

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 | Silvia Barbosa Rodrigues |
| Project title | Assessment of the success of direct seeding in the restoration of degraded headwaters in the Xingu River basin |
| RSG reference | 21062-1 |
| Reporting period | January, February and March 2017 |
| Amount of grant | £4951 |
| Your email address | silviabrodri@gmail.com |
| Date of this report | March 20, 2018 |

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 |
|---|--------------|--------------------|----------------|--|
| Verify the success of the restoration of riparian forests at the headwaters of Xingu river | | | | We visited 72 areas restored via direct seeding (our main scope), five areas restored via seedling plantings and five areas that were naturally regenerating. Our results show the good results achieved in areas restored via direct seeding. The locations of the areas are in a map (Figure 1) attached with this document. |
| Evaluate the trajectories and dynamics of areas restored via direct seeding | | | | We observed that areas restored through this method in the first 10 years had high density of individuals and a rapidly changing dynamic similar to areas in natural regeneration with high resilience. Direct seeding is a method easily implemented at large scales and lower costs compared to seedling plantings, but it is associated to ecological filters that restrict the method's success. However, our results showed that the direct seeded species established were able to trigger the successional process. |
| Evaluate the successional trajectories of plant community over 10 years | | | | Our results showed that pioneer and secondary species that were able to establish via direct seeding guaranteed the successional trajectory of forests in restoration process. These species contribute to vertical stratification that is one of the parameters that can help the recovery process to go on. |
| Assess how abiotic factors, land use history, and sowing methods influence affect the structure and species | | | | Our results show that over time the structural attributes of the vegetation community increase. Within 10 years the restored forests were stratified, had high density of |

| | | | | |
|------------------------|--|--|--|---|
| composition of forests | | | | individuals, closed canopy and trees without bifurcation. We found that above ground biomass increased with higher phosphorus content in the soil and over time. The structure changes that occurred during the 10 years are presented in Figure 2 attached with this document. |
|------------------------|--|--|--|---|

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

The main difficulty during the project was to find the restored areas with different ages, considering that the region has limited access due to road conditions. Also, many areas were very distant from cities and from each other. But even if the distance and roads conditions, we were able to sample the areas that we were willing to, by planning and with the help of landowners, people from the region, and the technicians of the Socio-Environmental Institute.

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

- Direct seeding proved to be a suitable method for the restoration of tropical forests, promoting a rapid recovery of the forest structure.
- Species established via direct seeding enhanced the conditions for the establishment of non-planted species, which is key for the succession trajectory.
- Restoration of forest via direct seeding results in high carbon dioxide absorption. The increment in above ground biomass was $5.31 \text{ Mgha}^{-1} \text{ year}^{-1}$, which corresponds to a liquid annual carbon absorption of $2,65 \text{ Mg C ha}^{-1} \text{ year}^{-1}$.

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

People from local communities are mainly involved in seed collection that was used to restore the areas that we sampled and will restore other degraded areas in the region. Our results are important feedback to them get to know the importance of their work. Also, local communities gave us support, help and received us and made feel like home.

5. Are there any plans to continue this work?

ISA will continue to monitor the areas in the region. In this project, the sampled trees were marked, and the areas were georeferenced, then new researches can be done in those areas to carry on the development of the vegetation.

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

Mainly through publications on scientific papers.

We also went to a Restoration Ecology Conference where we shared our results in a video that I am sending to you with this report.

Also, our results are shared with our contributors of the Socio-Environmental institute (ISA), which are leading different projects of restoration via direct seeding in Amazon biome.

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

When the money arrived, we had already done more than a month of field work. But the money arrived just in time because in the last month of work we had a lot of expenses with traveling, and field assistants' expenses.

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.

The local exchange rate used was 1 £ = 3.867 R\$. We paid 515 £ in taxes, when the money arrived. The rest of the money we tried to the budged proposed.

| Item | Budgeted Amount | Actual Amount | Difference | Comments |
|---------------------------|-----------------|---------------|------------|----------|
| Office and field supplies | 231 | 229 | -2 | |
| Travel expenses | 560 | 594 | +34 | |
| Soil analysis | 1120 | 1108 | -12 | |
| Field assistants | 3040 | 3020 | -20 | |

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

Amazon restoration is becoming more important these days. With the results of our study and other researches that are being done, new techniques can improve the method to restore this important biome. The acknowledgment that forest restoration via direct seeding results in high carbon absorption can motivate the use of this method. Future researches and large-scale restoration are important to Brazil to achieve national restoration goals.

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 used Rufford logo in the video and papers that we presented in the VII World Conference on Ecological Restoration. We are sending the video, narrated in Portuguese, and captions in English along with this report.

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

Silvia Barbosa Rodrigues planned the project, coordinated the team, and collected data, sampled vegetation. My main goal was to identify and characterize the species able to establish via direct seed and their role in the community succession trajectory. I analysed the data with statistical tools and discussed the results based on other scientific studies. This project granted by Rufford was part of my master's degree in the Ecology Graduate School (University of Brasilia). My dissertation was evaluated by influent researches of ecological restoration of Brazil.

Marina Guimarães Freitas also planned the project, coordinated the team, and collected data, sampled vegetation. She explored the relation between the vegetation structure and soil properties (sampled and analysed in laboratory). She presented the vegetation structure trajectory along the 10 years, describing the main characteristic of the vegetation community. This project granted by Rufford was part of her master's degree in the Forest Science Graduate School (University of Brasilia). Marina's dissertation was evaluated by influent researches of ecological restoration of Brazil.

Cleber Marcelino was our field assistant during all the Project. He is a seed collector that also helped to implement many of the areas sampled by us. He helped sampling the areas, contributed a lot in the selection of areas during the planning and also with botany identification. As a local (native-born) in the region, he told us many stories, traditions, management techniques from local people, making us to get to know and adapt to local reality.

Eduardo Malta Campos-Filho was the ISA coordinator, he gave us all the support to sample the areas, helped in the field, and identifying the plant species. As he was also presented in the implementation of many areas he reported how the restoration was done and characteristics previous use of the land.

Guilherme Henrique Pompiano do Carmo and **Junior Micolino da Veiga** helped in sampling vegetation, discussion of results, selecting areas during planning period and to contact landowners.

12. Any other comments?

We would like to thank Rufford Foundation for the grant, kindness and support.

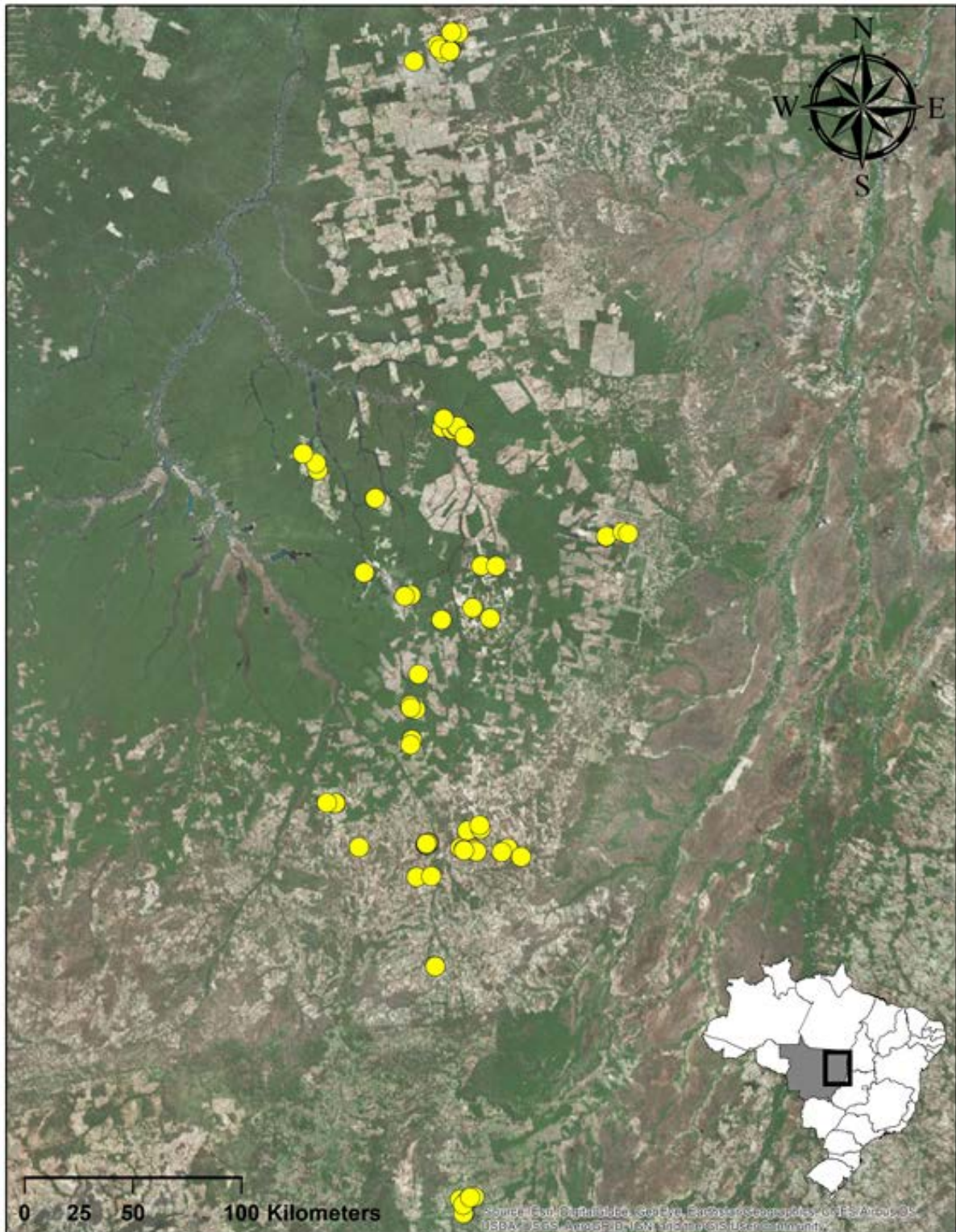


Figure 1. Location of the studied area in the east margin of Xingu River. Yellow points are restored forest sampled during the project.