

Final Evaluation Report

Your Details	
Full Name	Matana Levi
Project Title	Giraffe Foraging Ecology in Tarangire Manyara Ecosystem, Tanzania
Application ID	267341
Grant Amount	5000 Pounds
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Date of this Report	10 February 2020

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
To quantify the third and fourth-order resource selection by giraffes in the Tarangire Manyara Ecosystem				We used the scanning method along with random and systematic vegetation sampling to quantify the use-available resources. Results revealed that giraffes showed a strong preference towards some woody forage species while avoiding others in both home ranges and landscape scales. We identified 118 woody plant species where 38 forage species were selected for food in the study area. So far, we completed analysing data and writing the manuscript, and findings will be published soon.
To quantify the potential importance of <i>D. cinerea</i> as a forage species in the Tarangire Manyara Ecosystem				We also quantified <i>D. cinerea</i> forage observations and compared them with available proportions together with other forage species. <i>D. cinerea</i> was the most frequently used forage species.
To determine the seasonal habitat selection and foraging preference of giraffes in a large, heterogeneous landscape				The selection of forage species also varied considerably across the seasons. During the dry season, the abundance of some most preferred forage species like <i>Dichrostachys cinerea</i> and <i>Acacia tortilis</i> declined and sometimes were not available in some areas. Meanwhile, giraffes were unsurprisingly selecting another palatable forage even if they were not preferred.
Conservation Education				I organised some events and meetings with managers and shared with them the information regarding their area. I also visited secondary and primary schools around Tarangire Manyara Ecosystem in an attempt to raise community awareness on issues pertained to wildlife conservation while communicating our research findings.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

i) The landscape terrain, the Tarangire Manyara ecosystem, has many rivers flowing in and out of the protected areas. These rivers often cause floods and sometimes blocking ways around. Many areas in the ecosystem are made up of clay soil making it muddy and impassable as the rain progress. Around this time, we were obligated to start searching giraffe groups within accessible areas then visited these areas as they become passable.

ii) Thickets and waterlogged areas; project activities entailed the quantification of forage availability across the entire landscape in order to obtain availability data. Conversely, some portions of the ecosystem were not assessed especially those with thick vegetation especially the southern part. During the wet season, several parts of the Tarangire Manyara landscape were out of reach hence confining the scope of our study. Based on the proposed method, giraffes foraging patterns were recorded using instantaneous scanning sampling, where one group was followed for 2 hours of records. Though we occasionally terminated behavioural observations after a group entered thick and impenetrable vegetation, which leads to difficulty sighting and navigating the seldom-used routes, thus reducing times of records and consequently affecting group forage use estimates.

iii) Interferences by tourists; some parts of the Tarangire Manyara Ecosystem received a large number of tourists throughout the year. Visitors in protected areas occasionally influenced giraffe behavioural changes hence affecting animal foraging patterns. As a consequence, we paused forage records then proceeded when herd members were calm and comfortable.

IV) Presence of aggressive animals. Sometimes it was not easy assessing forage availability, which required one to drop down from the car, establish transect and lay plots. In such circumstance we were forced to mark the areas then come back on the next day any time around when such animals were not around

3. Briefly describe the three most important outcomes of your project.

i) Provision of landscape baseline information; we have managed to generate baseline information on the current woody plant availability and their use by the giraffe. Such information will act as prerequisites for assessment and monitoring of habitat change and their associated challenges for effective biodiversity conservation in the future.

ii) Better understanding about the role of bush encroachers on giraffe foraging ecology; Based on study findings, we now understand the role played by rapidly expanding bush encroachers like *D. cinerea* as potential forages for giraffes in TME. For example, *D. cinerea* was the most frequently foraged species in the ecosystem, suggesting such species to have been contributing substantially to animal diet. Formerly this encroacher was termed as aggressive, threatening wild herbivore populations.

iii) Conservation awareness campaigns; since this programme started, we have been able to conduct seminars and meetings with stakeholders. Besides, we have been and will continue using social media to address the potential impact of our research findings, which we trust would adequately instil community consciousness and political attention on issues related to wildlife conservation. We believe these outreach programmes have raised community readiness in supporting conservation initiatives in place.

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

The project ensured active participation of local people during fieldwork and outreach programmes, these entailed local pastoral and agricultural communities some of whom were directly employed in different field activities. Besides, I have worked with about six field assistants, three drivers, several village game scouts who were offered training on the use of field gear, e.g., GPS, binoculars and the tape measure. Field research assistants and game scouts/rangers were also trained on resource assessment techniques and plant identification. I am sure that the skills they gained will be very useful for any related project in the future.

5. Are there any plans to continue this work?

Certainly, I have plans to continue monitoring foraging behaviour and savannah habitat changes over a relatively long period of time. Based on the fact that studies on foraging ecology in landscape-scale requires enough time for foraging observations to adequately capture potential population aspects. Tarangire Manyara ecosystem being a large and partially connected landscape that saves as connected sub-populations where giraffes roam with seasonal patterns and considering the current rapid encroachment by woody species leading into ungulate's population dynamics. TME needs long term resources to use available assessment programme to be able to predict the trend and effects of habitat changes. Although we have managed to generate baseline information on forage availability and their use by giraffes at present, there's still a lot to do with regard to temporal resource assessments in order to understand the rate of habitat changes and their potential impacts to livestock and wildlife considering their impacts to wild and domestic grazers.

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

So far, I have personally met with managers and shared with them our research finding along with conducting verbal presentations to academicians, pupils, students and conservation stakeholders. I have also completed composing manuscripts for publishing in peer-reviewed journals (e.g. American Journal of Mammalogy). I have also shared some of the conservation posts in social media, e.g., WhatsApp groups, Facebook, Twitter, LinkedIn, and Instagram. Some information was disseminated through our outreach programme. Likewise, more efforts will be put to disseminate our research findings to government and non-governmental conservation agencies for conservation intervention.

7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?

The project's actual length was 12 months. I have used the amount granted within 13 months with an addition of 1 more month for conservation education to the planned project period. There were also monthly shifts in project implementation activities from time to time. I have already accomplished all the core project activities, these included collection of field data, analysing data along with composing the manuscript for publication, as well as the conservation outreach program.

8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Transport (Car & Driver)	£3200	£3627	+427	The difference was added to the budgeted amount of £ 3200 to sufficient cover because the car was hired at much expensive coast than estimated
Binocular	£200	£151	-49	
GPS	£200	£403	+203	I purchased GPSMAP 66S for 1200000 Tsh which is higher than the budgeted amount the extra amount was added from other sources
Stationary	£150	£150		Spent as budgeted
Botanist	£150	£504	+354	3days were not enough for plant identification, so I spent more days with the botanist in the field. The amount exceeded were added from other sources
Food & Accommodation	£800	£672	-128	Spent as budgeted
Conservation Education	£300	£300		Spent as budgeted
Total	£5000	£5806	+807	The extra amount (807) was added from other sources

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

The ending of our research project marks the beginning of many other aspects that were not wholly addressed during our project period, mainly due to time and financial constraints. Following our outstanding results, we look forward to doing the following actions:

1. Introducing long term resource use-availability study in order to measure the rate of expansion of woody vegetation and assessing their long-term impacts on wild browsers and grazers.
2. Evaluate wildlife-livestock resource competition and their co-existence to be able to propose the best rangeland management practices that consider both conservation and community interests.
3. Propose best rangeland management practices established for equitable management and sharing of economic benefits from wildlife conservation and domestic animals owned by communities surrounding the entire ecosystem.
4. Embarking on long term conservation education outreach programme to raise community awareness and consequently build strong liaison between managers and the surrounding communities, putting in place a network of new community-managers relationship.
5. Active involvement in the implementation of our result-based conservation initiatives through collaboration with government and non-governmental organisations or any other conservation stakeholders.

10. 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?

Rufford Foundation logo was used in different presentations in and out of our institution, during awareness programme campaigns, meetings, and seminars. Besides, we will also continue using already made posters with the Rufford logo while sharing our project funding through social media.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

Prof. Anna C. Treydte (Researcher Professor of the Biodiversity Conservation and Ecosystem Management). She is the principal master's supervisor, and her role was to oversee the successful completion of this project, including timely reporting to the Rufford Foundation.

Dr. Derek E. Lee (Co-supervisor). Principle scientist and researcher at Wild Nature Institute. He has also conducted several giraffe studies in Tarangire National Park. He was a potential adviser and advised me on how to effectively carry out various activities regarding giraffe studies and how to implement and achieve stated goals.

Monica Bond. Researcher at Wild Nature Institute. She has been conducting researches on giraffe for about ten years in Tarangire Nation Park, Tanzania. She advised me on how to carry out the field project activities effectively

The Wild Nature Institute. This played an important part in provide technical advice and logistics. The institute advised me on how to monitor and evaluate the project expected outcomes

The Park Ecologist, Tarangire National Park and Park Management Office, Manyara ranch manager, and Randilen WMA Manager. We worked together to ensure the effective implementation of the best rangeland management practices and restorations of the Tarangire Savanna Landscape.

12. Any other comments?

I am appreciative of the Rufford Foundation for the financial support for my master's research that enabled me to investigate woody forage availability and giraffe foraging ecology in the Tarangire Manyara Ecosystem, Tanzania. Through your support, we have generated a list of potential forage species across the landscape. We further identified the preferred and avoided forage species across the landscape. Our findings may be used as a start-up point for further in-depth studies and as monitoring tools in the future. The information available is critical towards the formation of best management practices for giraffe conservation. Though there is still a need for further in-depth studies, 1-year period was not enough for animal forage observations in a large and heterogeneous landscape. I, therefore, recommend for a long-term and comprehensive resources use-available assessment study be conducted in this human-influenced landscape to accurately address the impacts associated with woody expansion to both wild and domestic browsers and grazers.



Left: Matana Levi responding to pupil's question at Makuyuni Primary School. Right: With Head Teacher for Makuyuni Primary School.



Left: Poster presentation at Mswakini Chini Primary School. Right: Matana Levi Monduri District Natural Resources Managers.



Left: Matana Levi with Head Mistress, Mswakini Juu Primary School. Right: Group image at Mswakini Juu Primary School.



Matana Levi in discussion with Randilen WMA Manager.



Group pictures at Lowasa Secondary School.



Left: Mr. Magra, Randilen WMA VGS (and as an Assistant) at Makuyuni Primary School. Right: Matana Levi discussing something with Manyara Ranch Manager.