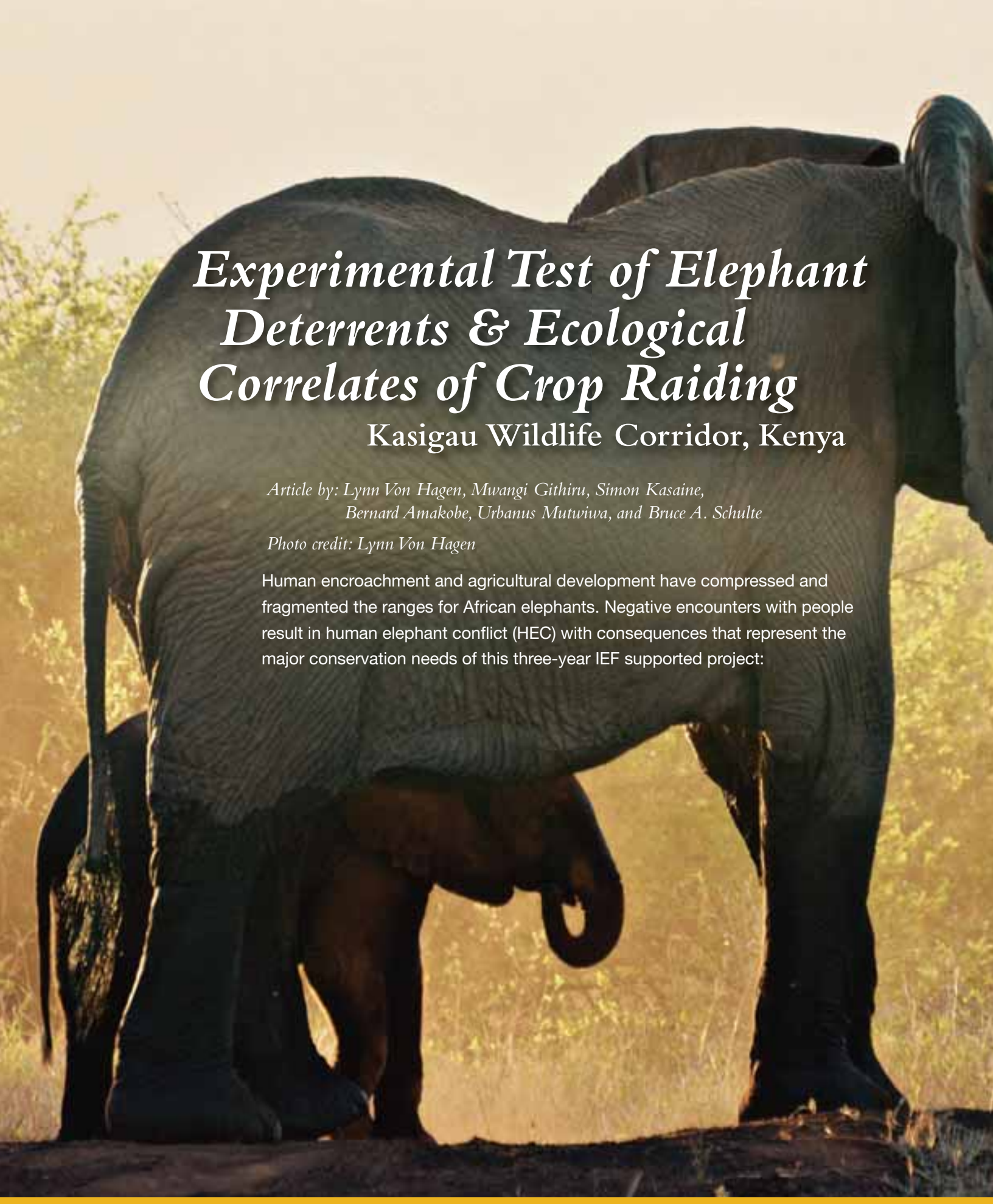

Experimental Test of Elephant Deterrents & Ecological Correlates of Crop Raiding

Kasigau Wildlife Corridor, Kenya

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Photo credit: Lynn Von Hagen

Human encroachment and agricultural development have compressed and fragmented the ranges for African elephants. Negative encounters with people result in human elephant conflict (HEC) with consequences that represent the major conservation needs of this three-year IEF supported project:

(1) Crop raiding is the major form of HEC, and losses to elephants can severely influence livelihoods. Thus, there is a great need to identify sustainable and affordable means to reduce crop raiding by elephants. Farmers would benefit from means of deterring elephants that approach their crops and being warned of elephants at a distance heading in the direction of their fields.

(2) People's poor attitudes towards elephants reduce the effectiveness of conservation initiatives and practices, ultimately resulting in a decline in elephant populations. People often attribute crop raiding to any elephants in the area, but it is possible only particular individuals are the culprits and other species may also be to blame. Many bull elephants we catalogued in the project area have one or more large scars, likely the result of negative encounters with the local people. By determining which elephants and what other species crop raid, we can target solutions and enhance human attitudes towards elephants in general.

(3) Elephant presence in confined areas or recovering ecosystems can result in extensive damage to canopy trees. Bark striping that results in girdling a tree can lead to mortality. These trees provide habitat (e.g., nesting sites) and cover for other species. In addition, humans use these trees as a resource for lumber, medicinal products, food, and fuel. Thus, there is a need to maintain these trees in the habitat for elephants, wildlife, and humans. Furthermore, we are determining how the timing and extent of tree use by elephants relates to the probability of crop raiding.

(4) Elephant activities can facilitate biodiversity and enhance ecosystem services. However, elephants confined by human presence or enclosed by fences can overuse a particular habitat resulting in a loss of biodiversity. Elephants and their activities can facilitate enhanced biodiversity but not all species are favored by elephant presence. Thus, highly mobile yet easy to locate species such as larger mammals and predatory birds may be indicators of elephant absence or presence and potentially signal temporal shifts in crop raiding rates as well as elucidating the broader influence of elephants on local biodiversity.

(5) Crop raiding by elephants needs to be considered in perspective of overall crop yield. Previous studies have shown that farmers will attribute crop losses to elephants even when elephants are not the primary reason for crop loss. In order to improve human livelihoods, we need to know the relative importance of various factors on crop survival as well as have good data on the overall prevalence of elephant crop raiding.

We are testing deterrent fences to reduce elephant intrusion into crop fields with a third and fourth trial. We have demonstrated that the new metallic strip fences (Kasaine fence) singly and in combination have a statistically significant deterrent effect. We now hope to determine if and when habituation to this method occurs, test different iterations and applications of the fence, and in the near future test early warning devices which alert farmers to elephant presence. In addition, this year we are planning to erect three more beehive fences in the community for testing in comparison to other deterrents. Our ability to use beehive fences depends on our success at establishing viable hives. We should see a direct benefit to elephants by reducing conflict with local farmers while collecting data that will inform us about deterrent methods that are worth trying on a broader geographic scale.

We are also creating an elephant identification database and using photographic trap cameras to identify elephants that crop raid our experimental plots. We are making visits to the local primary school to facilitate a good relationship with the local community. As part of the larger project, Wildlife Works conducts surveys with people in villages in the study area to examine their attitudes on wildlife, elephant conservation, and sustainable practices to maintain a viable livelihood. We plan to compare these perceptions of crop raiding to our study data, which could give insight as to the level of misperception of elephants as the only or predominant threat to sustainable livelihoods.

Assessing damage caused by elephants to tree species in the study area is also critical. As all 240 elephant-favored trees were located and tagged in the first year of the project, we plan to perform follow-up inspections for tree damage with the intention to revisit each tree. We will use this information to assess the timing and degree of damage relative to crop raiding. We will test the hypothesis that escalating tree damage could be used as an indicator of impending crop raiding. The alternative hypothesis is that higher tree damage reflects the preference for browse over crops by elephants (especially in light of the higher costs of raiding when crops are protected). In the future, we will wrap some trees of value with wire to determine if this wrapping reduces tree mortality from elephants (such mortality is primarily the result of bark stripping).

For the entire study to date, we have monitored all species entering farms and/or damaging crops. From the onset of the trials, it was observed that elands were commonly present and doing damage in experimental fields. Analysis from the first three trials demonstrated that elands were frequent visitors in two of the tree trials, sometimes as often as elephants. However, elephants did considerably more damage. Though deterrents were designed to prevent elephants from entering, analysis also revealed that all active deterrents (except acacia) were effective against elands, despite their amazing jumping prowess. As elands are renowned for their “skittishness,” this suggests that the movement of these barriers in the wind may be effective in preventing crop damage by elands. However, unprotected farms may incur significant damage from elands, which could be misattributed to elephants. Since farmers have erected home-made wind socks long before our study, we can capitalize on knowledge of indigenous people, experimentally evaluate their means of deterrence, and add viable deterrent methods to the catalog of defenses against crop raiding.

Elephant damage to farms usually consists of a combination of dung deposition, trampling, and consumption, yet through year two of our study, we still found no elephant dung in the experimental fields. Consumption was responsible for the majority of crop mortality from elephants, but farmers only lost 5% of their overall yield because of elephant raids. Maize is widely known as one of the preferred crops by elephants, but of the three crops planted within our experiment 27% of cowpeas were damaged, while only 7% of lentils and 6% of maize were destroyed by elephants in our experimental fields. This indicates that cowpeas may need to be defended to a greater extent than other crops, and future studies could determine if this crop acts as attractant for elephants. IEF