

## The Rufford Foundation

### Final Report

---

Congratulations on the completion of your project that was supported by The Rufford 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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

---

Grant Recipient Details	
Your name	Gilson De Souza Ferreira Neto
Project title	Soil fertility as the key driver of herbivorous mammal abundance on Amazonian fluvial islands
RSG reference	20754-1
Reporting period	December 2016 – July 2018
Amount of grant	£5.000
Your email address	<a href="mailto:gilsoneto2011@hotmail.com">gilsoneto2011@hotmail.com</a>
Date of this report	14 <sup>th</sup> May 2017

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
Dry season sampling				Initially we aimed to sample 65 points and 35 islands. However, 25% of the camera traps did not work during the fieldwork. Furthermore, two camera traps were stolen. Because of these reasons our sampling effort decreased to 49 sampling points (the camera trap is our sampling unit) and 28 islands.
Wet season sampling				Due to constraints of camera traps and logistic difficulties to install the camera traps in the wet season, we did not work in this period.
Data analysis				It has been completed
Defence of Gilson de Souza Ferreira Neto dissertation to reach his MSc degree				It will be done by July 2018.
Two high quality papers				It will be submitted at least one by August 2018.
Academic and non - academic dissemination				We have disseminated the Rufford logo and the project through the Anavilhanas National Park page and through the page/website of the Amazonian Mammal's Research Group.

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

Even though we received the amount of £5.000, the conversion from pounds to Brazilian Real was only 18.245,60, which was less than I was expecting to receive. We decreased our sampling efforts to half of what we were planning considering financial constraints and the fact that we have got sponsored financially only from Rufford. Because of that, costs with fuel, field assistant, food supplies were reduced and some other research equipment such as camera traps were not bought. We are also very grateful to Rayovac that donated batteries for this project and Idea Wild for donating a personal computer, GPS and a rangefinder.

There is some anthropogenic action in the archipelago, especially on the islands closer to Manaus where the wood extraction, hunting and fishing are very common. Because of this we had to change the point where the camera trap was installed in some occasions. Furthermore, two camera traps were also stolen in points where the wood extraction is very valuable. There was a logistic difficulty to reach all islands.

The boatman and I slept several days on the islands, which are far from any medical point.

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

Our records were dominated by the omnivorous generalist species *Didelphis marsupialis*, which accounted for 64% of all mammal records. The proportion of generalist omnivorous individuals appeared not to be affected by the predictive factors. However, when considering only records for proportion of herbivorous mammals, soil fertility was the measured variable with the strongest positive effect on the proportion of herbivorous mammals. The proportion of herbivorous mammals responded positively to distance from the sampling point to the nearest human community, logging and distance from the sampling point to the nearest mainland, while forest cover responded negatively. Thus, gradients of soil fertility can help to explain the distribution of herbivores and define crucial areas for conservation and future restoration.

The camera traps have captured 139 mammal registers of 13 different mammal species which are *Coendou melanurus* (prehensile-tailed porcupine), *Cuniculus paca* (lowland paca), *Didelphis marsupialis* (common opossum), *Hydrochoerus* (capybara), *Leopardus pardalis* (ocelot), *Mazama americana* (red brocket), *Nasua* (South American coati), *Panthera onca* (jaguar), *Pecari tajacu* (collared peccary), *Philander opossum* (gray four-eyed opossum), *Proechimys sp.* (spiny rats), *Sapajus apela* (tufted capuchin) and *Tamandua tetradactyla* (southern tamandua).

The dynamics of such a system have never been investigated and its mammals have never been investigated before. It is not only important because it is unique, but also because a knowledge of how such a system works has great future applicability: not only does it provide a base-line against which future habitat loss can be measured by mammals, but it also gives the park authorities an idea of what they have in terms of large mammals and how important the islands are to them. These are things about which the park authorities currently have no quantitative data at all, which makes it very difficult to effectively plan the management of these, the park's major feature.

In addition, the aspect that relates soil fertility to the abundance of medium and large mammals on the islands has a direct practical application in that. It will allow ecotourism operators to choose the islands on which visitors are most likely to see mammals and encounter the tracks of medium and large carnivores. This is also highly useful for the park's management plans and its plans for controlled ecotourism access.

Furthermore, the situation in fluvial islands is very different compared to terra firma forests. Studies of relations between soil fertility and mammalian abundance are generally made at a very large scale, but the situation in Anavilhanas occurs over a much smaller distance in a tropical river archipelago. It is most unusual, as far as we know, it occurs only here and in the even larger archipelago immediately above Anavilhanas named Mariuá. There is also the fact that most other studies that have related soil fertility to mammalian abundance and/or biomass have done so either in forests. No-one to our knowledge has done so in a tropical river island setting.

This then is the ecological reason for doing this. In terms of conservation, it is important to realise that there is no previously existing inventory of the medium and large mammals of the fluvial islands of the national park (the only existing data comes from the section of the park that lies on the 'mainland'). A knowledge of the mammal species in the park is clearly highly desirable by the park authorities for management purposes, linking the observed densities of mammals to soil fertility will help us explain the patterns observed.

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

All of our field guides are the only ones that work outside home and they provide to their families. We directly helped them, since a job opportunity is difficult where they live. We bought an enormous amount of food and fuel in Novo Airão during the fieldwork even though the price there was higher than Manaus. Therefore, we believe that this could contribute to local business and small merchants.

Furthermore, we have information about the distribution of vertebrate species in the Anavilhanas and Jaú National Park, where the human communities extract wood and information about soil and vegetation. Since this information will be given to the authorities' park, we believe that the knowledge we acquired in the field will be returned to the local communities through the new management plan of the park. We also plan to achieve this by doing lectures in the schools and making other events of environmental education with all the village community in the next step of this work.

#### **5. Are there any plans to continue this work?**

In the next step of this work we will sample for a longer period in different seasons, since I will have more than 4 years to finish my doctorate degree and I already have information about the logistic situation of the local. Because of that we hope that the conservation management will not be working completely in the dark.

This is the second largest fluvial archipelago in the world (the largest one lies just upriver). Because of this, and the unusual situation with sediment fertility variation these are the first study to do this so. There are no previous studies elsewhere in the world that the park authorities can use as firm guidelines. So, it is a – (just for one a correct use of the term) - a unique situation. Results have shown the park, what kind of species they have and the densities of these. Presence of rare and endangered

species will, of course, boost the profile of the park, but recording the presence of a full and intact mammal assemblage will also be a much sought-after result as it will indicate that the ecosystem there is as intact as can be expected given the long history of low-intensity hunting and human impact in the general region (mostly before the park was established). During the fieldwork, mammal species identification and data analysis we had lots of new ideas and perspectives for future studies with Amazon mammals in fluvial islands systems.

The knowledge about Amazon mammal's biology is still very low, especially regarding to mammals in fluvial islands. Reference libraries are few and have big gaps, due to lack of resources and logistics to work in these systems. Because of these reasons I plan to continue this study for my doctorate degree through the Rufford grants programme.

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

Reports from the project will go to the local and national chapters of the Brazilian National Parks Authorities (who are very keen on the project) and to Manaus-based NGOs who are working in the park (such as WCS-Brasil and Fundacao Vitoria Amazonica). I have also put information on the web-site of the research group with which I am associated, the Amazon Mammal Research Group and Facebook page of the Anavilhanas National Park. I also intend to write popular articles (in Portuguese) for national ecology magazines and websites.

**7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?**

We used the RSG during the fieldwork. We planned to do to fieldwork between August – November 2017 (dry season) and January – March 2017 (wet season). But due to problems reported above in section 2, we used the RSG only between August – November 2017. So, we planned 6 months of fieldwork but we only did 3 months.

**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
Field assistant	2000	1000	1000	We spent half of what we were planning because of the decrease of the sampling effort
Food supplies	1980	509	1471	We spent less than what we were planning because of the decrease of the sampling effort

Nikon 7247 Action 16x50 Binoculars	165	165	0	
Garmin GPS 65CSx WAAS	159	0	159	The GPS was lent to the Project from the Amazon Mammals Research Group
Batteries for garmin GPS	48	0	48	The batteries was donated to the Project from Rayovac Spectrum Brands
Solar-powered battery charger	11	0	11	We have not bought this material
Laser rangefinder	78	0	78	The laser rangefinder was lend to the Project from the Amazon Mammals Research Group
Two-stroke oil Mobil Delvac 20 Litres	276	276	0	
Headlamps	50	50	0	
Fuel	6000	3000	3000	We used half of the field that we were planning to because we decreased our sampling efforts to half considering financial constraints and the fact that we have got sponsored financially only from Rufford.
Waterproof notebooks	18	0	18	The waterproof notebooks was lent to the Project from the Amazon Mammals Research Group
<b>TOTAL</b>	<b>10785</b>	<b>5000</b>	<b>+5785</b>	

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

While it is true that none of the species captured by the camera trap are currently classified by the IUCN as Endangered or Critically Endangered at the present time, deforestation, wood extraction, hunting and international pressure for Amazon products threaten much of the central Amazon.

As populations of large and medium sized Amazonian mammals disappear elsewhere in the basin, refuges such as Anavilhanas are becoming increasingly rare. I believe it behooves us to take a highly proactive approach and gather information from currently little-impacted systems so that they may be in the best possible manner when, in the future, they are more isolated and under greater threat. Information gathered proactively now under halcyon conditions, will have immense practical value in the future when areas such as Anavilhanas and Jaú National Park are last refuges and bastions of biodiversity.

This study has important conservation value for the region. The area in which the study occurs is a national park (Anavilhanas National Park and Jaú National Park). The most unusual feature of the park is the immense riverine archipelago. Although

these riverine islands were the main reason for the park's creation, many aspects of their biology are little known, including the mammals. This study will be the first attempt to study the mammals of these islands. With another archipelago directly above it on the Rio Negro, it represents a unique ecosystem, in which the mammal assemblages change seasonally as the islands are colonized as they emerge and then are abandoned as they flood. Many of the islands are large (over 1000 ha) and will have on them species such as tapir, jaguar, peccary and deer, among others.

This will be useful to the park authorities to assess what they currently have as well as forming the baseline against which any future changes in populations can be measured. Soil fertility is intimately related to plant productivity and this to carnivore abundance via the biomass of herbivores. Whilst this is well established within Amazonia (and elsewhere) it has generally been analysed over large distances. Anavilhanas is highly unusual because the fertility of soil on the islands changes over a very short distance because some islands are seasonally covered by the sediment-rich waters of the Rio Branco and other are not and are only ever seasonally covered by the exceptionally nutrient-poor water of the Rio Negro. In consequence, it is very likely that, although all the islands look very much the same in an aerial photograph, they are far from being so.

In terms of mammal conservation and where to invest conservation management and funds, this could be key information as this survey is likely to show that some islands have more species and individuals than others. (Although exactly how such a pattern will play out we cannot say until we have done the survey). In terms of ecotourism, the link there is simply the fact that the islands that are seasonally covered by the waters of the Rio Branco are likely to have more mammals and/or for visiting ecotourism boats - containing people who have paid to see animals and expect to see them - going to those islands with the most mammals will clearly be a good thing to do. Informing the park authorities as to which kinds of islands are richest in mammals will not only allow them to ensure ecotourists have a good experience, but also to some extent manage the impact and the whereabouts of ecotourism boats, so helping to minimize any impacts their visits and proximity might have on the wildlife (both mammalian and other).

**10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did The Rufford Foundation receive any publicity during the course of your work?**

We will use Rufford Foundation logo in all lectures we made until today about the project. We will also acknowledge the RSGF in the submitted paper and in the written version of the dissertation.

The Rufford log have been posted in the Amazonian Mammals Research Group page and website, and in the website of the Anavilhanas National Park.

<https://gpmainpa.wordpress.com/2017/09/21/efeito-da-fertilidade-do-solo-na-biomassa-e-composicao-da-assembleia-de-mamiferos/>



<https://www.facebook.com/parnaanavilhanas/>

<https://www.facebook.com/gpmainpa/posts/1360308360762506>

**11. Please provide a full list of all the members of your team and briefly what was their role in the project.**

**Gilson de Souza Ferreira Neto** – Principal investigator of the project. He was the main responsible for all the phases of the project

**Adrian Paul Ashton Barnett** – Gilson's master advisor. Assisted with the project elaboration and he will assist with the paper elaboration.

**Wilson Roberto Spironello** – Gilson's co advisor. He assisted with fieldwork expeditions and by lending camera traps and research equipment's.

**Fabrcio Beggiato Baccaro** - Gilson's co advisor. He will assist with the data analysis and with the paper elaboration.

**Carlos Alberto Quesada** - He is a renowned researcher based on the Amazonian National Institute of Research with large experience in Amazonian soils. He contributed with soil reagents and comments in the final manuscript

**André Luis Sousa Gonçalves** - He is a researcher with experience in camera traps, ecology and natural history of mammals in the Amazon. He has helped to conceive this field experiment.

**12. Any other comments?**

I expect to continue my studies in fluvial islands through the Rufford Second Grant on my doctorate studies. I intend to start the new step of this project with the Rufford Second Grant in the beginning of 2019 when I will be starting my doctorate.