

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	Anders Gonçalves da Silva
Project title	Conservation and landscape genetics of lowland tapir (<i>Tapirus terrestris</i>) in a periodically flooded Amazonian forest, Brazil
RSG reference	25.08.07
Reporting period	Final Report
Amount of grant	£4,074
Your email address	anders.goncalvesdasilva@ubc.ca
Date of this report	11 May 2010

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
Collect DNA samples of lowland tapir in the Jaú National Park		X		We had set out to obtain 200 samples but difficulties in logistics and encountering samples reduced us to 47 over 150 days of sampling effort.
Extract good quality DNA for analyses			X	In spite of the harsh environmental conditions present in the Amazon, we were able to extract and successfully amplify both microsatellite and mitochondrial DNA markers. [on-going]
Establish a rapport with local community members for sampling collection			X	We successfully trained and hired one local community member to assist in sampling and taught three other members on the techniques necessary for sampling. [on-going]
Establish a rapport with local NGO			X	We successfully established an informal partnership with the <i>Fundação Vitória Amazônica</i> , a local NGO that works within the Jaú National Park, which was essential for obtaining samples, for logistic support in the field, and for obtaining geographical information systems data. Data from this project will be delivered to FVA for incorporation into the Park's action plan. [on-going]
Establish a rapport with the Park's authorities			X	We successfully established a relationship with the Park's local authorities (IBAMA), which issued us collection permits, and provided logistic assistance in the field. Data from the project will be delivered to IBAMA for use in the Park's management. [on-going]
Generate interest in tapir conservation research within the Amazon			X	We delivered presentations at educational and research centres in Manaus, and spoke to numerous researchers. I am now co-advising one Master's student (Gabriela Medeiros), and have one prospective doctoral student, who are both interested in applying genetic techniques to understand tapir related phenomena, and thus assist in its conservation. [on-going]
Generate a dynamic Digital Elevation Map and Global		X		We have acquired the maps, photographs, and other relevant data necessary. We are now putting it all

Information Systems database that includes flooding levels				together to obtain the landscape model component of our project, which will allow us to query about different developmental pathways. [on-going]
Generate data on genetic variation to infer tapir movement in the dynamic landscape of the Jaú National Park		X		The majority of the samples are in the lab. The original protocol for DNA isolation did not work as expected. Further optimisation identified a suitable protocol. However, additional equipment was required, which was on backorder for a few months. In addition, we had trouble shipping samples, with them being held at Brazilian customs for over a month due to a misunderstanding as to what the shipment contained. Finally, the last shipment of samples are awaiting the arrival of the CITES permit (already awarded, but not delivered). However, the Brazilian CITES managing authority is currently on strike, and has been for some time. Nevertheless, we have been able to identify large amounts of genetic variation in the samples already examined, which is extremely positive. [on-going]

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

- 1) The shipping of the first batch of samples was delayed due to unforeseen problems. Confusion between the courier, the Brazilian customs, and myself, caused the samples to sit at customs for over a month. Fortunately, the issues were resolved, and laboratory work was able to commence. We do not foresee the same problem for the second batch of samples.
- 2) Our original protocol for extracting DNA, developed from samples collected in a captive setting, has not worked as well on the wild caught samples. Further optimisation has produced improved results, however it requires a piece of equipment that has been in back order for the past three months, and we have only just received it.
- 3) Adriane Morais, our principal person in Manaus, was offered a permanent position with the Amazon State Government, which meant we were without a local person dedicated to the project for a number of months. Adriana Barcelos eventually filled this position, and Carlos André Nogueira has assisted her. Adriana and Carlos have been essential in the liaising with Carlos "Tripa" Abraão at the field-site, FVA and IBAMA, organizing the deposit of the samples at the collection at UFAM, and shipping the subsamples to the lab.
- 4) The Brazilian CITES managing authority are currently on strike, setting our work back, as we await for the delivery of the permit that has already been awarded.

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

- Demonstrated the feasibility of systematically collecting mammal samples for genetic analyses in one of the most remote and challenging areas of the Amazon without the necessity of trapping and anaesthetising individuals. This opens up the possibility to employ genetic techniques for long-term monitoring of mammal populations in relatively pristine and remote areas to provide data for building models to understand the effects of different development pathways on biodiversity.
- Raised awareness about the potential for using genetic tools for answering ecological questions of conservation interest among the scientific community working in the Amazon region. This has led to the interest of two Brazilian students in applying genetic tools to their questions of interest. One (Gabriela Medeiros) is already developing her Master's project on the effects of cessation of the flooding regime on lowland tapir populations caused by the creation of the Balbina Dam in the Brazilian Amazon, and the other (Adriana Barcelos) is considering developing her doctoral thesis on a similar topic. It has also led to a collaboration between the Wildlife Conservation Society and the Universidade Federal do Amazonas to employ these techniques.
- Generated interest in tapir conservation in the Amazon, with a group of interested parties forming a core nucleus who actively advocate tapir conservation in the region, formed by Gabriela Medeiros, Adriana Barcelos, Eduardo Venticinque, Adriane Moraes, Flávia Pinto, and myself. This group is actively seeking new interested parties, will participate in the preparation of the Brazilian lowland tapir national conservation action plan, and will continue to look to increase tapir conservation awareness in the region.

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

Our partnership with FVA has allowed us access to the research station at the Jaú National Park, an introduction to the small local community of about five families that live by the station, and access to a wealth of GIS data. Through FVA we met Carlos "Tripa" Abraão, who we trained as our field assistant and whose canoe we used to reach potential sampling localities. His training will allow him to work with other researchers, as well as with the Chico Mendes Biodiversity Institute and FVA, who are both partners in a monitoring programme within the Jaú National Park, and in other areas, to collect genetic samples not only of tapir but of other species as well. The genetic data could be used to estimate numbers of individuals, sex ratio, movement patterns, and other biological information of relevance. Meanwhile, working for a monitoring programme could represent a significant source of income for many families.

5. Are there any plans to continue this work?

Yes, the work will continue, as we want to establish a framework for modelling species-landscape interactions based on genetic samples. We also want to understand the interaction between flooding regime and tapir population dynamics.

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

Results from this work will be shared through:

- Seminars and talks at professional meetings, schools and universities. A talk is being prepared for the International Symposium early next year in Malaysia.

- Publication of results in scientific journals and other venues. A manuscript is currently being drafted to show the potential of collecting viable genetic samples in the Amazon, in addition this research will figure prominently in a book chapter on tapir genetics in the up coming book on Tapir Ecology, Evolution and Conservation be edited by Mike Zavada and myself.
- A report to the Chico Mendes Biodiversity Institute and IBAMA will inform the government of the outcomes of this project and will form the basis for future work in collaboration.
- Reports to the project's collaborators, *Fundação Vitória Amazônica* and *Universidade Federal do Amazonas*.
- All the data and conclusions will also be available to the members of the IUCN/SSC Tapir Specialist Group and the parties involved in the drafting the Brazilian lowland tapir's national conservation action plan.

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 over 2 years from early 2008 until early 2010. This period was longer than originally anticipated due to a change of site and due to the difficulties in accessing the new site and the low rate of sample recovery. In this period, we completed 150 days of sampling (10 days per month over 15 month) and collected 47 samples. At the height of the wet season (between July and September) sampling was not feasible due to the dispersion of the animals and the amount of rain, which quickly dissolved the faecal material.

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	3,610.00	2,819.60	791.00	Because of the change of site, transport costs changed
Field Equipment & Supplies	464.00	467.19	-3.19	
Lab Supplies	0.00	787.16	-787.16	The excess budgeted for transport was used for generating DNA sequence data, a data type not originally budgeted
Total	4,064.00	4,073.95	-9.95	

In total, we were awarded £4,074.00. With the change in location, £1,300.00 that was originally budgeted for hiring a car was instead partially employed in purchasing fuel to run the outboard motor on our assistant's canoe to reach sampling sites and in obtaining additional genetic information, because we did not have as many samples as we originally thought. The additional genetic marker, the mitochondrial DNA, was not included in the original proposal but will give us more information per sample, in particular information pertaining to female dispersal and movement patterns. All receipts are filed with the University of British Columbia accounting office.

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

In the short-term, we see three different opportunities where our project can have an impact:

- Obtaining samples in the Amazon is extremely challenging due to the lack of adequate logistical support, and the environmental conditions of extreme heat and humidity. Our results show that it is possible to sample dung, and recover DNA in quantity and quality sufficient for most analyses. Therefore, we can work with the Chico Mendes Biodiversity Institute and FVA, who are both partners in a monitoring programme within the Jaú National Park and in other areas, to collect genetic samples not only of tapir but other species as well. The genetic data could be used to estimate numbers of individuals, sex ratio, movement patterns, and other biological information of relevance. To this effect, we are currently working on a manuscript to publish the methods in a peer-reviewed journal and also train other personnel of the relevant organizations in the collection and preservation of the material. One community member (Carlos Abrão), and two students (Adriana Barcelos and Gabriela Medeiros) are already trained and at least two members of the IUCN/SSC Tapir Specialist Group are also starting to use the same techniques. This will allow for a larger breadth of monitoring options, and for higher quality of the collected data.
- A national action plan for lowland tapir is currently being developed in Brazil. The expertise and data generated by this project will be used to inform the action plan, in particular in relation to amount of genetic variation to expect in pristine conditions (even with some level of subsistence hunting), habitat use of tapirs in the region of the Jaú River and around the Balbina Dam Reservoir (and what that means for other areas), and the effects of the flooding regime.
- Methods and techniques to combine landscape and population data into a temporally dynamic model in which one simulates different scenarios are still relatively new, in particular for wild species. Our project hopes to pioneer some of these techniques, and assist in setting some of the standards for organizations such as the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES – UN Environment Programme).

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 was recognized in all presentations given in which the project was mentioned or it was central to the presentation, in particular to: the graduate programme in Biodiversity at the UFAM; to the graduate programme in Ecology of the National Institute for Amazonian Research (INPA); to the students of the Biological Dynamics of Forest Fragments Project (Smithsonian Tropical Research Institute and INPA); and to the Ecology and Evolution programme at the University of British Columbia Okanagan. The RSGF was also credited when I presented relevant work in the last International Tapir Symposium held in 2008. I also recommended the RSGF to a number of professionals in the Amazon. Finally, the RSGF will be recognized in all future publications.

11. Any other comments?

The project has had numerous difficulties, yet the questions being addressed are extremely pertinent. One of the main issues in the Amazon biome is the construction of hydroelectric dams to meet current and future energy needs for sustained development. More than 70 are currently planned for the Brazilian Amazon, with possible effects demonstrated by the first major dam (Balbina). We will certainly see them happening again with the Belo Montes dam, which has just received government approval (<http://news.bbc.co.uk/2/hi/8633786.stm>), in spite of strong protests from members of the civil society and indigenous communities.

In this regard, and in the name of the Amazon Tapir Conservation Team and all Brazilian tapirs, I would like to thank the Rufford Small Grants Foundation once again for their continued support of my work in the past 5 years. **Thank you!**