

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 | Rodrigo Barbosa Ferreira |
| Project title | How do matrix-habitat types influence edge effects? Field study on bromeligenous frogs and ecological perspective of local farmers at Brazil's Atlantic forest |
| RSG reference | 10284-1 |
| Reporting period | September 2012 to December 2012 |
| Amount of grant | £5957 |
| Your email address | rodrigoecologia@yahoo.com.br |
| Date of this report | 16 th January 2013 |

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 |
|--|--------------|--------------------|----------------|--|
| Field work: Investigate the use of the three most widespread matrix-habitat types by frogs | | | X | We successfully conducted the first phase of this research (rainy season of 2012). A total of 21 sites were sampled for frogs that correspond to seven replicates of each of the three matrix-habitat types. We also need to evaluate frog responses during the dry season, which presumably will change compared to the rainy season due to the different climatic conditions. |
| Field work: Understand how the three most widespread matrix-habitat types influence edge effects on frogs | | | X | As a complement of the objective above, we also successfully conducted the first phase of this research (rainy season of 2012). We searched for frogs inside 126-5 m x 5 m plots (-50 m, 0, 50 m and 200 m within the forest reserve), comprising seven replicates of each of the three matrix-habitat types. We also need to evaluate frog responses during the dry season. |
| Field work: Gather life-history data for several frogs currently listed as threatened or data deficient by IUCN Red List | | | X | For several species listed in these two categories, we collected ecological information that had not been previously collected. The findings will carefully be examined in a partnership with Dr. Ariadne Angulo, who is responsible for the maintenance and curation of the IUCN Red List amphibian database. |
| Field work: Mentor local biologists | | | X | We mentored two local biologists (Mr. Cassio Zocca Zandomenico and Ms. Fernanda Lirio Ferreira), who conducted field surveys on the composition of bromeliad frogs in three forest sites. We plan to write scientific papers from this data after evaluating bromeliad use during dry season. Based on our first field season results, we have one scientific paper under revision in the regional journal "Boletim do Museu de Biologia Mello Leitao" describing observations on maternal care by the leaf-litter frog, <i>Zachaenus carvalhoi</i> . We are writing another manuscript on the defensive behaviour of <i>Gastrotheca</i> sp. |
| Educational element: Photographic exposition | | | X | Twelve selected photographs of the interaction between frogs and bromeliads composed a photographic exposition at a primary and high school. It could be viewed by about 1,200 students. Its purpose is to increase their knowledge about bromeliad frog conservation. |

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| Educational element: Interview local villagers | | X | | We interviewed 12 families. We expected to interview more families but it was difficult to find both men and women at home in the same time. We will be able to increase the number of interviews when we return during the dry season. |
| Educational element: Booklet | | X | | We distributed folders about the research project to the local villagers and students. However the primary intention was to go further and design a more elaborate booklet containing high resolution and colourful pictures that provided ecological and conservation information. We will achieve this goal during the next field season. |
| Educational element: Stickers and t-shirts | | | X | We distributed project stickers and t-shirts with the RSGF logo to local villagers and they were very well received. In total 150 stickers were distributed. |
| Educational element: Talks with the local students | | | X | We presented two talks to ~50 local high school students at the Mello Leitao Biological Museum. |
| Educational element: Field expedition with biology students | | | X | We lead a field expedition with local biology students in the Biological Reserve Duas Bocas. |
| Sharing results: Participation in national and international conferences | | | X | Besides the activities mentioned above, where we shared our results with the local villagers and students, we also will present the scientific results in national and international meetings, such as VI Brazilian Congress of Herpetology and 26 th International Congress for Conservation Biology. Several scientific papers will certainly be published in national and international journals. One is already submitted. A final report containing suggestions for management practices of particular properties surrounding the Biological Reserve Augusto Ruschi will be delivered and discussed with this reserve administration. |

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

Below I summarise the most relevant changes we made once we got in the field.

- a) I did not expect to have difficulties finding field assistantships but once I got to the field site I had a hard time hiring people. I took several approaches to find field assistants. First, local contacts helped to identify some potential assistants. Second, I contacted biology students at the local college, but there was a conflict with class time and the time we had to be in the field, so despite their interest, I was unable to hire these students. Finally, I hung flyers on boards in local stores, and this had a good success.
- b) It was almost impossible to install pitfall traps in that type of shallow and rocky soil. I ran a pilot study to compare three other potential sampling methods (plots of 1 m x 2 m, 5 m x 5

m, and plots of 8 m x 8 m) that have frequently been used to collect frogs. Searching directly inside bromeliads and in the leaf litter within 5 m x 5 m plots was chosen because it caught the highest number of frogs.

- c) Early in the project, I had talked to the reserve director and had been told that I would have access to a reserve vehicle to conduct my research. Unfortunately, the reserve decided that this would not be possible because they can do not do this for all researchers. Therefore, I needed to buy a vehicle using my own salary to conduct my research.
- d) I did not expect to find such low densities of bromeliad frogs. In fact this group of frogs occupy very distinctive habitats that are mostly on the top of mountains, where bromeliads are abundant. As our sampling method also was able to collect leaf-litter frogs, we went ahead and collected data for both groups.

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

- a) We surveyed 21 sites consisting of seven replicates of each of the three matrix-habitat types (coffee plantation, eucalyptus plantation, and secondary-growth forest). A total of 805 frogs were hand captured. Regarding frog response to matrix types, both species diversity and the total abundance of frogs were lower in coffee plantations, *Eucalyptus* plantation, and secondary forests than in the interior of the reserve. In addition, species diversity in edge habitats was lower than in interior forest habitat for coffee plantations and *Eucalyptus* plantation matrix types. All of the bromeliad-dwelling frogs were found only in the interior of the forest, mostly in the 200 m plots inside the forest.
- b) Of the 805 frogs collected, only 1-5 individuals of each species were sacrificed for amphibian collections. Two amphibian collections, the Mello Leitao Biological Museum and the Rio de Janeiro Biological Museum, will receive most specimens. These voucher specimens are a valuable biological resource mainly for taxonomic research because some of the collected species are scarce in collections. In fact, some species will have the first exemplars deposited in the former collection. Among those collected frogs, we found four new frog species. One species is a new bromeliad-dwelling frog species may even be a new genus of frog. I am working with a colleague to describe the species as well as its habitat preferences, to determine what bromeliad features the species prefers for reproduction, as well as its calls and larvae.
- c) Educational elements were successful and the local villagers and students responded positively by a) going to the photographic exposition, b) attending the presentations, c) participating in the field expedition, d) wearing the project t-shirts, e) putting project stickers on their house walls, f) participating in our interviews, and by g) allowing us access to their properties for the frog survey.

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

First, it is worth mentioning the positive response we received from local villagers once we presented ourselves as frog researchers. Often these introductions resulted in long conversations because local villagers loved to discuss their knowledge of frogs. In this region, it is common to hear several myths involving frogs; for example a) hand capturing frogs can spread contamination through skin parasites, b) if a frog urinates in your eyes it would blind you, c) frogs attract snakes to homeowners' properties, etc. As these opinions are detrimental to the taxon and they are not accurate, I had the opportunity to answer questions regarding these topics.

In total, we visited approximately 34 local-villager families. In these visits, besides the long conversations, a folder containing our project's approach and stickers were given to them. Some of these families were interviewed to understand their perspective about frogs and habitat fragmentation. I plan to continue this objective during the next field season.

I was happily received by professors in a local elementary-high school that promptly supported the photographic exposition in their school. There were 12 photos in the exposition that remained on display for two weeks for approximately 1,200 students.

We gave two talks to 50 local students in the Biological Museum Augusto Ruschi. During these presentations, we talked about the ecological relationship between bromeliads and frogs. Students actively participated by discussing their own views and experiences. Additionally, we led a field expedition with 18 local biology students for the Biological Reserve Duas Bocas.

We also mentored two local biologists (Mr. Cassio Zocca Zandomenico and Ms. Fernanda Lirio Ferreira) in methods for conducting field surveys of bromeliad frogs in three forest sites. We believe that this experience will improve local environmental policies because both biologists work for the environment sector of municipal government.

5. Are there any plans to continue this work?

Yes, and we are optimistic we are in a stronger position to collect invaluable data on the effects of environmental change on frog communities as well as collect invaluable on IUCN data-deficient species. The proposed research should also be conducted in a dry season to fully capture frog responses to matrix influences in this biome.

In a meeting with the local reserve managers (Augusto Ruschi Biological Reserve) it was agreed that our research results will be incorporated into their management practices in dealing with private properties surrounding the reserve. This is our first successful effort in improving environmental policies and management practices in Atlantic rainforest. We believe that our project's results will also be extended to other reserves in this biome, especially if we can provide more robust inferences by evaluating our research questions during the dry season.

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

- a) I, Rodrigo Ferreira will present the preliminary scientific results in July 2013 during the VI Brazilian Herpetology Congress. I am also taking with me the local biologist Cassio Z. Zandomenico to present a poster about our observation of maternal care by *Zachaenus carvalhoi* (Cycloramphidae).
- b) My PhD advisor, Dr. Karen Beard is an active participant in this project. She will orally present our preliminary results in the 26th International Congress for Conservation Biology, also in July 2013.
- c) As I mentioned previously, a scientific publication is currently under revision by the regional journal "Boletim do Museu de Biologia Mello Leitao". This manuscript reports our field observations on a leaf-litter frog *Zachaenus carvalhoi* that for the first time was seen displaying maternal care.
- d) Observations on life history of frogs will be submitted to journals in a near future. I gathered this type of information for several frog species that has not been previously observed displaying such behaviours. My intention is to mentor the two local biologists (Cassio Z.

Zandomenico and Fernanda L. Ferreira) in the writing process for these potential scientific publications. Additionally, life-history information was gathered for numerous data deficient and threatened frog species listed on the IUCN Red List. These findings will be carefully examined in a partnership with Dr. Ariadne Angulo, who is responsible for the maintenance and curation of the amphibian database on the IUCN Red List of Threatened Species.

- e) A compilation of interviews with the local villagers will be published in the regional online scientific journal "Natureza online".
- f) After we finish the second field season, we plan to write a scientific paper regarding the use and influence of matrix-habitat types on frogs inside the forest and submit it to a high impact journal, such as Conservation Biology or Nature.
- g) A complete report containing suggestions on management practices will be written and sent to the local biological reserve. Additionally, I will send this report to the State Agency for Nature Protection hopefully to influence policy makers regarding management practice of reserve surroundings.

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

This grant was used for the field work during the period August-December 2012. This corresponds to three months more than previously planned. The extended deadline helped us to redirect efforts to increase and improve the field research. The original proposal planned to conduct our field work in August to December of 2011 but we had to postpone it to the next rainy season (August-December 2012) because we had not acquired the total financial support we needed to run the entire field season. Additionally, RSGF released the financing support in September 2011, after the rainy season had begun.

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 |
|------------------------------------|-----------------|---------------|------------|---|
| Motorola Talk about MJ 270R | 86 | 86 | | |
| Kestrel 3000 pocket wind meter | 123 | 123 | | |
| Digital Camera | 344 | 454 | -110 | |
| Plastic Bucket of 1m/diameter | 15 | 0 | +15 | |
| Plastic Bucket of 20 L | 1292 | 0 | +1292 | Used to pay field assistants |
| Wood stakes | 443 | | +443 | Used for vehicle gas, which was more than anticipated |
| Plastic drift fence | 258 | | +258 | Used for vehicle maintenance |
| Gas (car) | 250 | 250 | | |
| Car maintenance | 200 | 200 | | |
| Lab assistants | 323 | 323 | | |
| Field assistants (4 people) | 1917 | 1817 | | |
| Office supplies | 150 | 135 | | |
| Folder to distribute among farmers | 330 | 220 | +110 | Used to buy the camera. |

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|-------------------------|-----|-----|--|
| Car bumper sticker | 95 | 95 | |
| Photographic Exposition | 130 | 130 | *Currency conversion = 1 GBP was 3.16 Brazilian Real |

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

Certainly another sampling season will need to be conducted to understand frog responses to matrix habitat types during the dry season. Considering that during the dry season climatic conditions are different, frog responses are likely to be different as well. For example, during the dry season, air humidity is drastically dropped which potentially influences frog's behaviour.

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?

- a) The vehicle purchased to be used during the sampling period had stickers fixed on both sides. Two large stickers of RSGF logo were fixed on the car.
- b) 50 t-shirts showing RSGF logo on the back were distributed to both the field assistants and to selected members of the local community.
- c) 150 folders containing RSGF logo were distributed to the local students and villagers to inform them about the project's objectives and possible outcomes as well as the effects of habitat fragmentation on bromeliad frogs.
- d) The photographic exposition exposed RSGF logo to approximately 1,200 students of a local elementary-high school.
- e) RSGF was acknowledged in the scientific publication that is under revision by "Boletim do Museu de Biologia Mello Leitao". Certainly the RSGF will be acknowledged in forthcoming publications.
- f) The poster and the oral presentations for the VI Brazilian Herpetology Congress will expose RSGF logo. The oral presentation during VI International Congress for Conservation Biology will also have RSGF logo.

11. Any other comments?

This project represents a key step in producing scientific knowledge that will change management practices of private properties surrounding biological reserves along Brazilian Atlantic rainforest. This project's outcomes certainly would not have been possible without the support of the RSGF, for which we are extremely grateful.