One year after the rollout of the *Coexistence Toolbox* for reducing human-elephant conflict

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Introduction

Three of the most significant issues for elephants across Africa today are habitat loss, climate change, and an expanding human population (Abrahms 2021). It is predicted that by 2050, Africa's human population will have doubled in elephant range States, creating enormous pressures for elephants (Powers and Jetz 2019; Shaffer et al. 2019). As farmland spreads and infrastructure developments fragment habitat, elephants are forced into increasing conflict with people (De Minin et al. 2021; Frank et al. 2019; King et al. 2017).

In Kenya, the problem is exacerbated by elephant corridors being blocked by human settlements and infrastructure (Okita et al. 2016) and erratic weather patterns. A prolonged drought from 2021 to 2023 affected much of Kenya, as communities are experiencing more extreme weather conditions due to the changing climate (Kogo et al. 2021). Both humans and elephants have lost their lives following conflict altercations in the East African country (Hamm 2023).

In Samburu–Laikipia, where Save the Elephants (STE) north Kenya research centre is located, at least 97 elephants were killed in 2022 as a result of human-elephant conflict (HEC) (Wildlife Research and Training Institute (WRTI), Kenya Wildlife Service, Save the Elephants, unpublished data). HEC will become one of the most significant threats to elephants, and for conservation practitioners to combat over the next 50 years. Communities will need practical, sustainable, and affordable ways to coexist peacefully with these mega herbivores.

Figure 1. An elephant under a standard gauge railway (SGR) underpass in Tsavo, Kenya, in 2022. The railway divides the Tsavo East and West NP ecosystem into two. (© *Josh Clay/Save the Elephants*)

Figure 2. A beehive fence on a farm in Kajire, Tsavo, in 2023.
(© *Meha Kumar/Save the Elephants*)

In 2022, STE launched a unique 'how-to' manual, the *Human-Elephant Coexistence Toolbox* (the Toolbox)—which carefully details deterrents which have been tested in the field—to enable rural communities to protect their lives and livelihoods from elephants (King et al. 2022). Built on the success of the Elephants and Bees Project in Tsavo, the Toolbox comprises over 80 elephant-friendly tools, including the successful beehive fence method which has been deployed worldwide across 90 elephant conflict sites in 23 countries. The Toolbox manual is currently available in English, French, and Swahili with plans to translate it into more African languages for broader access. The second edition with more tools and updates from our field partners has just been launched[1].

Since its launch, the Toolbox has introduced several methods to partner organizations and farming communities through our Elephant Crisis Fund (ECF) and the IUCN AfESG. Training workshops on how to use the methods of the Toolbox effectively, are also in place.

In Tanzania, on the edge of the Serengeti National Park (NP), the Frankfurt Zoological Society (FZS) has implemented several mitigation tools as prescribed in the Toolbox, including elephant-safe grain stores and watch towers for communities suffering from food losses. Losing a grain harvest which could feed a family for months presents a huge cost to small-scale farmers, and elephants can easily destroy traditional storage structures made from 'mud and wattle' which are

Figure 3. A woman stands in front of an elephant-proof grain store installed by FZS in Tanzania; cement/brick stores like this are used to protect grains from elephants.
(© *Lucy King/Save the Elephants*)

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[1]Contact the authors to receive updated methods of the *Human-Elephant Coexistence Toolbox* manual which will be made available on the web platform in the future. King et al. 2023 HEC Toolbox vr2 (English)

what these communities previously used. To help prevent the raiding of grain stores in buffer zones around Tanzania's unfenced Serengeti NP, and communities becoming intolerant of elephants, sturdy storage is essential.

In southern Zambia, Conservation South Luangwa is supporting farmers to harvest chillies that are used to make a pungent elephant repellent, a recipe designed by WildAid that is featured in the Toolbox (Oniba et al. 2020; Tiller et al. 2022). The repellent, brewed from ingredients including chilli, garlic, ginger, dung, and rotten eggs, has proven to be successful in keeping elephants at bay. In 2023, farmers harvested more than 3.3 tonnes of chillies, generating more than USD 3,800 in sales. Methods such as these are not only proof that there are other peaceful ways for farmers to protect their livelihoods but also, in some cases, even secure an income.

Another HEC Toolbox intervention, an audio gadget called a BuzzBox™, has proved successful in Liberia. Rare camera trap footage captured a forest elephant (*Loxodonta cyclotis*), fleeing from the technologically produced bee sounds in Liberia. Created by Wild Survivors, who are based in Tanzania, the BuzzBox™ wildlife technology was specifically designed for savannah elephants to create an acoustic deterrent that would prevent the pachyderms from crop raiding and help reduce conflict. This was the first time that BuzzBox™ had been trialled on forest elephants, which are now 'Critically Endangered'.

The trial, in collaboration with Elephant Research and Conservation (ELRECO) in Liberia, showed that this noise deterrent is an effective tool for preventing both forest and savannah elephants from entering farms and could be a valuable mitigation tool in HEC hotspots in elephant range States. Forest elephants have endured rapid population decline, losing more than 86% of their numbers in just over three decades.

In our Tsavo research station in Kenya, several Toolbox methods such as beehive fences (King et al. 2017) and metal strip fences (Von Hagen et al. 2020), noise deterrents, early-warning alarms, water tank protection, non-palatable crops, and watchtowers have already proven to be effective. The metal strip fences create clanging noises as they blow in the wind and reflect light from the sun (or torches) towards approaching elephants,

Figure 4. The settings of a BuzzBox™ are adjusted shortly before its deployment in Liberia in 2023. (© *ELRECO*)

doubling up as both an audio and visual deterrent (Von Hagen et al. 2020).

Another farmer in Mwakoma village, Samuel Salim, has used the Toolbox to build his own modified version of the watchtower using mud and sticks, both of which are affordable and readily available resources. Nighttime monitoring from watchtowers is an effective way to deter elephants from raiding crops, as farmers can spot approaching elephants from a distance, warn their neighbours, and use torches or noise to scare them off before elephants reach their farms.

To avoid elephants decimating an entire farm in just one night, farmers are also growing non-palatable crops such as sunflowers, neem and red chillies instead of the traditional maize and tomatoes. Alternative crop choices mean that farmers can protect their farms and livelihoods, as well as learn to live in closer harmony with elephants.

Agriculture is not a sustainable income-generating activity for the Kajire and Mwakoma communities due mainly to dry conditions, but also increased crop-raiding by Tsavo's elephants. This semi-arid area receives minimal rainfall, which reduces harvest yields and income from farm produce, making agriculture an undependable economic option that forces farmers to diversify their income. The Toolbox provides plenty of ideas for alternative income generating ideas for subsistence farmers in these conditions also living with elephants.

Figure 5. A watchtower in a farm in Kajire village, Tsavo, Kenya. (© *Sarah Kunkel/Save the Elephants*)

Figure 6. Living near Tsavo East NP in Kenya, Jones Mwakina, a farmer displays his homemade noise cannon device designed to scare elephants away from his farm.
(© *Jane Wynyard/Save the Elephants*)

Figure 7. An STE team monitors a beehive fence on a sunflower farm in Sagalla, Kenya. Sunflowers are an unpalatable crop to elephants. (© *Jasper Scofield/Save the Elephants*)

Figure 8. Fishermen in Lake Jipe share the lake with wild Tsavo elephants, and example of coexistence. (© *Anthony Ochieng/Save the Elephants*)

Figure 9. Participants and trainers of the second Trainer of Trainers Workshop display copies of the *STE Human-Elephant Coexistence Toolbox* during the training which took place at our research centre in Tsavo, Kenya, from 18 to 20 July 2023. (© *Meha Kumar/Save the Elephants*)

Conclusion

In Kenya, our team now hosts training workshops to teach partners, farmers, and communities how to use the *Human-Elephant Coexistence Toolbox* and to learn new ways to coexist peacefully with elephants. These three-day training events combine theory sessions with visits to farms in the vicinity of Tsavo West and East NPs, to see many of the farm-based mitigation tools available in the Toolbox such as metal strip fences, watchtowers, and beehive fences.

The trainees are now equipped to help others in their respective hotspots and to establish elephant-friendly deterrents in communities throughout Kenya, spreading awareness on how they can harvest and store crops safely, and live peacefully alongside their elephant neighbours.

To date, the Human-Elephant Coexistence Toolbox manual has been shared free with more than 350 individuals and partners in 54 countries. Many of these are NGOs or conservation bodies that have funding available for community conservation work but struggle to know which interventions can be used with positive livelihood results in order to help people in African range States learn to coexist with elephants. In the second year of implementation of the Toolbox manual, it is encouraging to see that the methods are showing evidence of the effectiveness of each of the interventions in the Toolbox manual. We invite feedback from the conservation network and encourage practitioners to download the second edition from our website: https://ste-coexistence-toolbox.info/en/

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