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. 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	James Herrera
Project title	The search for Sibree's dwarf lemur (*Cheirogaleus sibreei*) in southeast Madagascar
RSG reference	11809-1
Reporting period	August 2012 to February 2013
Amount of grant	£5755
Your email address	James.Herrera@stonybrook.edu
Date of this report	5th January 2014

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
Blaze trail to remote mountaintop in Ranomafana National Park, southeast Madagascar. Establish a base camp on Mt Maharira, survey transects and trap-lines			X	The mountain site where Sibree's dwarf lemur was suspected to occur, Mt Maharira, is extremely remote, more than 20 km deep in the forest of Ranomafana National Park. I established camp, created three transects and five trap-lines
Survey for dwarf lemurs			X	My team and I conducted 15 nocturnal surveys on each of the three transects to search for dwarf lemurs. We had only 10 sightings because the lemurs seemed to be very rare.
Trap for dwarf lemurs			X	My team and I set up to 50 traps per night to attempt to catch dwarf lemurs. While other nocturnal mammals were much more frequently captured (especially the closely related mouse lemurs, *Microcebus rufus*), we captured dwarf lemurs much more infrequently. We did however capture a total of 9 Sibree's dwarf lemurs as well as 12 Crossley's dwarf lemurs at Mt Maharira
Measure dwarf lemur morphometrics for comparison to published data on *C. sibreei*			X	We took 10 measurements of captured dwarf lemurs to compare to the literature and data provided by my collaborator, Dr Marina Blanco. We also photographed all animals to document pelage and female genital morphology, which is distinct in *C. sibreei*.
Compare data on dwarf lemurs from Mt Maharira to *C. sibreei* data from Tsinjoarivo, central Madagascar			X	I compared my morphometric and qualitative morphology data to those provided by Dr Blanco using multivariate statistics and qualitative assessments.
Find a new locality for *C. sibreei*			X	The multivariate morphometric data indicate that nine of the animals captured from Mt Maharira have similar head, snout, and body measurements to *C. sibreei* individuals

				captured at Tsinjoarivo. Further, five animals have the distinct female genital morphology documented from *C. sibreei* at Tsinjoarivo. Lastly, nine animals have the distinct pelage coloration that distinguishes *C. sibreei* from other dwarf lemur species. The other 12 individuals are much larger and had coloration patterns and the female genital morphology that match *C. crossleyi* and *C. major*. Thus, my preliminary results based on morphology indicate that I have indeed found *C. sibreei* at Mt Maharira in Ranomafana National Park. Further, *C. sibreei* appears to be sympatric with other eastern dwarf lemur species. This pattern was documented at Tsinjoarivo as well. Successfully establishing the presence of *C. sibreei* at Ranomafana is a huge range extension for the species, otherwise only known from a single site 260 km to the north. Ranomafana is also the only known national park protecting this critically endangered lemur.
Survey botany on Mt Maharira for comparison to rainforests on eastern foothills			X	With my Malagasy assistants, I inventoried tree species and measured habitat structure on all transects and trap-lines for comparison to previous data I collected in rainforests on the eastern foothills of Mt Maharira. The forest is completely different on top of Maharira compared to rainforests below the mountain; while rainforests to the east are highly diverse with large, tall trees, forests on Mt Maharira are monodominant with dry forest species, and forest structure is stunted with dense stands of small trees.
Share new information with local authorities			X	I have had meetings and presented my results with the local Madagascar National Parks director and the staff of the Centre ValBio research station to inform them that the animals captured at Mt Maharira are *C. sibreei*. They are

				excited to hear this news and to have the data shared with them. I also hosted MNP agents at my Maharira camp and they were able to observe first-hand the two dwarf lemur species present in the park.
Present results at international meetings		X		I presented the results of this research at the 2013 International Prosimian Congress, held at Ranomafana in August 2013. The attendants at the meeting included the greatest lemur scholars and experts on biodiversity in Madagascar. They were convinced and thrilled to hear that Sibree's dwarf lemur occurs in Ranomafana. I will continue to share this new information through presentations at scientific conferences, publication in journals, and presentations given to broad audiences such as at universities and public schools for young children.
Conduct genetic analysis to confirm species status and calculate metrics of genetic diversity	X			I am still currently in the field, exploring a new site outside of Ranomafana. This site has similar habitat characteristics to Mt Maharira and during my preliminary trapping mission I have also found Sibree's dwarf lemur. I will process the genetic samples in New York when I return from the field January 2014.

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

Just finding the way to Mt Maharira was exceptionally difficult. It took 2 weeks of trail blazing and navigating in the most remote forests of Ranomafana National Park to reach the summit of the mountain. Along the way, I also encountered illegal gold miners destroying a pristine river in the heart of the park. I rushed out of the forest to inform the national park service and local military who mounted an investigation and apprehended the gold miners. Gold mining has become a recent problem in the park and because of the remote locality it is hard to patrol such areas. By conducting research in these remote areas, I can help to monitor illegal activity in the park as well.

Working at Maharira long-term was extremely difficult because of how remote it was. I led 4-week expeditions to the mountain with my research team. Supplies for my team of 10 assistants would require up to 60 local people as porters to carry supplies to camp. I led five such expeditions, each growing larger and longer than the last until the final expedition in January.

Finally, the January expedition was cut short by a few days because a cyclone rolled into southeast Madagascar at the end of the month. Torrential rains led to heavy flooding and we had numerous large rivers to ford to get out of the forest. I have been in several cyclones in the past but this expedition was the most remote and getting out safe was a real miracle. Luckily and thanks to an emergency evacuation plan I had established, all 15 members of my team during this expedition and all 60 porters made it home safely.

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

The most important outcome is the confirmed discovery of Sibree's dwarf lemur in a protected area, approximately 260 km south of its only other known site, Tsinjoarivo. This species was thought to be extinct until it was reported from Tsinjoarivo in 2009. Tsinjoarivo is an unprotected forest fragment, suffering from continued logging and clearing for agriculture. Confirming Sibree's dwarf lemur presence in a protected area will be a huge aid to its conservation.

The second most important outcome of this study is discovering that the habitat on Mt Maharira is in stark contrast to the rest of Ranomafana National Park (RNP). While RNP is predominantly rainforest on eastern slopes, Mt Maharira contains elements of dry forest otherwise found in western Madagascar. The orography and topographic continuity of Mt Maharira with the western high plateau create a unique biome, isolated from other such forests by as much as 200 km. Having a better understanding of the habitat requirements for Sibree's dwarf lemur will help target further sites for survey and protection. For example, I used local maps as well as remote sensing and GIS to identify remaining forest similar to Mt Maharira. I targeted a forest north of RNP with similar topography and part of the central high plateau and have confirmed another site with Sibree's dwarf lemur. This site north of the park is currently under consideration for addition to the protected area system, and the presence of the critically endangered Sibree's dwarf lemur in the forest may tip the scale in favour of protection.

Lastly but equally important is that this study supported local rural communities bordering RNP. I hired up to 12 local villagers as guides and research assistants throughout this project and for many of them, this was the first time they earned a salary. I also hired a total of 100 different people for temporary work as porters to the field site. I bought food locally and from numerous different local people, spreading the economic aid as far as I could.

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

In my work around RNP, I always hire local people to help in research. I hire between three and six local people as research assistants for long-term work (6 – 20 months). I also have hired over 300 people for temporary work as porters, guides to remote locations, drivers, or to build research equipment. I also buy all my food locally; e.g., rice and beans, fruits, bananas (both for the team to eat and as bait for traps!) directly from farmers bordering the remote field sites. In fact, most of my Rufford Small Grant award was used for salaries to local people. These local communities otherwise do not have consistent income. The majority of the population lives below the poverty line – less than $1US per day. They report that they only earn between $5 and $10 per month from temporary work. During expeditions to Mt Maharira, each porter would make $10 in one day, and they would

frequently work as porters twice per month. Research assistants made up to $100 in one month. This was a huge economic boom for these rural communities.

In addition to economic benefits, I try to involve the local communities in biodiversity science and teach them about the values of biodiversity. I hold discussions in villages about my results and the non-use values of biodiversity, as well as the importance of conserving the forest for future use. I bring local school children for nature walks and have picnics at my camps. I give the children notebooks and pens and they take notes on the things we see and discuss, as well as draw pictures of the plants and animals they see and like. These activities are an enriching and educational experience for the children as well as for me.

5. Are there any plans to continue this work?

I plan to continue this work and am seeking funding from multiple sources to conduct further surveys. I received funding from the International Primatological Society to conduct another survey to Mt Maharira in October 2013. I also received support from Conservation International (Margot Marsh Biodiversity Fund) to survey similar habitats north of Ranomafana, outside the park limit. There still exist some remnants of similar forest type (high plateau forest) outside the park, but these forests are under heavy threat of deforestation. Currently, large tracks of forest, similar in composition to those in which Sibree's dwarf lemur was found, are being burned to clear land for pasture and agriculture. I have found a new population of Sibree's dwarf lemur outside the park and I am working with the local communities and land owners to protect the forest through community management. I train and hire local people from these different communities in research and monitoring techniques so that they can learn about the importance of biodiversity and have an economic benefit from research and hopefully this will deter further deforestation in the area. The local communities are also engaging in patrols for illegal activities such as gold mining and hardwood timbering, activities frequently done by migrants and not local landowners. Further, I want to start a reforestation programme in this region concentrating on the unique flora of the central high plateau. I started a similar programme in a region of rainforest, and so this new locality, which has many dry forest tree species, will focus on reforesting a different biome.

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

I presented these results in August for an international community of primatologists and experts in the field of lemur research during the 2013 International Prosimian Congress. After my presentation, I was invited to write my results up for a book being edited concerning lemur ecology and conservation, to be published in 2014. I will write the results for publication in journals such as Animal Conservation and Conservation Biology. More locally, I have presented my results for the Madagascar National Park local agents in Ranomafana, had frequent meetings with them about the diversity in the park as well as threats such as gold mining. I hosted MNP staff at my camp where we captured both types of dwarf lemurs so they could see the differences between the species and confirm with their own eyes the presence of this critically endangered lemur in the park. I bring local school children for nature walks in the forest to talk to them about the biodiversity in their backyards. I will create educational materials sharing basic findings on Sibree's dwarf lemur for the local national park service agents, the research station, and also go to schools in the rural communities to teach about lemur diversity and how important lemurs are for a healthy ecosystem.

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

I have been conducting this research between August 2012 and December 2013. From August 2012 to February 2013, I used RSG funds, as proposed in my Rufford request. I continue the work with funding from other sources, including a recent private donation.

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 CentreValBio research assistants	1514	1348	-166	The salaries for the Centre ValBio research assistants was lower than originally budgeted
local assistants	1363	1611	248	I hired more local assistants than initially planned to support the heavy workload these expeditions required and because CentreValBio assistant salaries were lower than budgeted. I trained all these assistants in methodology and provided them with stable income for 6 months.
Food on expeditions	2840	3248	408	Food prices were higher than during my expeditions in Ranomafana in 2011. Also we purchased more food than initially calculated because of the increased size of the team
NGO fees	38	81	43	fees increased for camping and logistics
Total	5755	6288	533	

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

I foresee development of this project in three main areas in the future. First, I will expand the survey area to include the unprotected forest corridor north of RNP, at Ampatsona. The forest of Ampatsona is continuous north of the park, allowing an unbroken link between populations inside and outside the protected area. Corridors provide routes for gene exchange as well as movement related to range shifts predicted due to climate change. The corridor north of the park has not been intensively surveyed for its biodiversity. I have begun preliminary surveying, including transect surveys for lemurs and botanical inventory, as well as lemur trapping. I have confirmed the presence of Sibree's dwarf lemur in this unprotected forest. The forest is heavily used, however, by local land owners as well as migrants involved in illegal activities. Slash-and-burn agriculture is the primary cause of deforestation in the area, practiced by the local land owners. The local people need new

improved agriculture techniques, such as terrace farming, to have a lower impact on the land and a more sustainable harvest. I want to bring agricultural technicians to the region to train people in sustainable agricultural practices and stop slash-and-burn agriculture from consuming the last remaining high plateau forests. Deforestation due to gold mining and harvesting precious hardwoods is due to migrants from far-off cities who are illegally exploiting the forest. The local population wants to evict these migrants, but they are also afraid because frequently the migrants are also bandits who steal cattle and household goods. I have begun working with the local people to clearly delineate their land and put plaques at main trails that access the forest, warning trespassers. I have also created an association of local police forces to patrol the forest, especially areas of heavy migrant traffic, to ameliorate further threats.

Secondly, I want to develop this project by initiating a community-managed protected area at Ampatsona. The local population have legal rights to the land, sanctioned with the government. I want to work with the land owners to create a protected area that balances the people's needs for natural resources and the need to conserve biodiversity. I will emphasise the ecosystem services the forest provides, especially water management. The forest of Ampatsona is a watershed for several major rivers that supply water to countless villages. Largely dependent on lowland paddy rice farming, the local people need clean water supplied by the forest to irrigate their farms. They understand the importance of the forest for their water supply and I want to emphasise this point in delineating key watersheds that should be preserved. Further, the local people in Ampatsona are highly dependent on the forest for natural resources such as timber and building materials, medicinal plants, and for grazing their livestock. Their non-agricultural uses of the forest are relatively low impact, and they recognize the rapid loss of forest as a problem for their livelihoods. Lastly, they are resentful that the forest is heavily exploited by migrant's gold-mining and cutting precious hardwood trees. They want to protect their forest from this outside threat. For these reasons, I believe a community-managed protected area will be an effective means to conserve the forest as well as the livelihoods of local populations. We are calling this project: "Ny alan'olona" – the people's forest.

Lastly, while the forest of Ampatsona is continuous with RNP to the south, it is broken and severally fragmented from other high plateau forests to the west. I want to protect the remaining highlands fragments from further loss as well as reforest the areas between fragments to reunite the last remaining highlands forests. Working with the local people to delineate their agricultural areas, I plan to clear fire breaks between active agricultural areas and the forest fragments. The fires due to slash-and-burn agriculture spread far above the farmers' planned agricultural plot into the forest interior, shrinking or eliminating the fragments. Constructing fire breaks will decrease forest loss due to uncontrolled fires and will also be an economic stimulus for local populations because I will hire landowners to clear the breaks. It will also reinforce the boundaries of "Ny alan'olona". In addition to fire breaks, I want to build tree nurseries in the villages of Ampatsona and conduct reforestation with native trees as well as fruit crops. I have started reforestation projects in remote areas in RNP in the past, and I have found that planting a mix of native trees and fruit trees is appealing to the landowners because they can harvest the fruits once the trees are mature. They are far less likely to burn the land because fruiting trees are killed by fire, unlike other non-native trees used in reforestation such as pine or eucalyptus. Protecting the remaining high plateau forest as well as promoting regeneration in degraded areas will ultimately conserve a species rich and endemic biota not found in other habitats in Madagascar.

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?

I did not use the RSGF logo in materials or presentations. However I did acknowledge funding from RSGF during my presentation at the International Prosimian Congress.

11. Any other comments?

I appreciate the project page on the Rufford website. Having my project description and contact information on the website allowed other researchers doing similar research to find me and correspond. Being in the field, I did not have internet access to keep the project page updated but I will create a final update for the end results of the project.