

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	Aylin Alegre Barroso
Project title	Reaching the ecological sustainability within the protected area Yara-Majayara, Baracoa, Cuba.
RSG reference	13121-B
Reporting period	April 2013 – May 2014
Amount of grant	11500
Your email address	aylinalegre@gmail.com
Date of this report	August 27 th 2014

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
To enhance compost production by supplying water to farmers, for decrease bat guano use.			X	Was planned one cistern (10 m ³), but we could afford one more cistern of equal capacity of water, and the reparation of two more cisterns. That was possible because of the good prices of the construction materials.
To diminish human excreta discharged into the ground by the construction of 10 ecological (dry) bathrooms.		X		We planned 10 bathrooms but it was possible to construct just five because the prices of the wood increased.
To reduce impacts of free livestock in the farms and to promote the use of animal excreta in the production of compost and biogas plants, all of this by providing enclosures for the farms.			X	
To promote the use of a renewable and cheaper fuel and to diminish forest devastation in the area (through the construction of five small biogas plants).		X		We planned five small biogas plants, but just three were done. Just three farmers had the real possibilities to have sufficient quantity of animals to obtain enough excreta for the biogas plants.
To conduct ecological researches about spiders as potentials biological control of pests and the possible effects of the use of herbicides, pesticides and burning on the diversity and abundance of spiders in the crops (always involving the farmers on it).			X	
To continue leading invertebrate fauna inventories in the protected area.			X	
To support communitarian environmental education through:			X	

<ul style="list-style-type: none"> - Workshops to build capacities for farmers and technicians of the area in ecological management of crops. - Ecological trails guided by panels. - Handbook of agriculture good practices and ecological management of pests. - Guide of common plagues and their biological control. - Talks in communities and schools. 				
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

We were affording some difficulties with the acquisition and the prices of the wood to construct the ecological bathrooms and the rustic panels to guide the trail. In the first case we had to construct the half of the numbers of bathrooms planned (five ecological bathrooms), in the second case we found a better solution. As some farmers were very motivated with the idea of ecological trails in their farms, we could not desist of it. Then we had an initiative, we replaced the panels of wood for another material (poly vinyl) to construct the charts. The new material even a little more expensive gives the possibility to the farmers of moving away the panels if the weather conditions are bad, also if they want, they can move the trail easily to new places for example to another property. In this way other motivated farmers can participate in this initiative showing their ecological solutions in their farms to a diverse public (students, tourists, etc.) that visit the protected area. This initiative denominated guided trails is a Latin American methodology where the visitors are incited to reflect and to take their own decisions without imposing them the knowledge, neither the attitudes. We are attaching the sequence of the charts, which are in Spanish and English in order to facilitate the divulgation of the idea among interested people.

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

We can split our most important outcomes in three types:

1- Constructive outcomes

Among all the constructions made during this project (water cisterns, ecological bathrooms, biogas plants, enclosures in the farms), the first was the most important outcome. The construction of two water cisterns and the repair of two others enhanced the compost production in the protected area. Several farmers began to do compost piles and to refuse bat guano (a serious conservation problem previously detected during our RSG projects), by consequence was observed a decrease in the harvest of bat guano into the caves. These farmers could experiment by first hand that do compost is not dangerous like harvest guano inside the caves, besides they learned about the importance of bat guano in the cave

ecosystem. Also with this action we provided water to several communities (Majayara, Majana and Boca de Miel) a basic necessity which is indispensable to afford any conservation effort.

We also have to mention the importance that had the construction of five ecological or dry bathrooms in the protected area (as a pilot experience) which served to show an alternative to the latrines. This kind of bathroom, contrary to the latrines, doesn't expel the waste directly into the ground, which prevents the contamination of the soil and the subterranean water and, of course the caves. The ecological bathrooms are especially important in the karst terrains, because the porosity of the limestone, even more because there the communities are located along three levels of marine terraces, where highest communities can pollute the inferior levels.

2- Environmental Education outcomes

All the environmental education results were relevant: i.e. the workshops to build capacity in farmers and technicians about ecological management of crops; the interactive talks in the communities and schools. However, the elaboration and distribution of a handbook of agriculture good practices and ecological management of pests, and a guide of common plagues and their biological control, as well as the design and establishment of an ecological trail guided by panels were the most important outcomes among this kind of contribution. We consider that the handbook, which reflected all the good actions to carry out in a farm to be in concordance with environment care and the human health, was a valuable final product for the farmers. On the other hand the guide of common pests and their biological control was a practical and useful tool for the farmers who want to reduce the use of chemicals in their crops and also it stimulated to keep researching about possible new biological controls of plagues among the farmers. Finally, the ecological trail inside the farms gave the opportunity to the farmers to show their achievements using ecological solutions and at the same time serves as a permanent education tool where several people (students, national and international tourists, etc.) were benefited.

3- Scientific outcomes

All the information obtained in the research about the effects of the use of herbicides, pesticides and burning of vegetation on the diversity and abundance of the spiders in a mixed crop (tomatoes-string bean-pimiento) and the identification of some pests among the spider's prey was useful in first place to the farmers. They participated actively in the field work, which allowed them to understand that some agricultural practices can influence in the conservation of the natural preys of their crops. Some general results of the spider research supported the above statement. The diversity and abundance of spiders increased in the plots without applications of chemical herbicides, pesticides and burning in the two months sampled. Also we obtained that in the earliest phase of the crop (October) the dominant species were residents of the soil (litter and ground) like species belonging to the families Ctenidae, Dipluridae and Salticidae but in the advanced phase of the crop (December) were found eminently weaver spiders belonging to the families Araneidae, Theridiidae and the hunter species of Thomisidae (flowers crab spiders) and Ctenidae. Some species were

registered uniquely in the plots without treatments like *Nops* sp. (Caponidae), one conspicuous species of the family Oonopidae and another species of the ant mimics spiders Linyphidae. These species could be those spiders, that had the highest ecological requirements and by consequence could be the most sensitive species to the effects of herbicides and pesticide or burning of the vegetation, although they could also be rare species in this agroecosystem, because they showed low abundance. Another interesting data were the observations of the predator behavior of some spiders on pests, i.e. one species of Theridiidae was observed predated the white fly *Bemisia tabaci* (Hemiptera), one Thomisidae species predated an adult of the lepidopteran species *Ascia monuste eubotea*, one adult of the lepidopteran species *Anomis erosa* was caught in a web of an species of Araneidae and one adult of the dipteran species *Liriomyza trifolii* was observed in a web of an small species of Theridiidae. Regarding the affectations of the tomato plants we observed that the 27% of the plants showed some foliar and fruit damage in the plot with application of chemical herbicides, pesticides and burning, however we observed a discrete differences in the plot without these treatments, we found that 29 % of the plants presented some foliar or fruit damage. This result could be because the plots without chemical treatments and burning need other managements that together with the spider control help to reduce the impact of plagues, like more applications of entomopathogen bacteria and fungi, and plantation of trap plants or barrier crops. The productivity in both parcels was almost similar. A scientific article is under preparation with all the data and results gathered during these experiments supported by the present project, but as is requested by the scientific magazines we will add another year of field research to public these results. It is necessary to mention that in the plot without chemical treatments and no burning, the farmer just did fumigations with entomopathogen fungi and manually eliminations of weeds.

We also have to mention another important scientific result, which was the participation in the XVII Mesoamerican Congress of Biology and Conservation. There we presented a work about the conservation of the troglobite species *Jimeneziella decui* (Arachnida: Opiliones) that lives in the caves of the protected area Yara-Majayara. This work illustrated part of the results that we had been obtaining in the area during five years with the Rufford Foundation support. The presentation was in the modality of poster and was the winner work in the contest of posters that was developed during the congress.

The submitting of another scientific paper (not planned) entitled "Estado de conservación de *Jimeneziella decui*. una especie cavernícola de Cuba (Opiliones: Laniatores), Revista Ibérica de Aracnología", was also another important outcome which deserve to be mentioned. In this paper was offered an analysis on the troglomorfic characters and the troglobite condition of the species. Some data about the observed capture behavior of *J. decui* and the biocenosis of the caves were also offered. A debate on the possible threats for the species and their habitat was presented. The conservation measures for this threatened opilion was also given, plus the actions already developed inside the Protected Area Yara-Majayara, Baracoa, Guantánamo, Cuba, which until now entirely include the distribution area of this endemic arachnid. All this information is very useful for the managers of protected area, mainly the list of the invertebrate fauna of four caves in the area.

It is necessary to comment the invitation that I received to participate as a member of the IUCN Cave Invertebrate Species Group of the IUCN Species Survival Commission, basically for the work developed in the conservation of the cave invertebrate fauna during the RSG projects conducted in the Protected Area Yara-Majayara, Guantanamo, Cuba.

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

During the project were involved five communities, Boca de Miel, Majana, Majayara, Yara and Boma. About 115 children of six schools, 25 farmers, eight technicians and other workers of the protected area were benefitted from this project; all of them received print materials produced during this project like the handbook of agricultural good practices and ecological management of pests as well as the guide of common plagues and their biological control. Also they received talks, about practical and ecological solutions to reach the ecological sustainability within the protected area. Specifically the farmers and technicians of the protected area received a workshop about ecological management of crops. With all the constructions (water cisterns, ecological bathrooms, biogas plants and enclosures for the livestock) were benefitted about 40 families from the communities Boca de Miel, Majana and Majayara. Regarding the ecological trail guided by panels, located in one farm of Majana town, had been benefitted children and adults from all the communities involved in the project, plus people of the near city of Baracoa and from other parts of the country, besides tourists who visit the protected area.

5. Are there any plans to continue this work?

We plan to continue working in the protected area, mainly promoting and assuring the conservation of the cave fauna and the invertebrate fauna of the zone and of course to keep completing the knowledge about them. Besides, we are very interesting to continue introducing ecological ideas among local people through environmental education work and offering them the real possibilities to keep acquiring ecological technologies. For this, we plan to apply in the nearest future to other funds.

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

The information and the experiences gathered during the project will be at the disposition of other researchers and national projects through fauna lists, a geo-referential database and a bank of images at the Institute of Ecology and Systematics, manuals of environmental education (i.e. Handbook of agricultural good practices and ecological management of pests, guides of fauna (i.e. Guide of common plagues and their biological control), as well as all the specimens collected during the field work of the project which were deposited in the zoological collections of the Institute of Ecology and Systematic for the revision by other specialists. Besides, the scientific and popular papers produced will serve to share the results with all the people interested. But also, we expect to still offering the interesting finds during

the project which are yet unpublished through new papers, for example about some taxonomic or ecological aspects regarding the invertebrate fauna of the protected area, as well as we plan to participate in national events to present the achievements of the project, in scientific or environmental educations matters.

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 proposed date frames for the project were April 2013 until May 2014. Although the funds arrived March 19th, the beginning date of the project continued being April 2013 (as was previously planned) and the project was satisfactorily finished at the end of May.

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
Transportation Havana-Baracoa	1700	1700		
Food	2600	2590		
Fuel	1000	986		We combine some trips and for that reason we save some money in this item, which was available for other item.
Batteries	100	110		
Vials for collects	100	94.10		
Wasting material for collects	100	112.31		
Building materials for water cistern and hydraulic connections	2100	2097		
Building materials for 10 ecological bathrooms	500	496		Because of the increase of the wood prices and the difficulties to obtain it we could construct just five ecological bathrooms.
Building materials for 5 biogas plants	500	300		We constructed three plants, instead of five. Just three farmers had the real possibility to have sufficient quantity of animals to obtain enough excretes for the biogas plants.
Materials for livestock enclosures	400	400		
Materials for rustic panels	200	350		We used a new material which was a little more expensive.
2 Manual grass cutting to diminish burning	200	0		These were not bought because the farmers decided that others tools were

				more important in this kind of terrain. (see below)
Tools for agricultural managements (rakes, machetes, shovels and hoes)		200		The farmers suggested buying these tools, instead the manual grass cutting for their agricultural works.
Video projector for education activities	400	389.25		
Office and school materials	300	280		
Printer toners	150	147.17		
Photocopier toners	150	139.22		
Pests and Predators Guide printing	400	410		The price of printing varied
Farmers' handbook printing	600	620		The price of printing varied
Total	11500	11421	78	Bank taxes transference

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

We feel that is necessary to continue divulgating the results of this project, in order to apply the experiences in other protected areas of the country with similar conservation problems. For that reason we plan to organize an encounter with the specialist of the karst ecosystems in the National Center of Protected Areas in Cuba to share all the results and experiences.

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?

The RSGF logo was used in every presentations of the project, like talks in the communities, workshops, in the poster to the XVII Mesoamerican Congress of Biology and Conservation, in the printed materials like the handbook of agricultural good practices and ecological management of pests and the guide of common plagues and their biological control, in the ecological trail' charts in the farms and in the informative pamphlets that supported all the environmental education conducted.

11. Any other comments?

We really like to thank the Rufford Small Grants Foundation for the support during 5 years in the work at the Protected Area Yara-Majayara, Guantanamo, Cuba. This place is considered a Natural Monument as few in the country, where the flora and fauna is diverse, with a high number of endemic species and the history and invaluable karst landscapes come together.