

The Rufford Foundation Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Sood Athumani Ndimuligo
Project title	Status of savannah chimpanzees (<i>Pan troglodytes</i>) in western Tanzania
RSG reference	14853-1
Reporting period	Final Report
Amount of grant	£5591
Your email address	Soodndimuligo6@gmail.com
Date of this report	Nov, 19, 2015

1. Please 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 estimate chimpanzee population size and density.			Yes	Faecal samples (300) have been collected, plan to ship them to Oslo are underway through Tanzanian responsible organ for wildlife research.
To understand chimpanzee genetic population structure and gene flow.			Yes	
To explore the role that ecological and geographical barriers may have played in separating chimpanzee subpopulations.		Yes		In each site the rivers, do not form a real barrier as in dry season water become low exposing rocks for chimpanzees to cross. Thus, may be able to see patterns that limit frequent movements upon long sequencing.
To increase our understanding of chimpanzee ranging patterns and home range sizes in savanna woodlands.			YES	
To reconstruct chimpanzee historical distribution and to document their current distribution.	Yes			Interviews not conducted at all, as local communities are sensitive on chimpanzee questions: with fear that saying yes to their presence entails relocation. This is a question for future investigation. Will respond to this using marxent model on suitable habitats and distribution.
To measure the spatial-temporal availability of chimpanzee resources (plant foods, water and nesting trees).			Yes	
To determine how such resource availability influences chimpanzee movements over the landscape.			Yes	

To contribute to a better understanding of chimpanzee nesting behaviour (including preferences for nesting trees and sites) in savanna woodlands.			Yes	
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

During the project period the following were the major unforeseen difficulties. 1. Chimpanzee hunting for zoo purposes by a person from the University of Sokoine of Agriculture with an authorized permit entered my study site to capture a male chimpanzee. This attempt happened despite of the noise to the relevant organs responsible for Wildlife research and a central Government in a group of organizations interested in chimpanzee conservation based in western Tanzania (The Jane Goodall Institute, Tanzania, Frankfort Zoological Society, in Tanzania and me). This action disrupted the study species because the study community of chimpanzees are unhabituated and not used to such large group of people closer to them. Chimpanzees could not nest in the area as are unhabituated. This led to delays in data collection on samples, and nesting for about two and half months without finding an animal or nest. Thus, I resolved this by extending data collection period from the site to obtain comparable data sets between the two sites. 2. Study design of monitoring two distant sites (south Masito and south Ugalla), this imposed an increase in costs as three proposed field assistants were not possible in a sense of leaving one person on each site as I move with one assistant between the sites. This resulted into increase in hiring two more assistants. The associated reasons are the presence of lions and leopards in the south Ugalla, thus walking or staying alone is dangerous, also in the south masito too. Increase of assistants made it possible to continue collecting faecal samples when I am in another patch or doing some other project activities in the same site. 3. Time of planning the field work and execution were different. This case resulted into increasing unit costs in terms of salaries from original plan during application to respond to real ground situation to enable smooth data collection and having on site team collecting phenology and faecal data, taking care of weather stations as well as other project equipment.

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

In this study the following are major outcomes that can be stated now:

- a) The project has discovered a new behaviour that was not known yet in the region. Savanna chimpanzees were observed cracking Strychnos fruits against tree branches to success and ate the seeds from the fruits. This was not yet known in western Tanzania savanna habitats. Thus, indicating some shared behaviour to ones in Uganda as eastern ape species. I will publish this as a research report article.
- b) I have been able to discover behaviour of savanna chimpanzee adaptation in dry habitat that is shared with eastern chimpanzees of Uganda yet unique to western Tanzania of well digging for water. Chimpanzees in Simulike, Uganda do so too, but unique as in western Tanzania chimpanzees use folded leaves (wadges) to drink the water from wells dug and

were not reported in Tanzania before. This will be published soon as an independent research report article.

- c) Preliminary data analyses of 540 nests characteristics, refutes theories such as: nesting may serve as anti-predatory by nesting far away from trunk, in this study this is not correct probably each habitat is different though the presence of escape routes existed in 65% of nests yet 42% of nests were closer to tree trunk opposite to other studies in Issa, Ugalla (Ogawa et al., 2013) located about 60 km away from this site. In addition, 95% of nests formation used one tree that would provide potential for escape to nearest tree. These differences on the theories may be due to cultural difference in other habitats because more trees would render escape lines or vegetation structure is different thus the theory may not be a general rule to all habitats.

Furthermore, the study reveals that the comfortability theory that chimpanzees would nest in places with tree cover to prevent from rain or storms did not positively show as 35% of nests were in places without vegetation cover above them. Other factors may be responsible for the variations such as: tree crown diameter, size of a tree used for nesting and preference for higher top of tree nesting than under cover of same tree or the nearest trees.

However, the data indicates higher support to other resource based theories: i) Water proximity is published to attract chimpanzee nests so is the evergreen forest that occur in valleys for savannah habitats. In this case there were more nests near water and forests (33% of nests) similar to other studies, ii) Nest location to food sources also is supported by the data, as most nests were located between 0-5 m (39%) and 6-10 (33%) implying that the distance between 0-10 m contributed 72% of all nests.

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

Local communities adjacent to the project have participated by obtaining employment to the project for the time of field work. Further, these community members have been able to receive salaries from the Principle Investigator too. The project employed eight Tanzanian local community members, trained them on how to collect data on phenology, faecal samples, preservation of samples, seed identification from faecal samples to identify food eaten, collection and fixing of plant specimens on site for identification later, as well as recording of nest and trees characteristics as we work together and respond to their questions why I do what I am doing to each nest.

5. Are there any plans to continue this work?

Yes! Following the observations on some behaviour in the field, I am thrilled to continue investigating on: First, refugia sites that chimpanzees use during the peak of dry period and what do they follow in such new areas? An example is that while working in the region a male chimpanzee was observed near human settlements feeding and sleeping in cultivated areas. It fed on pawpaw fruits and some *Ficus* fruits and had no fear at all. My thinking was probably humans have entered their historical ranges, or the disturbance is not yet very serious for the chimpanzees to vanish by moving to nearby forested landscape. This would entail landscape dynamics and the level of human pressure has negative effects to ape populations. I also have observed, well digging in the area though similar to other sites like Simulike, Uganda yet is new to the region and its use of leaves in wadges form. Thus following this behaviour over larger area in dry season may reveal how early

hominids adapted to such dry habitats and or indicate migration on prolonged dry period when coupled with weather data the effect of climate change and or migration to new areas as coping strategies are significant findings to human evolution models of early hominid. Furthermore, I found feeding on a younger plant (an herb) by removing the outer cover and feed on succulent stem inner part that is reach in water, this was in dry season; yet do not feed on adult plant stem which is harder and no water contained. I am investigating on the species identification to follow its biology. This study on such plants distribution and use by chimpanzees may yield a way on adapting to dry conditions when water is dry in the streams, while rivers are far as well as associated by many predators like lions that are many by foot prints in the area.

Second, is to investigate the role of rivers in the region on long term population dynamics using DNA. This is because water levels reduce and allow movements in some parts of the rivers. For example Piel et al., (2013) reported on such a crossing along Malagarasi River that was thought as a limit to northern migration from south. Landscape DNA study may reveal the patterns in genetics to entail focusing on conserving landscapes than current focal region. The area in western Tanzania is larger with rivers forming networks. Thus, studying small portion may not help conservation managers to understand well what is going on in a wider picture. For example, from Lake Tanganyika Moreau, (1945) reported the distribution to reach 14 miles from this lake, Kano (1971, 1972) detailed the distribution of chimpanzees in western Tanzania, yet the role of wider dispersal and rivers were not yet taken into account. I have made preliminary observations, that there are some chimpanzees beyond study sites that have not been found and studied. I will reach the sites to establish initial research pilot before leaving the area. In connection to the visit, I will publish a new distribution since it falls beyond known areas by the early researchers like Moreau (1945) and Kano (1971, 1972).

Third, I plan to study the effects of post Congolese refugees in western Tanzania and its implications to long term ape conservation. While in the field, I have been able to meet local community members and their reports entails danger in future with respect to food preferences. Tanzanians are known to avoid feeding all primate related species while Congolese are not restricted to this at all as they feed on most apes including chimpanzees. In the region I have been working, this behaviour is changing or has changed earlier before we noticed. Local Tanzanians, to date feed on primate species like baboons, monkeys not yet heard of chimpanzees. I thus plan to investigate the evolution, drivers and implications to chimpanzees as other primate species decline in the region. Conservation managers may need to provide sources of meat if is a question of higher prices in the market for cattle, goats, sheep and chicken to reduce or eliminate this behaviour. The behaviour is now prominent in villages along the lake providing some indications on cross-cultures from Congo.

Fourth, I am interested in furthering community conservation to communities adjacent to chimpanzee habitats on the danger of feeding on chimpanzee related species like monkeys and baboons. These species are known to be the source of ongoing human-pandemic HIV, as read in HIV in Africa to be related with hunting and feeding on primate species. However, this project needs careful design so that we do not induce fear to people that every place with chimpanzees or other primates are in danger. This may cause population decline due to hunting to eliminate the apes in the area.

Finally, another study would be to examine the currently known theory that nesting serves as anti-predatory. Meaning that nests are located away from a trunk to enable escape from predators, higher up in a tree and slopes as well as riverine forests (evergreen due to streams) where there many trees to avoid predation because of potential escape route. This study would provide insights

on: predator species, predator density, and other nocturnal species in relation to nest locations. I hypothesize that places with higher predator density will have no nests and the opposite is true. I propose that, chimpanzee nesting may be responding to tree structures and distribution than predators as their densities may not be higher in the area. I already have a collaborator on Four Camera to set this project only funding the field work and a Masters student to keep an eye while I supervise the work in the field.

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

Yes! I plan to share these results by: (i) Publishing in scientific journals four to five papers on (a) Chimpanzees nest characteristics in savannah woodland, Tanzania, (b) Chimpanzees nesting tree characteristics in savannah woodland, Tanzania (c) Comparative study of vegetation in Chimpanzee habitats in Tanzania (d) Suitable Chimpanzee habitats distribution in Tanzania and (e) Chimpanzees population size in savannah woodland, Tanzania; (ii) Publish Research Reports on: (a) Well digging and tool use in water drinking by savannah chimpanzees of western Tanzania, (b) Savanna woodland chimpanzees termite fishing and tool use in western Tanzania, (c) Savanna chimpanzees tool use in Strychnos fruits opening in western Tanzania, (d) Savanna chimpanzees transport of food materials to sleeping sites: An archaeological model for early hominid and (e) Savanna chimpanzees adaptation to dry habitats in western Tanzania; (iii) provide a 2-hour talk at the Jane Goodall Institute on 20th December 2015 on what my work has found, what need to be included in the next year's plans that enhance improved ape conservation and other biodiversity therein. This lecture shall detail mainly on what were the preliminary findings from the first 540 nests, observed habitat conditions, human disturbances and need for immediate actions such as patrols to limit the growing hunting as well as cattle grazing that spread people in the habitat, cause diseases to apes not used to such and a wider perspective on models of educating local communities through Roots and Shoots Program of the Jane Goodall Institute.

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

The project period was 16 months. The common length would have been 12 months only an excess time of 4 months.

8. Budget: Please 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.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Salaries for field assistants	1392	3418	2026	Difference in time of planning and the field conditions (presence of predators in the site and changes in living by locals) resulted into increasing number of assistants and salaries thus increased. I managed working through by adding Quota Scheme fund for my subsistence to complete the data cycle for the two sites for better comparison.

Technical Equipment	3518	1185	2333	I planned for more technical equipment to be bought in Tanzania. Later I realized not to be present so had to start buying from USA, UK using available fund from Quota Scheme for my subsistence. Thus, cheap though transport to Tanzania needed more care and hence paid some fees. I therefore used this grant for supporting data collection by paying assistants in Tanzanian shillings. Furthermore, I received two weather stations from a one of the Post doc researchers at the University of Oslo for free then will return them in January when I return to the University, this also aided some reduced costs. Another Clinometer was given to me by the Jane Goodall Institute, Tanzania.
Botanical survey by a Professional botanist	696	947	251	Botanical surveys in the riverine forest (along rivers or streams) increased number of days for sampling three kilometres on each transect as it took 3 days in such habitats than woodlands. Thus, days increased over the planned costs. Second the herbarium work to identify specimens at the University of Dar es Salaam required payments to support the Botanist while doing my work
Total	5591.98	5550	41	

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

Important steps include but not limited to: (i) continue collaborations with on the ground conservation practitioners to protect the area before is too late using wider approaches, (ii) provide information to managers on what have featured in the area to act immediately such as hunting and cattle spreading in the area, (iii) Continue to collaborate with financing organs to undertake regional and landscape studies that provide important conservation approaches to enhance long term conservation in western Tanzania, and (iv) Highlight importance of local communities as a hindrance to ape conservation. This is because humans living adjacent to these areas are important organs of changes that need to be considered for achievable conservation before is too late.

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

I am going to use the logo on the materials to be produced through the Roots and Shoots Program that foster environmental stewardships to young people in primary schools and secondary schools. Also, in the lecture planned on 20th December 2015 at the Jane Goodall Institute, Tanzania in Kigoma.

11. Any other comments?

First, managing chimpanzee populations in western Tanzania requires a multifaceted approach such as conservationists, researchers and communities. The reasons being: the area is very large, about 6000 km² connected well to along chimpanzee movements due to least human population around and inside the habitat. Thus working collectively managers and researchers to improve its conservation status as well as the health have several merits: it is a home to other biodiversity at all levels, home to huge watersheds that feed most rivers and the Lake Tanganyika that supports life of millions of people through fishing and water for life.

Second, wide considerations of promoting human benefits to indicate the role of forested areas near them is important. Current situation entails conflicts, frictions and incompatible resource use being it land, or wood resources. Promoting resource delineation at different locations can reduce conflicts and promote cooperation between local communities and managers as this land is not a protected area by now.