

## The Rufford Small Grants Foundation

### Final Report

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

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. 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. 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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

<b>Grant Recipient Details</b>	
<b>Your name</b>	Armino da Silva
<b>Project title</b>	Integrated geodatabase for rainfall variability adaptation and long term elephant conservation in semi-arid rangelands of Mozambique Central Ecosystem
<b>RSG reference</b>	8885-2
<b>Reporting period</b>	February 2011-February 2012
<b>Amount of grant</b>	£6000
<b>Your email address</b>	<a href="mailto:ndo.silva@yahoo.com">ndo.silva@yahoo.com</a>
<b>Date of this report</b>	22 February 2012

**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
1-map inter-annual rainfall variability pattern from 1960 to 2010			↗	Conventional data were acquired but are affected by lack of consistency. Remote sensing data has deeply covered this gap. This parameter does not directly affect the inter-relationship between human, elephant and habitats. However, rainfall variability impact on human, elephant and habitats was fully evaluated by means of soil water sampling along differential gradients.
2- determine soil water availability variation along different land-based livelihoods, soil textures, elephant rangelands, altitudinal and rainfall gradients			↗	We sampled and mapped soil water in 2011. We correlated soil water with monthly rainfall to serve as baseline data for monitoring the impact of rainfall fluctuations on biodiversity and land uses. This is ensured by long term soil sampling data. To minimise this issue we have collected satellite images of different temporal resolution and computed Normalized Difference Vegetation Index (NDVI). NDVI of 2011 was correlated with soil water of 2011 and from this we predicted soil water values for different NDVI values and periods/spaces.
3- estimate the spatial-scale land-based livelihoods and biodiversity patterns (rangelands and mammals)			↗	The use of Enumeration Areas (EAs) supported by Global Positioning System (GPS) and Systematic Sampling is a good strategy for questionnaire survey. Participatory mapping based on georeferenced maps and aided by transects and quadrats of different sizes minimise the costs of surveying large geographic areas and deliver consistent results at different scales.
4- estimate the spatial scale rainfall (soil water) and land-based livelihoods interrelationship variability			↗	It was very interesting to discover how indigenous people manage to survive under rainfall stress. To which extent their land-based livelihoods influenced the patterns of soil water distribution and how this affects rangeland loss.
5- aid to explain to which ecologically threshold forage pattern varies in			↗	The complexity of this objective urged us to survey elephant rangelands (extent, productivity, abundance and richness). Added to this we took records of goats

response to rainfall (soil water) variability and how wildlife should sustainable adapt to it				sharing the rangelands with elephant. In the future we will take records of elephant dung to complement this activity. It was amazing to know that if one day we handle enough water to Indigenous people of semi-arid rangelands and without any regulation; they will intensify the extent of their land based livelihoods resulting on loss of elephant rangeland. "without water no life". More water implies more diversity of rangelands. Semi-arid rangelands development strictly depends on water availability. However, at which standard water is beneficial for both elephant rangeland and indigenous people?
6-raise community awareness on innovative rangeland adaptation tools and water management tools			↗	We have learnt from indigenous people. Our talk to them was a source of discussion on drought and elephant concerns. Our advice was perfectly received by the community and we hope to practically implement the outcomes of the talks and this research
7-design a spatial model (system) adapted to meet the climatic variation, livelihoods needs and long term elephant conservation			↗	On each site and at particularly rainfall intensity (soil water availability) it is known what the indigenous people and at which extent it should be done in order to satisfy their aspirations and avoid damaging elephant rangelands. These alternatives are integrated and dynamic.

**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

It was our second project phase. The knowledge of the study area from previous projects has greatly helped us during the planning phase and no unexpected difficulties were encountered in the field, unless the inconsistency of conventional rainfall data, which was mitigated by remote sensing data and soil water sampling in the field.

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

1-Introduction of goats in semi-arid rangelands is a tool for ensuring elephant conservation in the context of drought and ever never seen human demographic numbers every moment worried on satisfying their food security and financial issues. Clearly, farmers owning goats were economically

progress-driven (US\$1144 -US\$4386) better than those only based on crops (US\$0-US\$149) and tended to invest more in soil-water-elephant conservation (SWEC) practices than others.

2- The diversity of plants ate by elephant in areas grazed by goats was higher (>32 spp./sq km) than these of cropping areas (<8 spp./sq km), indicating the scope of areas grazed by goats had more soil water content when compared to cropping areas.

Further, coarse surfaces grazed by goats represented 3.33% of wetness indicating a possibility of draining large amount of rainwater due to large pores. As a result low elephant range richness was documented and drought was severe. In the same scale, fine surfaces grazed by goats represented not more than 12.74% of soil wetness and the presence of higher elephant range richness did not only indicate the potentiality for beekeeping but also they can be used for compressed blocks.

Slight differences were depicted between goats grazing on shallow sandy soils (coarse surfaces) which had weighted less (10.425 kg at average age of 10 months) compared to these of clay soils (fine surfaces) (11.660 kg at mean age of 6 months), indicating the scope of sandy clay/clay sandy soils when wisely managed are potential resource for poverty alleviation and biodiversity conservation.

3- Even when rainfall was equally distributed along the year, differences on soil texture and organic matter content should strongly determine the future of land based livelihoods and elephant conservation in semi-arid rangelands. For that reason, shallow sandy surfaces denoted less water (>5 %) relatively to sandy clay/clay sandy and loam sandy (up to 12.74 %). Differences on soil water availability do not entail diversification of land uses and their management. Such luck of diversification might be due to traditional habits and attitudes of Nyungue, Xtonga and Csicena. Local feeding habits/attitudes strongly affect land use decisions and consequently the soil and water management practices, which affect organic matter availability that facilitates vegetation establishment and consequently the diversity of elephant rangeland. Thus, habitat loss is related to bearing feeding habits and attitudes.

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

Participatory mapping required constant contact with communities by means of public meetings. From these meetings villagers expressed their worries such as 1) drought devastating *Zea mays* and *Arachis hypogaea*; 2) crocodile killing cattle during wet season; 3) massive loss of *Adansonia digitata* due to uncontrolled fire and 3) land uses expanding on elephant corridors which have resulted on severe human-elephant conflict (HEC). Such worries where plotted on a village georeferenced map and with aid of local guiders the spatial indigenous knowledge was validated in the field. After a public meeting and guiding activities, meanings of acknowledgment were given to them including sugar (1 kg per household) and guiding fee (US\$8). Added to this the camping site and inherent services were paid (US\$5/day). Ancestral recognition fee before entering in the bush was made by 5l of wine (US\$12.5). Added to this Enumerators were recruited from villagers ad trained on questionnaire administration. Bicycles were hired for transport in difficult areas to reach (US\$2/day).

#### **5. Are there any plans to continue this work?**

Yes!

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

We have the integrated geodatabase that anyone can request it anytime. Also we are disseminating our results near to District Directors of Agricultural Activities, Traditional Leaders and Villagers. Further we are planning a radio conference and participation in international conferences with topics related to rangeland management in the context of drought and agricultural pressure. The communities have also joined to our cause of birth by the Semi-Arid Rangelands Forum for Integrated Resources Management (SARFIRM) which recognises that out of agriculture alternative opportunities that tackle wildlife management can help on farmer's development and amend aridity indices.

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

Rufford Small Grant (RSG) was very crucial during 10 months. Compared to the anticipated length of the project, the RSG full covered the project needs.

## 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
Transport (vehicle hiring with a driver and fuel)	vehicle hiring (£188) Fuel (£0)	£1350 £ 987	-£1350 -£987	Covered by the costs of hiring GPS, which were provided by other National Project Partners, project risk money, tents hiring and satellite imagery grant
Participatory mapping and participatory workshops	£640	£640	0	-
Stipend for local enumerators	£1370	£1370	0	-
Stipend for local field guides	£133	£133	0	-
Stipend for research assistants	£312	£212	0	-
Stipend for a supervisor	£290	£290	0	-
Camping site fee	£16	£16	0	-
Flip chart and markers	£50	£50	0	-
Climate data and Results dissemination	£638 £0	£638 £ 288	0	
Satellite imagery	£551	£0	+£551	
GPS	£1037	£0	+£1037	
Risk	£185	£0	+£285	
Tents	£64	£0	+£64	
<b>TOTAL</b>	<b>£5974</b>	<b>£5974</b>	<b>0</b>	

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

The next steps consist of practical activities implementation in the field. Such activities will focus on best practices for semi-arid rangelands management. A map of best practices for each site in the contest of elephant conservation, land based livelihoods needs and drought management was generated. How the disaster should be changed into success will be our focus in the next steps. Thus, for ensuring these deals we honestly request the help from you all nature conservators. We are open for deeper collaboration.

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

Yes the RSGF logo was used in all materials produced from this project. I did publicity of the RSGF at University, maybe you can see an increase of students and lectures from Mozambique competing for this useful nature conservation grant. Also I did publicity to the members of Semi-Arid Forum in order they know to whom belong this initiative that means the patron of the think.

**11. Any other comments?**

On behalf of Elephant Project Conservation in Semi-Arid Rangelands, we would like to thank the Rufford Small Grants for supporting this project and the rest of the group for excellent performance you gave during this project. I would like also to thank all the readers who took the time to write in with feedback. My special grateful goes to Dear Jane Raymond, The RSG Trust Administrator and to Dear Josh Cole, The Grants Director by transparency on management of RSGF. Also I'd like to express my deep appreciation to the scientific committee that seriously judged our research project; please your comments were carefull handled during this research.

Lastly and very painful I acknowledge Mr. Ernesto E. Nombora by his effort that dedicated to the success of this project, but unfortunately God has named him very soon in the last 20 February 2012. Please Dear Nombora your soul rest in peace, I love you too much my pen friend. Where you gone send us insights for the best performance of the elephant project that we together started in Tanzania. Nombora I have no words to say Goodbye and your soul rest in peace. I feel a Gap of your friendship.