

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	Jonathan Kolby
Project title	Investigation of Forest Canopies as Possible Safe Havens from Amphibian Chytrid Fungus (<i>Batrachochytrium dendrobatidis</i>): Hope in the Midst of a Global Amphibian Extinction Crisis.
RSG reference	54.05.08
Reporting period	08/06/09 to present
Amount of grant	£3549
Your email address	<u>J_kolby@hotmail.com</u>
Date of this report	31/01/10

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
Deploy vertical data logger arrays to monitor the environmental conditions inside arboreal bromeliads.			X	Canopy access rope climbing techniques used to climb to the necessary heights; quite challenging and exciting.
Radio-track endangered amphibians to determine behavioural patterns and the location of diurnal retreat sites.			X	The terrain was very demanding to work in at night, but working with a co-investigator (Merlin Jocque) made the work much safer and easier as a pair.
Conduct chytrid infections surveys of susceptible endangered species to determine infection prevalence.			X	No complications; went very well.

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

During this project, no unforeseen difficulties were encountered.

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

1. I have proven that arboreal and semi-arboreal amphibian species do not appear to be protected from *B. dendrobatidis* by the condition of arboreal water bodies, nor do they experience decreased exposure by avoiding infected terrestrial water sources. Therefore, arboreal amphibian species are indeed in danger from epidemics of amphibian chytrid fungus. Although these amphibians do not enter permanent water bodies, can be found any distance away from rivers, and obtain their moisture from the rainwater captured by bromeliads and other epiphytes, they are still being affected by *B. dendrobatidis*.
2. I have determined that environmental parameters believed to suppress the productivity of *B. dendrobatidis* in culture did not have the same effect on this pathogen in the natural environment. Even though laboratory studies have shown that *B. dendrobatidis* becomes inactive below pH 4, we have found infected amphibians in bromeliads where the pH dropped as low as pH 3.53.
3. I have collected baseline environmental and behavioural data for *Plectrohyla dasypus* and *Plectrohyla exquisita* which will be used to create captive husbandry guidelines in order to

save these species from extinction. Since neither of these critically endangered species has ever been maintained in captivity, I hope to establish the first amphibian conservation programme in Honduras to protect them from extinction caused by *B. dendrobatidis* by creating the first captive assurance populations. Husbandry guidelines for these species will be based on the information collected by our forest data loggers and radiotracking surveys. These guidelines will be provided to local Honduran students and scientists involved in the project. This project has not yet been awarded funding, but in the meantime, preparations continue.

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

5. Are there any plans to continue this work?

Yes, in order to address the emerging concerns produced by the results of this project, I wish to continue and expand this project. I have now discovered that this waterborne disease is somehow able to traverse dry land and even ascend into the rainforest canopy. In addition, during this non-aquatic dispersal, *B. dendrobatidis* was able to remain viable and virulent. Exactly how this is occurring remains an alarming mystery, but such processes would have major global conservation implications on future disease control and abatement. Therefore, my goal for summer 2010 is to reveal these enigmatic dispersal processes by quantifying the frequency of chytrid dispersal caused by four possible modes of locomotion: 1) amphibians; 2) arthropods (flying insects and aquatic crustaceans); 3) wind/rain; and 4) human locomotion/contaminated footwear. In addition, I will evaluate the risk of extinction faced by each of Cusuco National Park's 16 endangered and critically endangered amphibian species and determine priority actions necessary for successful future conservation efforts.

In addition, I hope to establish the first amphibian conservation programme in Honduras to protect the country's vulnerable amphibians from extinction. The programme would be based at a major Honduran university (Zamorano), where the Directors have already agreed to this project. The programme would encompass the construction of two biosecure amphibian rooms at the university, where several species of critically endangered amphibians from Cusuco would be maintained in captivity to prevent extinction and allow for future reintroduction programmes. I have not yet been able to secure funding for this project, but hope to obtain funding in late 2010.

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

The results of my work will be published in peer-reviewed journals and verbally communicated to the Honduran government. I have recently been informed by the Honduran government that my previous work will be used to guide the creation of future governmental monitoring programmes to help protect amphibians in other national parks within the country.

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

The RSG was used between 01/02/09- 20/12/09. The length of this project remained on schedule as anticipated.

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
<i>B. dendrobatidis</i> survey supplies (Swabs, ethanol, microcentrifuge tubes, nitrile gloves, and other consumables)	315	315		
Canopy access climbing equipment (work harness, carabineers, hand ascender, chest ascender, stop descender, grillon hook, etc.)	980	980		
Environmental data loggers, pH probes, temperature probes	1065	1065		
Amphibian radio telemetry equipment (antenna, receiver, miniature radiotransmitters)	1190	1190		
TOTAL	3550	3550		

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

I feel that it is now important to continue this project as previously described in an effort to explain and understand the observations we have made. Obviously, infected frogs and infected water can spread *B. dendrobatidis*, but that does not explain how it has been able to traverse terrestrial regions where there are wide gaps between amphibian populations and an absence of streams and rivers. I think the situation is a lot more complicated than we realize and that we must develop a better understanding of the full range of dispersal mechanism which *B. dendrobatidis* employs in order to address this biodiversity crisis on an international scale. The second phase of this project strives to accomplish this and will help the Honduran government make better decisions about how to reduce the impact of further *B. dendrobatidis* dispersal into other national parks with vulnerable amphibian species.

It is also important to publish our findings as soon as possible, so that other researchers can benefit from the significance of our findings. The goal of this work is not to only help Honduras, but also to help other countries which are facing the same declines in biodiversity due to *B. dendrobatidis*.

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 have not yet used the RSGF logo, but will use it in upcoming presentations which I am preparing to give about this project. The RSGF will also be properly acknowledged in all publications prepared from this work.

11. Any other comments?

I would again like to extend my sincere gratitude for the support which Rufford Small Grants provided for this project. This research was very challenging to execute and a wonderfully rewarding and successful experience. I hope to complete and submit a new application very soon to move this project forward in 2010 and continue to help combat the global amphibian extinction crisis.