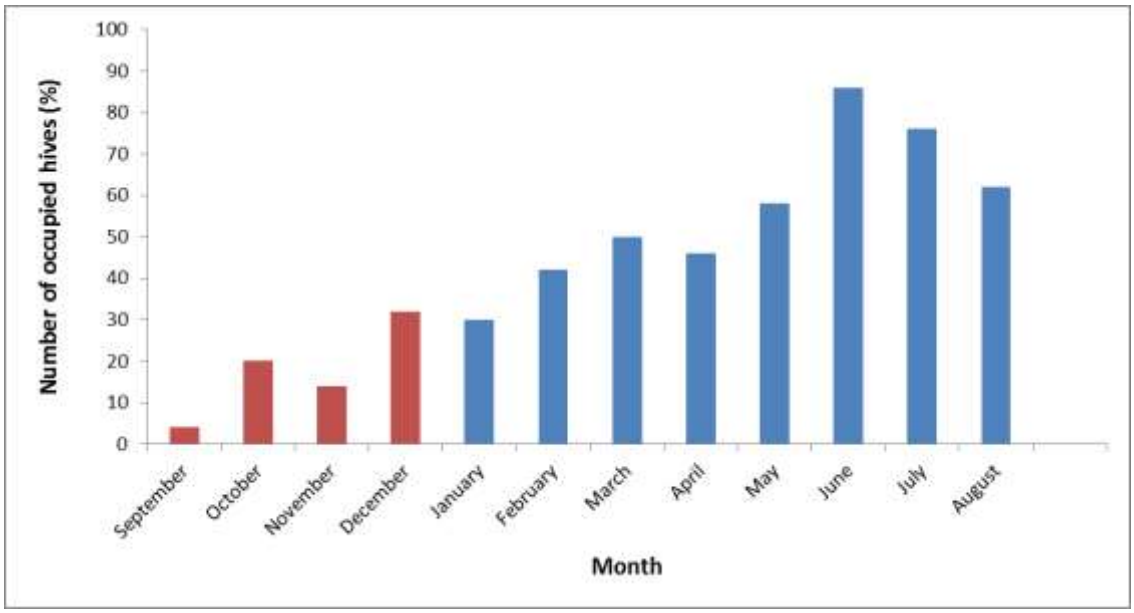

Figure 9: Number of occupied hives in Kisaki village beehive fence. Whereby, red bars represents occupancy in 2020, while blue bars represents occupancy in 2021.

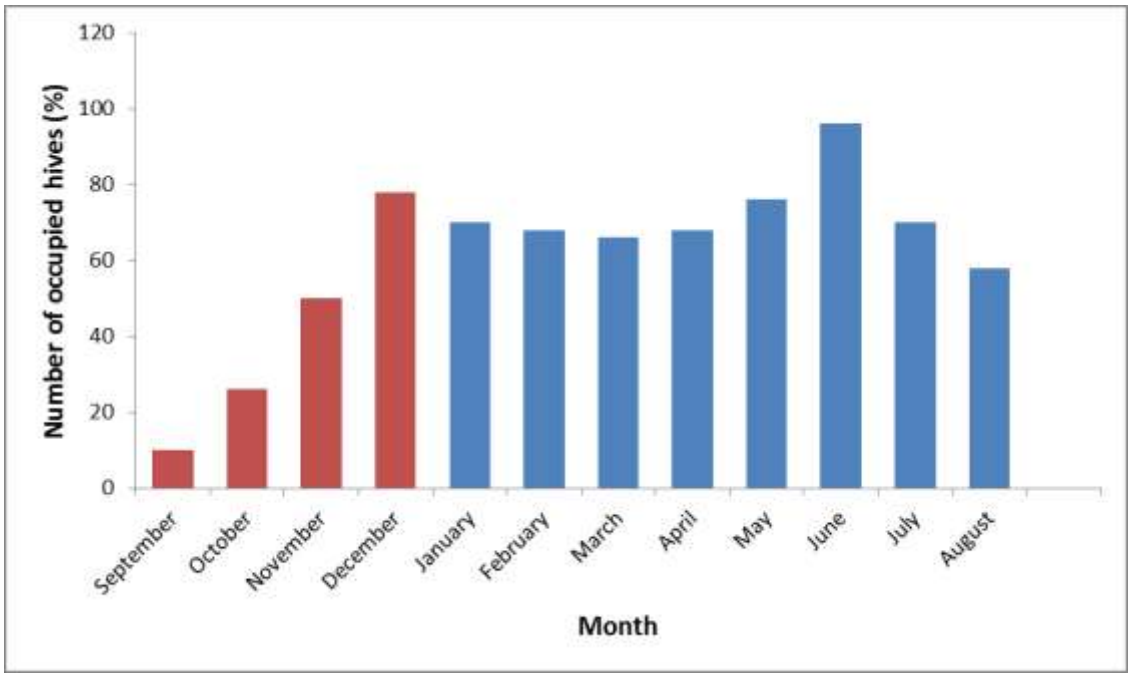

Figure 10: Number of occupied hives in Kisemo village beehive fence. Whereby, red bars represents occupancy in 2020, while blue bars represents occupancy in 2021.

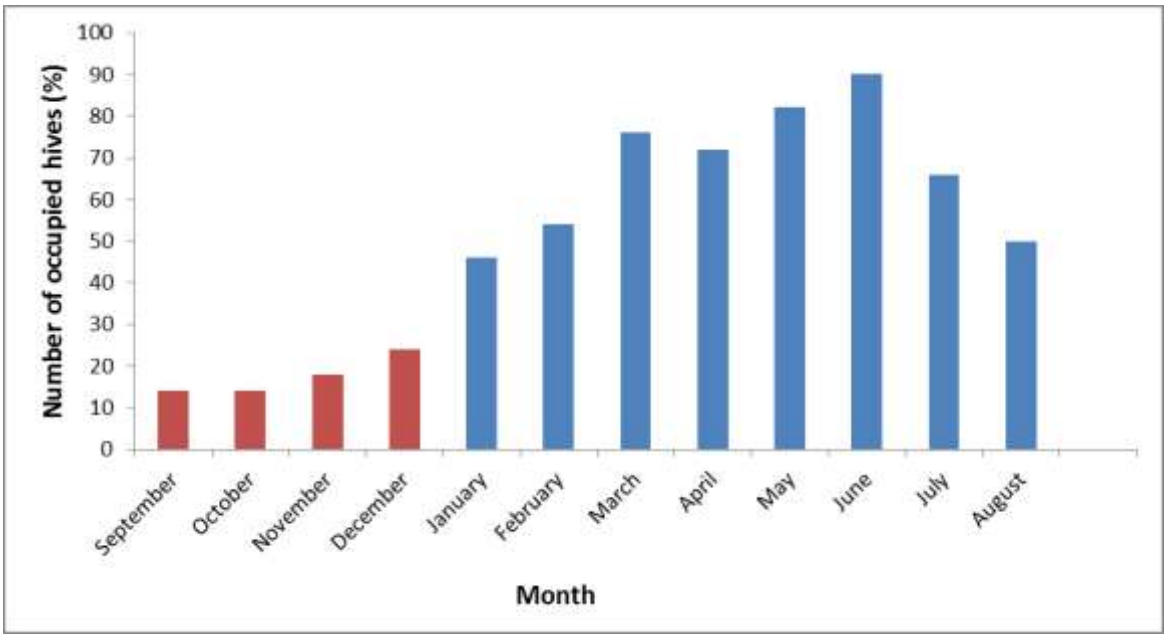

Figure 11: Number of occupied hives in Mgude village beehive fence. Whereby, red bars represents occupancy in 2020, while blue bars represents occupancy in 2021.

2.3 Honey harvest, processing, packaging and sell

The farmers groups harvested and packaged 130 kg total of honey called “Maisha na tembo” (lives with elephants-coexistence honey) in all villages and made US$910 profit of annual sells.

Figure 12: Honey harvesting, processing and packaging

2.4 Monthly elephant monitoring around the fence and farms

We record monthly elephant movements, HEC incident trends to track incidents where crop damage or human injuries or deaths have occurred, as well as elephant activity within 100 meters of the fence. We have continued to monitor our beehive fence projects and trends in human-elephant conflict (HEC). As a result of this, crop destruction incidents have decreased because the elephants avoided crossing the beehive fences and instead found other paths.

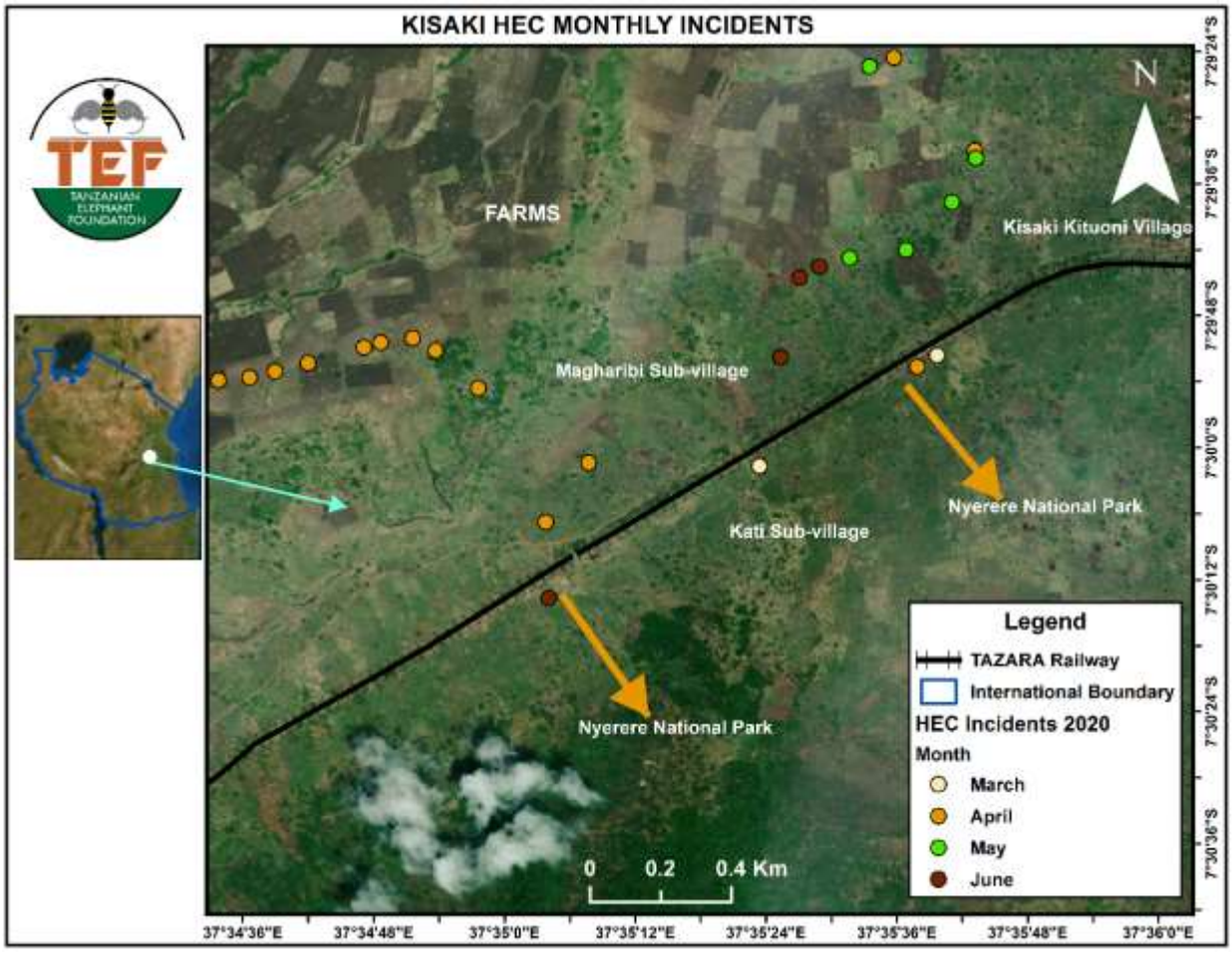

Figure 13: Monthly elephant movement before a beehive fence in Kisaki village

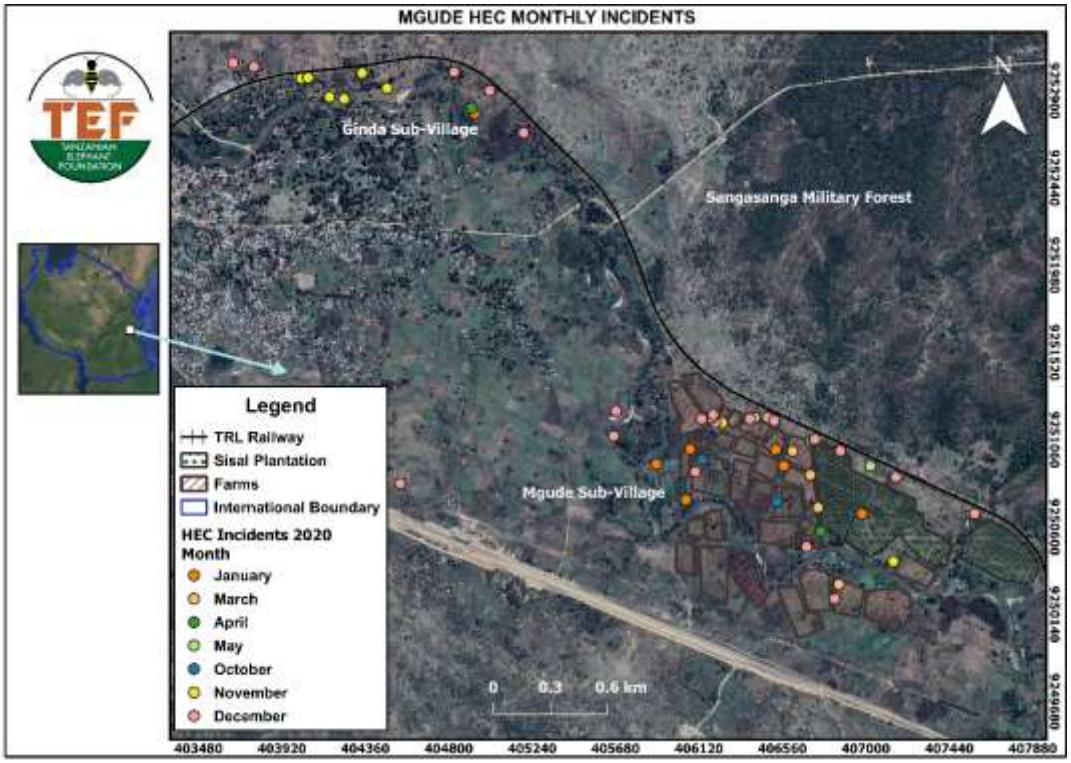

Figure 14: Monthly elephant movement before a beehive fence in Mgude village

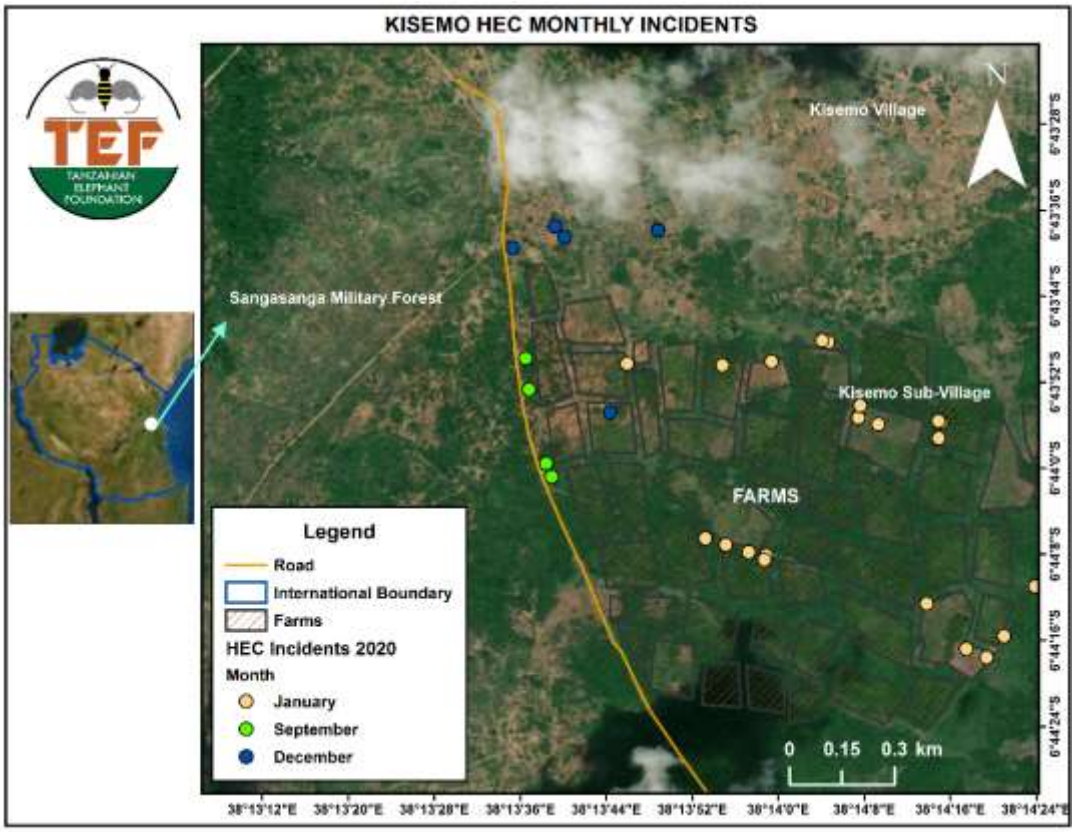

Figure 15: Monthly elephant movement before a beehive fence in Kisemo village

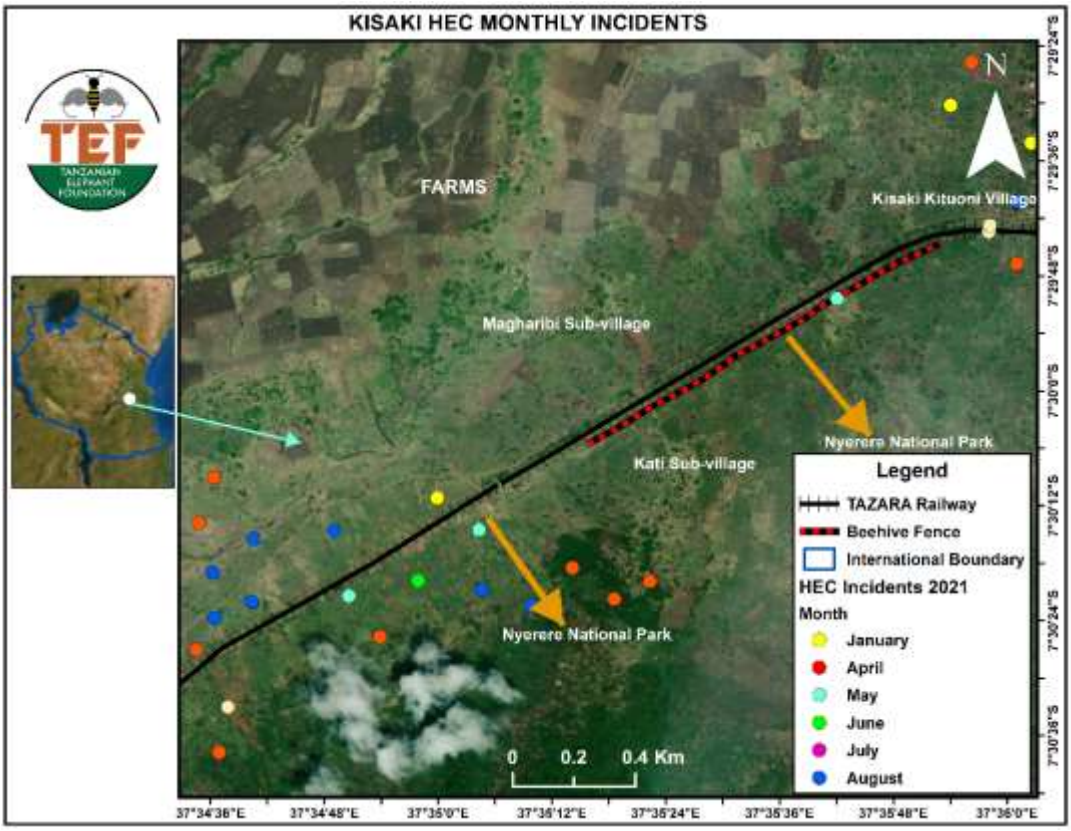

Figure 16: Monthly elephant movement after a beehive fence in Kisaki village

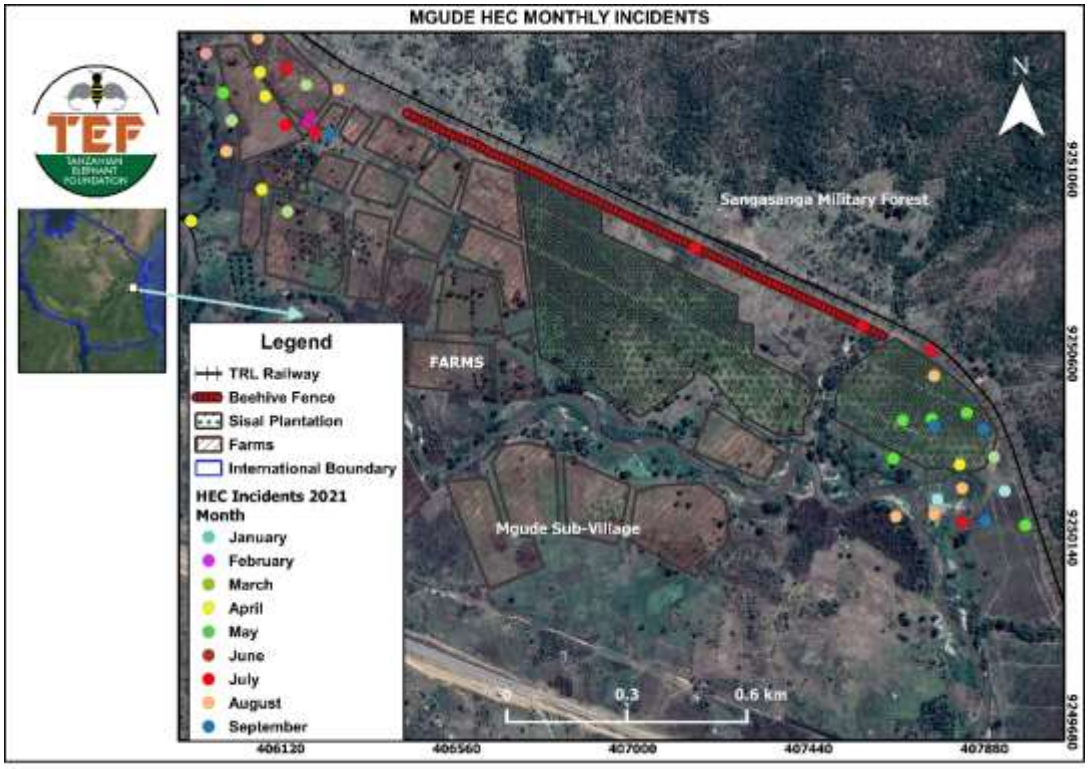

Figure 17: Monthly elephant movement after a beehive fence in Kisaki village

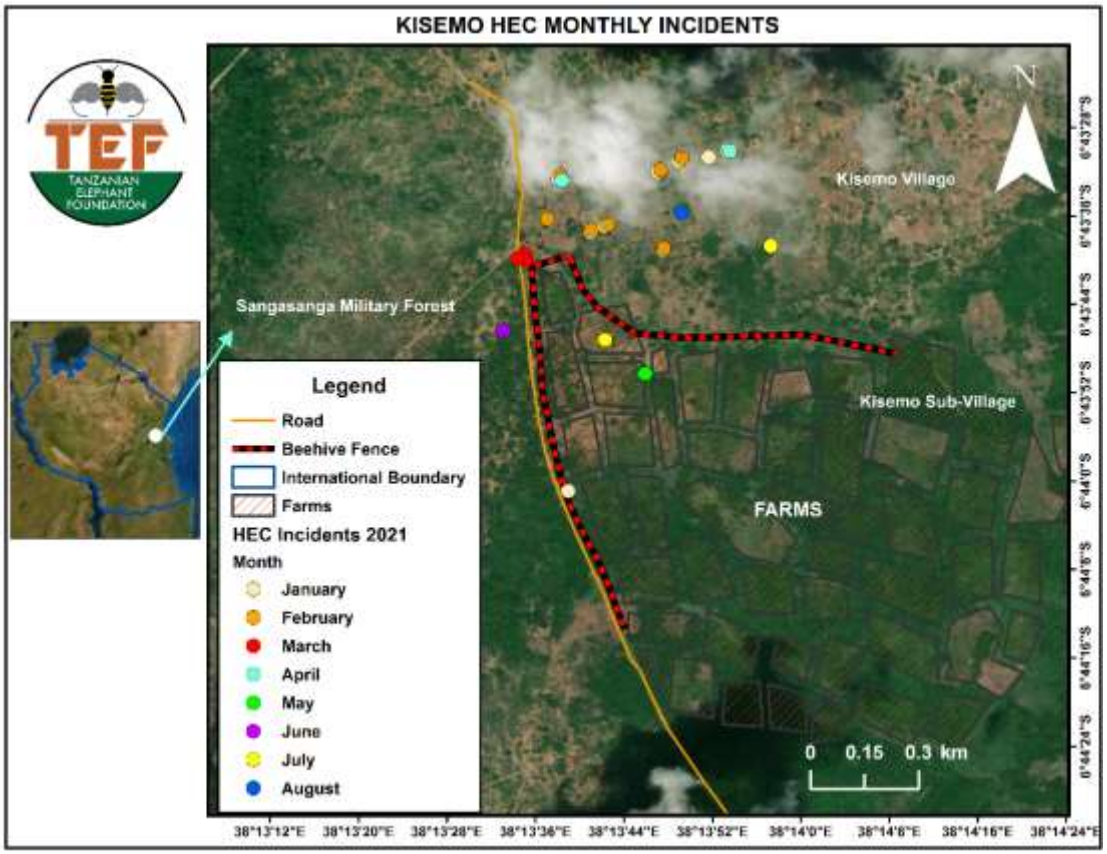

Figure 18: Monthly elephant movement after a beehive fence in Kisaki village

Activity 4: Marketing beehives fence projects for tourism and establish links with tour operators

Via existing links with Tanzanian eco-tourism operators, we have increased local incomes (US$315 in each village) from tourism by developing a human-wildlife coexistence tourism package featuring visits to the beehive fence projects. However, the coexistence tourism has been affected by the global pandemic (COVID-19).

Figure 19: Tourist visits for a beehive fences

Activity 4: Facilitating formation of Village Savings and Loans Associations (VSLA's)

VSLA is a group of people who save together weekly and take small loans from those savings. The activities of the group run in cycles of one year, after which the accumulated savings (shares) and the loan profits are distributed back to members and the cycle start again in the following year. In this case, the local communities were empowered through VSLA's in their registered farmer's group in order to increase access to financial services with access to loans and buffer financial losses through alternative income apart from farming activities.

The registered farmer's group members (25-40 individuals) were required to buy weekly shares. The price of a share was agreed by group members themselves in such a way that all group

members could afford. The value of 1 share during the first cycle of the VSLA's was US$0.5 and members were allowed to buy up to 5 shares per week. Group members were required to start loan application three months after VSLA's cycle start. The group members agreed on an affordable and friendly loan interest rate of 10%. Members were allowed to lend loan three times of their share capital. There were also a mandatory social funds contribution for the members which provided insurance and funds that were used for relief of members experiencing emergences such as loss of crops, human injuries/fatalities caused by elephants. The group members were required to contribute a mandatory flat rate, small amount of money affordable and tolerable to all members. In this case the registered farmer's group members were required to contribute US$0.22 weekly through their social funds.

Therefore, loans provided at low interest rate to farmers groups through VSLA's were used to enable income-generating activities (small investments) apart from farming activities and to assist with household cash flow. While the social funds provide useful lump sums for life-cycle events as a result it increase commitment and positive views and tolerance towards elephant and biodiversity conservation.

Figure 20: Farmers group in VSLA meetings

Table 1: Summary of VSLA

Village name (Farmers groups)	Start & End dates	Total value of community shares (US$)	Total value of Social funds (US$)	Profit from VSLA (US$)
Kisemo	August 2020-August 2021	1,121	310	370
Kisaki Kituoni	August 2020	1,304	300	380
Mgude	August 2020	1,877	389	485

Activity 5: Provision of conservation education and outreach programs

These programs are crucial to educating the community and students about elephant conservation and ways to coexist peacefully with elephants. HEC mitigation strategies combined with elephant conservation education, enhance wildlife conservation and human-elephant coexistence. Also, these programs provide knowledge which increases interest and motivation to learn about and use mitigation techniques and awareness about wildlife and elephants in particular. During the period of this project, we were able to conduct three conservation education through meetings and three through school visits.


Figure 21: Conservation education through school visits

3.0 Recommendations

The Beehive Fences Project in the communities around Nyerere National Park, Tanzania represents an innovative way of combining responsible tourism and nature/ animal conservation with sustainably supporting the local communities. Interestingly, these communities already used beehives hung in trees to repel elephants in the past. However, because they had no beekeeping suits they used to put burning branches in the hive to kill the bees or make the bees move out so that they can harvest the honey. Therefore the tree trunks they traditionally used for hives were unusable after the honey was harvested. The modern hives used in the Beehive Fence Project are Top Bar hives that consist of bars and have washable frames into which the bees construct the honeycombs. Through a metal-lined lid, the sun's heat is reflected, creating cooler air preferred by bees, which compared with traditional hives makes the hive-management easier and re-usable. The Beehive Fences not only serves to effectively protect elephants from angry farmers and villagers and thus from Ivory poachers, it also symbolises a change from trading ivory to selling locally sourced honey for the people around these communities. The communities around Nyerere National Park have a new, sustainable source of income from the Beehive Fences project, the roots of which stem from their own cultural history. The resulting peace between humans and elephants may create new perspectives for how these and other wild animals and their significance in the circle of life will be perceived.

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