Final Evaluation Report

Your Details	
Full Name	Oduor Sandy
Project Title	Physiological responses of African elephant to changing habitat conditions, anthropogenic disturbance and social disruption in Laikipia-Samburu ecosystem, Kenya
Application ID	40012-B
Date of this Report	June 2024

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

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Assess how physiological and nutritional stress response differ among African elephants of different age and social status, along an ecological gradient within Laikipia-Samburu ecosystem				We collected faecal samples from African elephants across different ages and social status (i.e., matriarch and her calf as well as young adult female and her calf) within Mpala (Laikipia County) and Samburu National Reserve (Samburu County), areas with different ecological regions and vegetation quality.
Assess how physiological and nutritional stress of orphaned African elephants at Reteti Elephant Sanctuary and released at Sera Wildlife Conservancy compare with age and sex-matched non-orphaned individuals in Samburu National Reserve.				We collected samples from individuals that had been rehabilitated at Reteti Elephant Sanctuary and released into the wild at Sera Wildlife Conservancy and compared them with wild individuals within Samburu National Reserve.
Assess how physiological and nutritional stress of male African elephants within Laikipia change during crop raiding and non-crop raiding periods.				We used collared data from the bulls and collected monthly faecal samples during the seasons they were crop-raiding and the season they were not crop raiding.

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

a) Our study observed lower physiological stress response among elephants that were found within Samburu National Reserve (Samburu County) compared to individuals within Mpala Ranch (Laikipia County). However, we did not find any significant differences in nutritional stress between the two locations. Our findings illustrate the importance of protected areas which cushion wildlife from anthropogenic pressures which may manifest themselves on the physiological state of wildlife. However, because of climate change such as prolonged drought as it was witnessed during our study period, elephants in both areas were under nutritional stress and hence no differences were found between the two locations.

b) Orphaned elephants had higher physiological stress response compared to the non-orphaned elephants. Our findings illustrate the influence of social disruption on the physiological state of African elephants and the importance that maternal care plays on the long-term survival and fitness of African elephants.

c) Male African elephants had higher physiological stress response during the period they were crop raiding compared to the period they were not crop raiding which reduced as the natural vegetation quality improved as measured by normalised difference in vegetation greenness (NDVI)

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

During the study period, elephants were inaccessible in some locations due to the ruggedness of the terrain and potential treats from animal attack such as buffalos. In certain locations, the elephants were inaccessible by vehicle and because of this, the team had to walk on foot with the presence of the security guard to access the targeted elephants for sample collection. As a result, we had to hire a security guard from Kenya Wildlife Service (KWS) to protect the team during the sample collection which increased the cost of doing the study. In addition to this, we hired a 4x4 vehicle to help us access the elephants in the difficult terrain and collect the samples monthly.

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

Local communities were involved in tracking of crop raiding elephants using the EarthRanger tracking data (https://www.earthranger.com/) and individuals located using the movement data for sample collection. Additionally, a workshop was held in both Laikipia County and Samburu County on the findings on how different land use types were influencing both physiological stress and nutritional stress response in African elephants.

5. Are there any plans to continue this work?

There are plans to continue with this work. This will involve assessing how differences in habitat quality, influences their immune system of African elephants for management interventions including habitat restorations. For instance, in some habitats, the elephants were infested with high parasitic load which could influence their physiological and nutritional responses.

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

A manuscript is currently being drafted for submission into one of the high impact journals including journal of Conservation Physiology, Functional Ecology and journal of General Comparative and Endocrinology. Findings of this study will provide further insights on how feeding in risky habitats for nutrient dense forage impact the physiological function of crop-raiding bulls. Additionally, the study will also provide further insights on how social disruption (e.g., loss of maternal care) influence the physiological function of African elephants and ultimately their fitness and survival.

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

Chronic stress has been associated with reduced immunity leading to increased susceptibility to diseases. As a result of this, the next phase of the project will involve undertaking immunological study to understand how land use change and climate change (i.e., prolonged drought) affect the immunological function of African elephants within the study system and assist in the enhancement of protection status of the species. This will guide in habitat restoration across the land use mosaic.

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

Although we did not use the logo of The Rufford Foundation, we acknowledged the financial support of The Rufford Foundation in our manuscript (soon to be published) which result in publicity of the organisation sponsoring the study.

9. Provide a full list of all the members of your team and their role in the project.
The following individuals were involved in the project:

Sandy Oduor: Sandy was the principal investigator of the study and he coordinated the implementation of the study.

Dr. Jenna Parker: Dr. Jenna Parker assisted with analysis of the results for preparation of the manuscript draft and also received a training on laboratory analysis from the project.

Ephantus Wambui: Ephantus assisted the team in processing the samples collected from the field at the Endocrinology Laboratory at Mpala Research Centre.

Meshack Lengees: Meshack assisted the team with sample collection at Sera Wildlife Conservancy where the orphaned elephants were released.

Ms. Clarine Kigoli: Ms. Clarine assisted the team with ensuring that collars form the crop raiding bulls were reporting on time and any technical hitches were resolved on time to help locate the elephants for sample collection.

10. Any other comments?

I would like to take this opportunity to immensely thank The Rufford Foundation for awarding me this 3rd phase of funding which has supported part of my PhD work. Publications emanating from this study will be shared with The Rufford Foundation and their financial support acknowledged.