



Busy and buzzing on the frontline of human-elephant conflict



Dr Lucy King is head of the Human-Elephant Co-Existence Program for

Save the Elephants. She has won prestigious awards for her innovative research including the Future for Nature Award, the St. Andrews Prize for the Environment in and the UNEP/CMS Thesis Award.



Naiya Raja grew up in Kenya and recently graduated from the University

of Durham, UK. She's focused on working with marginalised communities, and helping create sustainable solutions through motivation and agency.

Distressing images of poached African elephants have hit headline news in recent years triggering intense conservation efforts to save this iconic and intelligent species. Additionally, there is another less known threat to African elephants but equally as critical: human-elephant conflict (HEC).

Requiring immense tracts of land to satisfy their food, water, migratory and social needs, elephants traverse great home ranges, living alongside humans across the 37 'elephant range states' in Africa. However, in a changing landscape, expanding human populations and increasing competition for land and resources has resulted in the rise of human-elephant conflict. With exacerbating negative interactions, the friction between these two keystone species is reaching distressingly high levels.

As both families and bull elephants migrate through the landscape searching for food

and water, they will take advantage of any juicy crops they come across. Using their extraordinary sense of smell and incredible cognitive abilities, elephants have learnt how to break fences to pillage farms at night. A single night time crop-raid could strip a farmer of up to 20-30 bags of harvest, costing at least 20-50,000 Kenyan shillings which can leave the family desperate and starving. Agricultural losses involve damage to food crops, cash crops, and even food in storage, with the absorption of any loss at the individual household level. In many rural areas encountering challenging climatic conditions, human-elephant conflict is further exacerbating poverty and food insecurity, penetrating the social fabric of rural livelihoods. Raiding crops and breaking farm property, marauding elephants pose serious social, political, economic and conservation problems in Kenya, as they do in many parts of Africa and Asia.



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LEFT PAGE: Elephant matriarch running away from the sound of angry bees in Samburu National Reserve during bee playback experiments.

TOP: Turkana women building beehive fences to protect their farms against elephants in Ngare Mara, Isiolo.

BELOW: Beehive fences linking Langstroth beehives are helping to reduce elephant crop-raids by as much as 80% in Sagalla Community next to Tsavo East National Park, Kenya

To avoid confrontations and protect their crops, farmers have traditionally resorted to measures such as shouting, lighting fires, exploding firecrackers, releasing barking dogs, chilli bombs or fences, crashing metal sheets together, and often, if all else fails, using guns and spears to frighten or inflict pain on the elephants. With such dangerous conflict, both elephants and humans are sometimes injured or killed. Although methods such as electric fencing have proved to be effective in separating elephants from community lands, they are expensive and impractical for small-scale farmers to implement. Now, there is a growing focus on creating low-tech and affordable mitigation solutions.

In 2002, experiments by Prof Fritz Vollrath of Oxford University and Dr. Iain Douglas-Hamilton from the leading scientific research charity *Save the Elephants* revealed that elephants avoided feeding on acacia trees that had active beehives in them. Their original experiment was reported in *SWARA* back in Sept 2002. A buzzworthy find, this sparked exciting new research questions: ‘Were elephants avoiding bees because they were scared of being stung?’ and ‘Could live beehives be used as an active deterrent to scare elephants away from entering farmland?’.

Beginning a series of acoustic playback experiments with resting elephants, Dr. Lucy King and her team replayed recordings of disturbed bee sounds from a wild colony of African honeybees (*Apis mellifera scutellata*). The experiments revealed intense behavioural reactions from the elephants such as headshaking, dusting and immediate fleeing - provoked by the sound of disturbed bees. Furthermore, having teamed up with bioacoustician expert, Dr. Joseph Soltis from Disney’s Animal Kingdom, they discovered that upon retreat, the elephants emit a unique low

frequency sound that is thought to be a form of communication. The researchers found that the elephants’ retreat sound was significantly more frequent when they were exposed to the sound of disturbed bees compared to when they were exposed to a control sound. This suggests that the sound of disturbed bees is a powerful deterrent for elephants, and that they may be using this sound to communicate with other elephants about the presence of a potential threat.



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frequency infrasonic vocalisation, a ‘bee rumble alarm’, which warns neighbouring elephants of the eminent buzzing dangers. The experiments revealed that elephants appear to retain a negative memory about honey bees, repelling them from the area.

Moving on to develop a deterrent that had an element of discomfort, Dr. King devised the ‘beehive-fence’ concept - testing the use of occupied beehives in protection of small scale shambas (farms) in Kenya.

The ‘beehive fence’ innovation includes beehives suspended every 10 meters from 9

TOP: A bull elephant from Tsavo stops short of entering a beehive fence protected farm at 9:30pm, any attempt to push through between the hives results in the beehives swinging and askari bees coming out to chase him away.

BOTTOM: Elephant-Friendly honey, candles and lip balms ensure the beehive fences pay for their own maintenance needs and provide the farmers with much needed alternative income from their farms.

foot *Commiphora* posts that re-grow into trees, connected one to the other through a linked wire system. As elephants attempt to enter the farm, they instinctively try to pass between the beehives and as the interconnecting wire stretches, the pressure on the hives will cause them to swing erratically, releasing bees from occupied hives.

Although the project focuses primarily on using Langstroth hives as they provide optimum honey yields for the farmers, any type of beehive can be used. The Elephants and Bees Project team have tested the beehive fence design in three farming communities in Kenya with approximately an 80% success rate, and have produced a concise *Beehive Fence Construction Manual* that is available for free download from www.elephantsandbees.com. The present demonstration project site in Kenya is in the

AS A RESULT OF ITS UPTAKE SUCCESS, THE CONCEPT HAS NOW EXPANDED INTO EAST AND SOUTH AFRICA WITH COMMUNITIES AND NGO'S IN MOZAMBIQUE, BOTSWANA, UGANDA, CHAD, GABON, SOUTH AFRICA AND TANZANIA NOW TRYING THE IDEA FOR THEMSELVES.



foothills of Sagalla, next to the Tsavo East National Park boundary where Dr. King and her team have partnered with KWS to try to reduce conflict with farmers bordering the park. Starting with two trial fences in 2009, the demand from the community has increased so much that the project has now expanded to support 22 of the worse affected 'front line' farmers with more planned for construction in 2016. As a result of its uptake success, the concept has now expanded into East

and South Africa with communities and NGO's in Mozambique, Botswana, Uganda, Chad, Gabon, South Africa and Tanzania now trying the idea for themselves. With increasing interest from Asia, beehive fences are now being trialled in Thailand, India and Sri Lanka and despite the Asian honeybee (*Apis Cerana*) being less aggressive than the African honeybee, playbacks and field-trials are being replicated in Sri Lanka to see if the concept can be adapted to local conditions. ●



A WIN-WIN SOLUTION

By Naiya Raja

Interning with the Elephants and Bees team in Sagalla in 2014 to complete my honours degree project at Durham University, I was given a unique opportunity to immerse myself and observe the outcomes of the project first hand. Discussing the beehive-fences with the local community through a semi-structured questionnaire survey, a phrase I encountered time and time again was: "nyuki ni mali...nyuki ni mali" (bees are wealth). Sure enough, it couldn't be more true. The bees not only provide security against crop-raiding elephants, (described as "askaris" and "good friends" by one farmer) but they also bring with them a handful of other benefits too.

One of which is the delicious 'Elephant-friendly-honey'. Purchasing the honey produced by the farmers, the Elephants and Bees team jar and bottle the raw honey at the research centre's on-site honey room. Each jar is unique, infused with the flora of particular farms and influenced by the foraging preferences of each hive's resident bees. Alongside the honey, the hives are a source of beeswax, propolis, royal jelly and pollen. These can be transformed into a range of value-added products, and the Elephants

and Bees team have recently developed Elephant-friendly candles and lip balm.

Providing a financial incentive and an offset against crop-raids, beekeeping is an important activity for rural livelihoods. Through enhancing the beekeeping activities, the team aims to boost the income potential that beehive fences offer to rural farmers. Lengthy conversations with the residents of Mwakoma village, Sagalla, revealed that honey has a wide significance in traditional herbal medicine practises and in brewing local beer, made with the indigenous Muratina tree. Providing an ecological boost for the area, honeybees are also vital in the maintenance of biodiversity. Often an overlooked 'ecosystem service', pollination is crucial in supporting human life and subsistence. With the increase in pollinators and reduction of crop-raids, farmers are beginning to see proliferating yields.

Although the ecological footprint of the beehive-fence is still under study, a significant environmental improvement in its design is the inclusion of live posts. Certain *Commiphora* trees can be replanted as both a post and a tree. Once the shoots and leaves grow, they provide natural shade for the beehives – requiring little maintenance in the future. Despite an array of challenges, such as pests, predators, water scarcity and absconding bees, beekeeping helps diversify farmers' livelihoods, in doing

so, promoting greater resilience for the future.

Perhaps one of the most successful aspects of the Elephants and Bees Project has been the changing attitudes towards elephants. With less hostility and rising tolerance, the Sagalla community is starting to develop a more positive attitude towards protecting elephants, once considered as problematic pests. If we want successful conservation for the future, we need to be sensitive of local ecologies, histories and priorities. Despite being at the frontline of human-wildlife conflict, many rural farmers are often sidelined and marginalised by conservation initiatives. However, we cannot continue to discount the voices and perspectives of those directly affected by conflict. Through providing low-tech and appropriate solutions, projects such as these enable local communities to become active and participatory agents of change, equipped with the skills needed to rebuild their livelihoods. ●

Further reading:
Project websites: www.elephantsandbees.com
www.savetheelephants.org
Facebook page for the Elephants and Bees Project website: www.facebook.com/ElephantsandBees