

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.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Fidisoa Rasambainarivo
Project title	Patterns of interactions and disease transmission between introduced and endemic carnivores in Betampona, Madagascar
RSG reference	17554-1
Reporting period	2015-2016
Amount of grant	£5 000
Your email address	f.rasambainarivo@gmail.com
Date of this report	June 26 2016

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
Interactions between introduced and endemic carnivores in the Betampona Natural Reserve			x	Using camera traps, we assessed the frequency and the nature of interaction between introduced, exotic carnivores such as dogs and cats and the endemic carnivores from the family Eupleridae. A manuscript regarding these results is being prepared and will be submitted for publication.
Evaluate the exposure of endemic and exotic carnivores to selected pathogens		x		We assessed the exposure of selected carnivores to pathogens commonly found in dogs and cats and that can spill over to endemic carnivores. We found that a large proportion of the sampled endemic carnivores (33%) were exposed to at least one pathogen. The small sample size (n=25) prevents us to complete advanced statistical analyses to identify risk factors. Further sampling and research is needed
Construct a transmission network		x		Using microbial genetics, we aimed to identify the route of transmission of a microbe between carnivores in Betampona. We were able to collect and culture microbes from faecal samples in endemic and exotic carnivores and the genetic analyses to determine the transmission network are ongoing.

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

No unforeseen difficulties arose during the project. Partial completion of the objectives is mainly due to the small sample size as a result of a low capture rate of animals.

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

This project allowed us to collect important information on how different species of carnivores interact and may transmit diseases to each other in a natural ecosystem of Madagascar.

First we were able to provide information about the frequency and distribution of interactions between exotic (dogs (*Canis familiaris*) and cats (*Felis* sp.)) and native carnivores (Eupleridae) in the Betampona Natural Reserve (BNR), Madagascar, using non-invasive camera trap surveys. We showed that domestic dogs were the most detected carnivore species within the BNR and we found that indirect interactions between exotic and native carnivores were frequent. These interactions were more likely to occur near the research station (Incidence rate ratio=0.91), which may constitute a disease transmission hotspot for carnivores at BNR.

Secondly, based on capture intervals of native and exotic carnivores, we demonstrate a strong potential for pathogen transmission such as the canine distemper virus, sarcoptic mange mite (*Sarcoptes scabiei*), and/or the canine parvovirus between exotic and endemic carnivores which may exert additional pressure on the endangered native carnivores.

Thirdly, using serological analyses, we showed that a large proportion of endemic carnivores (33%) are exposed to *Toxoplasma gondii*, a potentially fatal parasite in Eupleridae. This parasite can only be transmitted by cats and suggests disease spill-over from the introduced domestic cats to the native species of carnivores in Madagascar. Further analyses are needed to identify the impact of this pathogen on the endemic species of wildlife.

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

During our project we employed two guides from local communities. These guides were directly involved in all aspects of our project. We also conducted educational

campaign in villages regarding the health of domestic animals and performed free health examination of livestock during the project. Additionally, the PI was accompanied by a senior veterinary student from the University of Antananarivo, Madagascar which benefited from the experience of the PI in the field of conservation medicine. Finally the local communities received the results regarding the health of their domestic carnivores as well as information on diseases of relevance that may affect their animals in their area.

5. Are there any plans to continue this work?

Yes, we plan to continue this work and evaluate the health of a larger population of wild animals in order to identify the risk factors associated with exposure to certain pathogens and secondly we aim to identify and implement effective methods and measures to mitigate the impacts of exotic carnivore species on native wildlife and specifically the risks of disease transmission in Betampona. The measures that we are proposing to the Madagascar National Park, the managing agency of the protected areas and local communities aim at improving the health of domestic animals and limit the population of exotic species in the vicinity of the reserve.

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

We plan to share the results of this work by means of:

- A series of scientific publications in journals of relevance such as Ecohealth, Conservation Biology, Biological Conservation, etc. In addition, this work is part of the PI's thesis for his doctoral project and will be shared to the scientific community in the form of a PhD thesis.
- A series of conference and poster presentations in scientific conferences reports addressed to local authorities and collaborators
- Finally the results of this work will also be shared to local communities during community meetings.

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

Funds obtained from the RSG were all used in the field (From June to November 2015), which is in accordance to the anticipated length of the field. Funding from

other sources were used to perform the laboratory analyses From November 2015 to June 2016. The project is part of the PI's doctoral thesis and is on-going.

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
Airfare	953	953	0	RSGF fund was used to partially cover the airfare from the USA to Madagascar 1 USD=0.7 GBP
Transport to Betampona	195	212	7	RSGF fund was used to cover transportation fee of people and equipment to the field site 1 GBP= 4650 MGA (Ariary)
MacConkey Agar plates	175	207	32GBP	Exchange rate used 1USD=0.7 GBP Additional plates (n=2) were purchased compared to the first estimate.
Inoculating needles	40	23.1	+16.1 GBP	1 USD=0.7 GBP
Inoculating loop	18	23.1	-5 GBP	Exchange rate used 1USD=0.7 GBP
Food for 4 people for 150 days	2 400	2 418	-18 GBP	Food for four people at 75 000 MGA per day for 150 days Exchange rate used 1GBP=4 652 MGA
Local guides salary	1 170	1 170	0	Two people for 150 days each at 18 000 Ar/day Exchange rate used 1GBP=4 652 MGA
TOTAL	5 000	5018.1	-18 GBP	

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

We showed that a large proportion of endemic carnivores inhabiting the Betampona ecosystem are exposed to *Toxoplasma gondii*, a parasite that can be fatal for captive fosa (*Cryptoprocta ferox*). An important "next step" would try to determine the impact of this pathogen on the wild population of fosa and other Eupleridae.

Secondly, it would be important to monitor the exposure of exotic and endemic carnivores to common viruses and parasites in order to identify risk factors or the introduction of new diseases in the ecosystem.

Thirdly, it would be important to control the populations of exotic carnivores and improve the health of domestic animals inhabiting villages surrounding the Betampona Natural Reserve to limit the interactions and risks of disease transmission between species.

**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?**

We used the RSGF logo in presentation materials (PowerPoint) that were presented internally at the PI's University. The RSGF's contribution to this project is acknowledged in a manuscript that is being submitted for publication.

11. Any other comments?

We would like to once again thank the Rufford Small Grant Foundation for their important contribution to this project. We are looking forward to collaborating with the Rufford Small Grant Foundation again in the future.