

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	Helder Coelho Guabiroba Jr
Project title	Effects of different levels of environmental protection upon the local distribution of reef fishes: Does human presence alter reef fish community structure
RSG reference	24766-1
Reporting period	June 2018 to March 2019
Amount of grant	£4,732
Your email address	helder.oceano@yahoo.com.br
Date of this report	15/03/2019

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
Fieldwork sampling				As it was expected, two expeditions were successfully conducted in winter 2018 and summer 2019.
Sampling different sites within the Abrolhos Archipelago				Eight different sites were sampling. Those sites were no-take and no-entry zones.
Video records				More than 50 hours of video records were made during the expeditions.
Generate information about the response of fish assemblages in front of human presence (<i>i.e.</i> SCUBA diver presence) in sites subjected to different management regimes (no-entry and no-take zones).				Analyses of data collected in the first expedition revealed that reef fish community change between sites submitted to different management regimes. No-entry zones support higher abundance of herbivorous fishes than no-take zones. Despite such a difference structuring fish community, the minimum approach distance and more robust statistical models as well as the data analyses of the second expedition are required for a good understanding of reef fish community structure patterns and behaviour in the Abrolhos Archipelago.
Public talks and presentation				I have been involved with the Abrolhos Marine National Park staff in a course for local guides within the national park. During this course, we had the opportunity to gather together local fishermen, tourist guides, managers and scientists. It was an excellent opportunity to discuss aspects of use and conservation of marine environments of the Abrolhos National Park with all the involved parties.

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

Brazilian economics is not going well, mainly due to political corruption and instability, and for this reason the prices of everything related to living costs got higher. I had the opportunity to buy most of the equipment in US in order to save money and also get the right equipment (some of the cameras planned in the budget were not found in Brazil). As I was expecting to spend more money than it was previously planned, a lot of cuts were made in budget related to living costs, like using my own car for transportation, taking meals in local (and cheaper) restaurants and also cooking meals by myself.

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

1- Data collected during this project together with previously results for the Abrolhos Marine National Park (AMNP) showed that no-entry zones had different fish assemblages from simple no-take zones. Fish biomass structure was dominated by one trophic group (the mobile invertebrate feeders) in no-take (*i.e.* visited) sites while it was more equally distributed among trophic groups in no-entry zones (*i.e.* non-visited sites). Moreover, no-entry zones showed higher biomass and abundance of herbivores and more percentage of corals than visited sites. Despite these findings, my team and I still working the collected data in order to perform statistical models to investigate the behavior of reef fishes (the minimum approaching distance) in front of diver presence.

2- Raising concern within local people that work in the AMNP (managers, tourism guides, researchers, etc.) about the role of non-extractive activities (e.g. dive tourism) in the conservation of high biodiversity areas. The aims and ideas of this project were well accepted by managers and local community and are expected to induce better practices and behaviour among the users of the AMNP.

3- Using new methodologies (remote video systems) for reef fish community evaluation. Diver Operated Video system (DOVs) is a promising tool for collecting biomass, abundance, richness and also behavioural data like the minimum approach distance. Thus the use of this video device will certainly bring new light for reef fish behavioural studies.

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

The ideas of this project have been shared with local tourism guides working within the national park through public presentations and informal conversations. Local guides need to incorporate the ideas of this project in their daily activities within the national park, thus the contact with information that will arise from our data analyses will improve better practices within local community.

5. Are there any plans to continue this work?

Yes. This project was well accept by the national park managers and by local tourism guides and recognized as an important study that will help better management and use of protected areas. Moreover, incorporating such information for other MPA's in Brazil will certainly improve management and knowledge about the role of non-destructive activities in reef environments. I am planning to continue this study in other Brazilian MPA in order to widespread the ideas and improve our dataset for better evaluation and comparisons between different MPA management regimes.

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

The results of this project will be used in scientific publications that will be submitted for peer-reviewed international journals and at least one undergraduate dissertation. Data collected during this project are fully available for the AMNP managers and stakeholders. Also, results generated here will be used for presentations and public talks targeting local users of the National Park.

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

The Rufford Foudation small grant were used in the first 5 months of the project for buying all the equipment necessary for field work and then it was used during the expeditions in August 2018 and March 2019.

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
3 Re-Fuel 12-Hour ActionPack Battery for GoPro	195	446	+251	
4 memory cards of 64Gbytes	90	106	+16	
4 transportation costs (fuel and bus tickets) for fieldwork	269	450	+181	I used my own car for transportation during fieldwork.
30 days of daily costs (meals) during fieldwork	672	1020	+348	Living costs are higher than it was initially predicted budget.
2 Nikon Coolpix AW130	667	559	-108	Bought cheaper in USA than

cameras				it would cost in Brazil
Underwater Housing for Canon PowerShot G1 X Mark II	534	779	+245	
1 Canon G1X Mark II Camera	895	611	-284	Bought cheaper in USA
3 GoPro Hero4 Black Cameras	1,410	479	-931	Bought cheaper in USA
Accidental protection plan for cameras		50	+50	Found it necessary in front of the risk of damage during fieldwork
Backpack bag for cameras		38	+38	Found it necessary to ensure security of equipment transport and storage
Total	4,732	4,538	-194	Exchange rate: £1= BR\$ 5.19. This experience will lead to more accuracy planning and it will be useful in future budgets.

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

Although the Arolhos Archipelago provides a good opportunity to investigate the behavioural responses to human presence, it would be of great value to sample other sites submitted to some level of protection and human presence. This will improve our analyses and allow to compare different sites and management regimes.

Moreover, conversations with other researchers, MPA managers and dive guides revealed that the ideas of this project are quite suitable and necessary for some others Brazilian MPAs. Thus, it would be great to expand this project to other Brazilian MPAs while maintain a continuously monitoring in the AMNP.

Understanding the relationship of non-destructive activities and their potential impacts over reef environments is necessary to stablish limits of use and better conservation practices for such a high biodiversity areas.

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?

I didn't use the Rufford Logo because no public material was produced.

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

Helder Coelho Guabiroba Jr: leader of this project. Responsible for conducting fieldwork activities, data collection and analyses.

Dr. Jean-Christophe Joyeux: professor in-chief of the Ichthyology Lab of the Federal University of Espirito Santo state. Dr. Joyeux was responsible for advising all the aspects of this project to fit high scientific purposes. His scientific knowledge and criteria were very important for selecting and employing the methods proposed in the project as well as sampling design.

Dr. Ciro Colodetti Vilar: Dr. Vilar was involved in fieldwork expeditions. He had an important role delineating the experimental design, selecting sampling sites and in data collection. His ecological knowledge and statistics skills were very convenient during fieldwork and in data analyses.

Francielly Uliana: worked in data collection during fieldwork. She is carrying data analyses regarding the minimum approach distance of fishes and divers. Part of our collected data will be used for elaborating her undergraduate dissertation.

Maria Bernadete Barbosa: responsible of the AMNP facilities in the archipelago area, she had an important role in this project providing logistical support during fieldwork as well as indicating suitable site for sampling within the Abrolhos Archipelago.

Lucas Cabral: worked in fieldwork. He was involved with boat support, dive activities and also with data collection.

Caio Pimentel: helped in fieldwork and data analyses. Pimentel was responsible for teaching and guiding the software use for measuring the minimum approach distance.

I have established new partnerships with researchers for help in data analyses. These include **Dr. Tommaso Giarrizzo** from the Federal University of Para state and the PhD candidate Caio Pimentel. Pimentel is a team member of Ichthyology lab (which I am hosted under the advisory of **Dr. Jean-Christophe Joyeux**) and has been involved with the first expedition to help in the experiment design and methodology adjustments. Dr. Giarrizzo has been involved with research using with video records of fishes and has a lot of experience in ecology of fishes. Their support were fundamental for the experiment development and also for software acquisition for the minimum approach distance analyses.

12. Any other comments?

Leading a project founded by Rufford Foundation was an amazing opportunity for my academic and professional growth. The Rufford Small Grant allowed me to still working part of the ideas that raised during my master's project and also to be involved with conservation in a very important marine protected area in Brazil. I am

sure that our results will be very useful for management and conservation of the Arolhos Archipelago and for other Brazilian MPAs.

The Rufford Small Grant was very important in front of the economic and political crisis in Brazil. Brazilian government cut off a huge part of the budget designated for science and technology, education and also environmental issues (find below some important news about government actions related to cuts in science). In front of this economic and political scenario, the Rufford Small Grant was essential for carrying scientific works related to conservation. Thus, I am very grateful to have this opportunity provided by the Rufford Foundation.

Find some links of important news about Brazilian cut in science:

“Brazilian scientists lament ‘freeze’ on research budget”

<https://science.sciencemag.org/content/364/6436/111>

“Bolsonaro's first moves have Brazilian scientists worried”

<https://science.sciencemag.org/content/363/6425/330>

“Brazil's government freezes nearly half of its science spending”

<https://www.nature.com/articles/d41586-019-01079-9>