

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.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Heloisa Dantas Brum
Project title	Ecological basis for sustainable extractivism in the Amazon
RSG reference	15827-2
Reporting period	08/31/2015 – 30/04/2016
Amount of grant	£4996
Your email address	hdbrum@gmail.com
Date of this report	30/04/2016

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
1. Quantify the production of fruit and seeds of açai as a subsidy for both ecological models as to rationalise extraction by local people		X		This step will be finished in 2017 and will be complemented with the collaboration of the researcher PhD Adriana Carvalho, of UFRN, that study the valuation of biodiversity. We are monitoring 67 trees açai and preparing questionnaires for the interviews in 2017.
2. Map the spatial and temporal variability of açai's vital rates in explored and unexplored areas		X		We have accomplished the first step necessary to achieve this goal, which was the marking and mapping of the individuals of açai in upland and flooded forests.
3. Assess the population viability of the species (population growth rates) in explored and unexplored areas		X		We have accomplished the first step necessary to achieve this goal, which was the marking and mapping of the individuals of açai in upland and flooded forests.
4. Evaluate population growth rate sensitivity to the different vital rates (sensitivity analysis). This will enable us to discern which vital rates should be targeted in management plans		X		We have accomplished the first step necessary to achieve this goal, which was the marking and mapping of the individuals of açai in upland and flooded forests.
5. Develop a mathematical model of the species' population dynamics including key environmental influences		X		We have accomplished the first step necessary to achieve this goal, which was the marking and mapping of the individuals of açai in upland and flooded forests. All the

as well as density-dependent regulatory mechanisms				data collected, including the interviews, will be used for the development of the models.
6. Use the above mentioned model to simulate the effects of different intensities and spatial schemes of fruit extraction in order to determine which management strategies would have greater potential for sustainability from both ecological and economic points of view		X		We have accomplished the first step necessary to achieve this goal, which was the marking and mapping of the individuals of açai in upland and flooded forests. All the data collected, including the interviews, will be used for the simulations of these effects.

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

The fieldwork started in October 2015, during the dry season. We conducted the participatory mapping of the areas of use of açai in “várzea” floodplains and “terra firme” upland forests at the Uauaçú and Ayapuá sectors in the studied reserve (Figure 1). We held meetings in the communities of Uixi, Pinheiros, São João do Uauaçú, Fortaleza and Tambaqui. The meetings were attended by approximately 15 local residents in each occasion (Figure 2). They provided us with key information about the areas in which they collect açai, showing us in the maps where we could find a lot of açai, where the açai doesn't occur and where the extraction is held. The residents of these communities for the most part have lived in the region for decades, but most were born there, and basically live on natural resource extraction and have great knowledge about the species and the region's landscape.

During this stage, we observed that it was necessary to adapt the sampling design, since we found that the use of the species occurs along the entire landscape, although with varying intensity and that we found difficulty to establish plots in areas with harvesting of açai and areas with no harvesting of açai. Instead of installing 80 plots of 20 x 20 m, as originally proposed, we have established a sampling design into blocks, which will be detailed in the description of the outcomes (question 3). The information provided by local residents was key to a better study design. This information will also be complemented with data from

interviews (to be held next year) and then enable us to prepare the maps showing the distribution of açai areas and the use of areas by the local population.

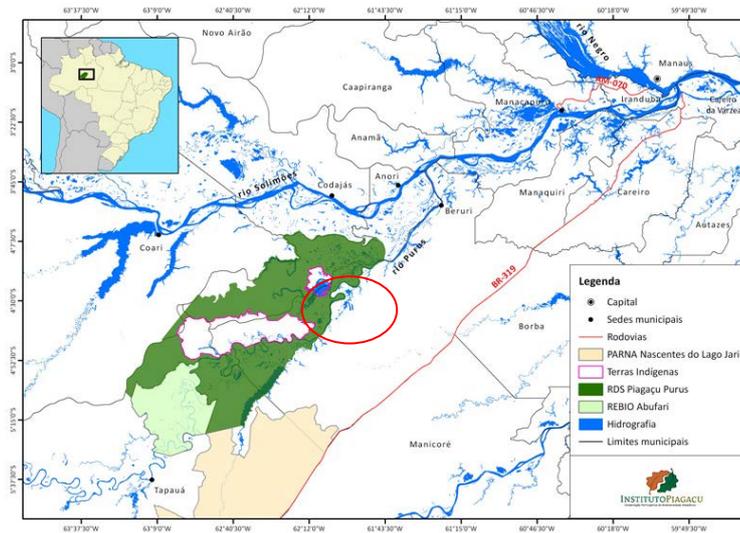


Figure 1. Geographical location of the Sustainable Development Reserve Piagaçu-Purus, surrounding municipalities and boundaries of indigenous lands, the Biological Reserve Abufari and Jari Lake National Park (Piagaçu Institute, 2010). The red circle is delimiting the study area (Ayapuá and Uauaçú sectors).



Figure 2. Meetings and participatory mapping realized at the SDR-PP, in the communities: A. Pinheiros; B. São João do Uauaçú; C. Uixi; D. Tambaqui.

During the fieldwork some areas were inaccessible because of the drought, limiting and delaying our work. The marking and mapping of the açai plants in the plots were a hard task, because of the high number of plants, especially the seedling in the flooded forest (*várzea*). Besides this, the rain and the distance between the areas (that reached 100 km between upland and floodplain forests) also hampered the activities. All this contributed to delay the fieldwork and forced us to carry out longer trips and more field expeditions, which increased our expenses.

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

1) We installed 200 permanent plots distributed in 10 blocks (Figure 3), five in the floodplain and five in the upland. Each block contains four treatments with five plots each (totalling 20 plots per block). The treatments are related to the density of açai in the area (high or low) and the proximity with the river (in the upland forest: near or far from the river) or the flood level (in the floodplains: high or low flood level). Each plot has 20 x 20m, and the total area sampled is 8 ha. In the lowland area, the number of seedlings of açai was very large, so we opted for a sub-sampling in four plots of 1 x 1 m in the corners of each plot of 20 x 20m, totaling 0.04 ha.

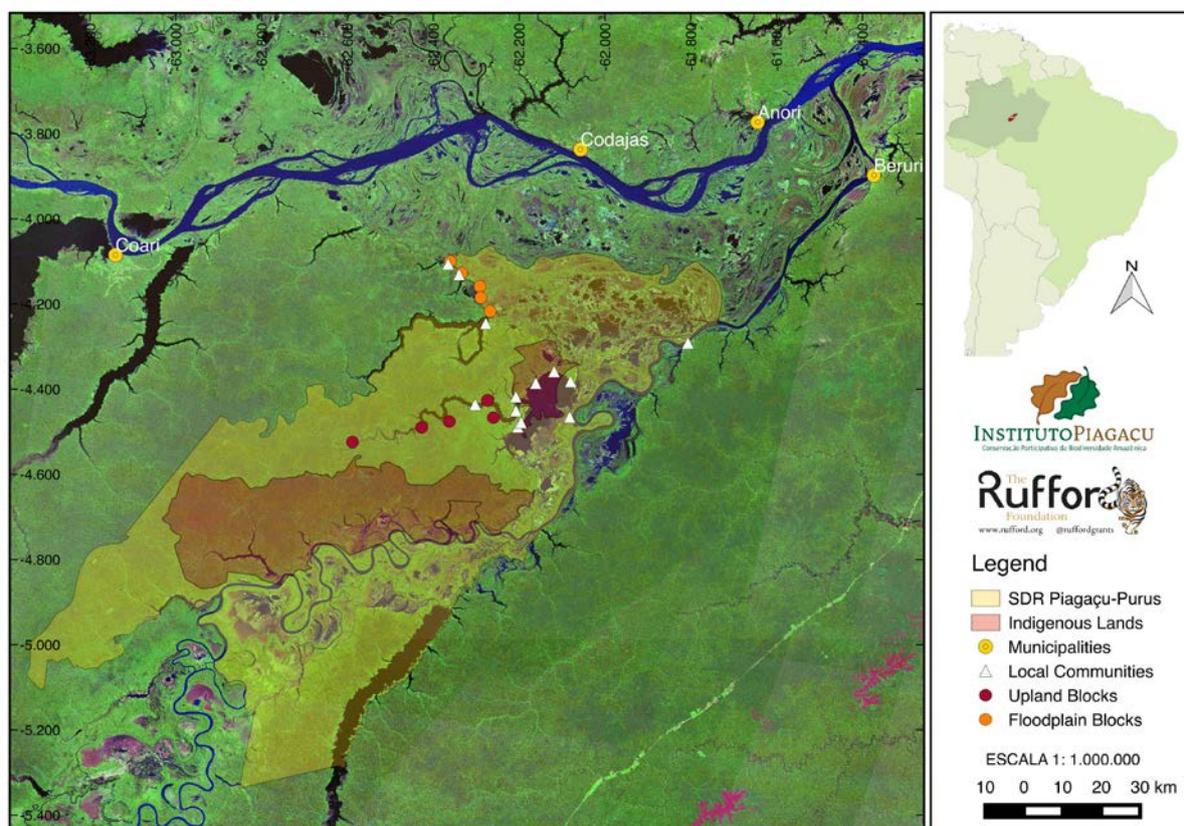


Figure 3. Distribution of 10 study blocks in the areas of floodplain (Juaçu) and upland (Ayapuá) sectors of the Reserve.

2) We have marked and mapped 4,099 individuals of açai, in different life stages and sizes (Figure 4). The great majority of individuals are seedlings and young plants, but apparently it seems that the population structure is different between upland forest and the floodplains. We have already begun to analyse some of the data from now on. In addition we are also monitoring 67 açai's trees (32 on the upland and 35 in floodplain) to quantify the production of fruit.

3) One of the most important factors influencing the growth and survival of plants might be the sun light. In order to estimate light availability to each individual of açai, we began to map and measure for total height all trees $\geq 10\text{cm}$ of DBH (diameter at breast height) inside each plot. With this data we will be able to estimate available light following the method proposed by Lieberman *et al.* (1995) that calculates the incidence of light in a plant as a function of the number of neighbours, their distance and their height. Until this moment, we marked and mapped 1082 trees, in 90 plots. We expect to finish the mapping of the trees in next year (Figure 4).



Figure 4. Steps of data collection in the plots: A. Marking of seedlings in the floodplain plots (várzea); B. diameter measure; C. Marking of bounds of the plots; D. Measuring height; E. Marking of seedlings in the upland plots (terra firme); F. Mapping of trees within the plots.

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

The locals, specially the extractivists, are involved with the data collection and are already aware of the work and the interviews which be held soon. With the progress of the project we expect to involve the extractivists and help them to solve problems related to the areas used for harvesting and some bottlenecks of the productive chain. There are some conflicts with the açai's collectors of the nearby city of Codajás that is not inside the reserve. We intend to settle this through meetings with all the stakeholders. Besides this we aim to improve trade relations through training courses and/or workshops related to beneficiation of açai. We plan other activities related to sharing the results with society which are described in question 6.

5. Are there any plans to continue this work?

Yes. In fact, the full achievement of the project's goals demands the continuation of the project until December 2018. Therefore, we would like to request the continuation of this project.

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

We intend to communicate the practical results of the project through a three-way strategy:

1. Production of an illustrated guide to sustainable harvest of açai fruits in the Central Amazon. This guide, written in accessible language, will still contain the main ideas and figures obtained by the project, and will be made available to both managers and local communities.
2. Organization of a 1-day workshop aimed at explaining the results of the ecological study, as well as the practical management implications for government managers and other NGO members working in the region. The workshop will be held in Manaus at the headquarters of the Secretary of Environment of the State of Amazonas. A video with the main talking points presented at the workshop will be made available in the Piagaçu website.
3. Organisation of a 1-day training course to explain in a more simplified way the ecological information and the practical management implications of the project to each of the local communities involved. The training is expected to prepare "multiplying agents" to distribute the information to other communities. The material will be presented in such a way that local dwellers understand the broad ecological processes involved in the açai fruit extraction, as well as the practical guidelines that need to be followed in order to produce a sustainable harvesting. We plan to offer three training

courses. Courses will be based on the illustrated guide, which will then be distributed to the attendees. The researchers at the Piagaçu Institute will be available to offer further support and assistance under demand.

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

All activities (from August of 2015 until April of 2016) were developed with The Rufford Foundation Grant. Most of the expenses had to be carried out in this first stage, due to the installation of the plots, purchase of equipment and intensive fieldwork with field assistants. This stage was the beginning of the monitoring of the plants, which we intend to continue for 2 years (until December of 2018).

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
Fuel	£704	£1811.74	£-1107.74	We spend more fuel because we had to carry out longer trips and more field expeditions and we go through longer distances within the reserve.
Books and Field supplies	£622	£693.87	£-71.87	We spend a little more because of the field supplies to install the plots and marking of the plants.
Food	£374	£365.29	£8.71	The amount spend was similar to the expected.
Field assistant	£1,556	£1532.23	£23.77	The amount spend was similar to the expected.
Airline tickets	£1,245	£412.88	£832.12	In this period, we accomplish only a part of the intended journeys over the entire project.
Boat tickets	£498	£286.15	£211.85	In this period, we accomplish only a part of the intended journeys

				over the entire project.
Currency conversion rate	£00.00	£45.25	£-45.25	Spent deducted by the bank at the moment of the resource deposit. It was not provided.
Total	£4,999	£5,147.41	£-148.41	This difference was paid through a small collaboration of the Piagaçu Institute.

Exchange rate used: £1,00 = R\$ 5,12326 (August of 2015)

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

This study has been pioneer in the evaluation of the population dynamic of an important Amazonian species and the effect of the extractivism, the environment and the density of individuals. Our next step is to continue the monitoring of the plants to then develop the mathematical model to evaluate the sustainability of the harvesting of açai at the lower Purus River.

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

We will produce maps (in greater detail than that presented in this report) with the location of the plots and with the location of the areas of harvesting of açai. These maps will be presented at the communities involved with the study. We intend to participate in scientific events disseminating the results in 2017. On all these occasions, the products will have the proper citation of the foundation's support.

11. Any other comments?

I would like just to thank to Rufford Foundation for the support which allow us to initiate this study that will generate valuable information on forest management and sustainable development and it is cooperating with technical support to local people in improving the use of natural resources.

