

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	Fredy Alexander Alvarado Roberto
Project title	Biodiversity conservation, ecosystem services and land use management in livestock dominated landscapes in South-eastern Mexico.
RSG reference	14030-1
Reporting period	September 2013 – September 2014
Amount of grant	£5764
Your email address	fredacho9@gmail.com
Date of this report	24 th September

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
Dung beetle richness biomass and densities		X		A total of 37 species in 18 genera have been identified. I found a reduction in the diversity of species and biomass along the gradient towards greater technification (from silvopastoral to technify). Due to the fact that identification of all of the species took longer than expected, I am currently working on the estimation of density of species.
Economic data			X	I have collected all of the economic data for 20 plots. Initially, we had planned to do this for 24 plots but in the end we worked on four plots per system in five levels of comparison (Forest, silvopastoral, traditional, technified and Maize-Sorghum-grass) for a total of 20 plots
Evaluation of ecosystem services		X		I have completed the evaluation for the removal of excrement and removal of the soil, however, evaluation of the control of flies and the quality of grasses was more complex than expected (in terms of time and logistics). For this reason we have suggested the exploration of other possibilities that allow us to model and map ecosystem services of importance in livestock production. This analysis will be complete by the first half of 2015.
Density-yield functions		X		I will begin the analysis of density-functions when I have completed the estimation of the density of species, which I am working on at present
Quantification of grass quality	X			This objective was not met with the proposed methodology. However, we have begun the exploration of satellite images of each of the plots in order to analyse other possibilities of quantifying the quality of the grasses.

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

We had proposed to evaluate control of the flies by the dung beetles. This objective was not achieved due to the logistic difficulty of placing the 480 flytraps within the funded period. Our pilot

study revealed the great difficulty of characterising the immature stage of the flies and the field experiment did not produce the expected results. Similarly, the evaluation of the quality of grasses using the 480 subplots was more problematic than expected (in terms of time and available resources). For this reason, and as suggested by the referees of this study it is proposed to analyse the net aerial primary productivity using satellite images and field verification in the following year.

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

1. Over the course of this study, we counted and identified 191,441 individuals. We found a landscape with land uses associated to livestock production that comprised 37 species and 18 genera of dung beetles. However, four species still await identification by experts (of these, three are possibly new to science). Our results revealed a greater species richness in the silvopastoral (19 species \pm S.D. 2.4) compared to the traditional (17 species \pm S.D. 2.4) and technified (15 species \pm S.D. 1.8) production systems and the intensive technified modules with production of maize, sorghum and grasses (12 species \pm S.D. 1.3), while the forests presented the highest species richness (24 species \pm S.D. 2.8).
2. The excrement removal rates (proportion of excrement removed by the dung beetles in a period of 24 hours) revealed that, with 68 kg deposited in each production system (n=4), the silvopastoral systems were the most efficient at removal (63% of excrement removed \pm S.D. 92.1), compared to the traditional (60% removed \pm S.D. 73.2) and technified (50% removed \pm S.D. 73.2), in contrast with the forest (75% removal \pm S.D. 90). The intensive technified modules of production were not included in this analysis because of the high variation found in the rates of removal among the study plots, caused by the asynchrony in the sowing phase of maize-sorghum.
3. The production costs/income interviews have been completed (August 2014); however, I expect to complete my analysis and adjust the data in order to conduct density-yield functions in order to establish which kinds of livestock regimes are capable of retaining more biodiversity relative to natural habitat. This analysis will allow me to understand the individual response of the species in each production system in terms of which species are more susceptible to the intensification of livestock production. This objective will be completed before September of the following year.

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

My study area is in one of the regions most important for livestock production in Mexico. For this reason, this project has sought the creation of synergies between livestock producers and NGOs. Similarly, we have involved campesinos and indigenous people of the area as field assistants, providing them with the direct benefit of funds obtained through the RSG. Over this year, we have participated in meetings with local producers in order to set out: 1) the objectives of this study; and 2) demonstrate the preliminary results. Similarly, we have sought to make the livestock producers and landowners aware of the methods and results of this research.

5. Are there any plans to continue this work?

This work will continue as part of my PhD research until 2016. Over this time, I will continue with the exploration of measurement of ecosystem function within the livestock production systems as well as the integration of results and conclusions of this research.

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

The results of this study, have and will continue to be shared with the producers and landowners where the study was conducted. I intend to produce a pamphlet in Spanish (for a broad audience), which will explain the importance of the different livestock production systems to biodiversity conservation and the supply of ecosystem functions that are key to livestock production. Likewise, the final results of this study will be published in at least two different articles in international journals. Furthermore, I will continue presenting my results at scientific/academic events both in Mexico and in other Latin American countries. I will present my results in 2015 in at least one of the thematic meetings organised by SAGARPA (Secretary of Agriculture, Livestock production, Rural Development, Fisheries and Food of Mexico). In May 2015, I intend to participate in the VIII International Congress on Agroforestry Systems for the Sustainable Livestock Production and Forestry to be held in Argentina.

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 Foundation grant was used over a period of 12 months from September 2013 to September 2014. The RSG grant funded two important phases in the field (2013-2014), meeting the majority of the objectives originally planned. Certain objectives have extended in timescale due to different factors relating to the study (i.e., technical support, climate etc.). I consider that eighteen months more would be ideal for completing all of the objectives of this study, considering that it forms part of a doctoral study extending from 2012 to 2016.

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
Consumable items for measurement of dung beetles diversity and ecosystem functions	£ 519	£ 519	-	The amount was sufficient to purchase all of the material.
Other materials and supplies (GPS unit, Portable Electronic Balances, Portable oven)	£ 629	£ 629	-	-
Salaries/field staff and assistants	£ 2439	£ 2800	£ 361	The amount of money was sufficient to cover the cost of three field assistants during the first and second rounds of fieldwork.
Main research accommodation in study area	£ 600	£ 800	£ 200	Total cost for research accommodation was estimated at £ 600 but in reality it cost £ 800. I made up the difference with personal funds.
Bus tickets	£ 257	£ 257	-	The amount of money was

				sufficient to cover this cost.
Fuel	£ 170	£ 250	£ 80	Large distances between study sites and recent increases in the cost of fuel resulted in a greater consumption of fuel and expenditure.
Vehicle	£ 1150	£ 1550	£ 400	Total cost for car rental was estimated at £ 1150 but in reality it cost £ 1550. I made up the difference with personal funds.
Total	£ 5764	£ 6805	£ 1041	All differences were covered by other sources of financial support (i.e., personal funds and those of my academic advisor)

Notes to Budget: £1 = \$21.50 Mexican pesos (29/09/2014)

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

I consider that the next important steps will be to integrate the different aspects of the results, as well as to explore other methodology (i.e., satellite imagery) that will allow me to generate a detailed and comprehensive analysis of the provision of ecosystem services, biodiversity conservation and the production of livestock in southeast Mexico. From January to April 2015, I plan to conduct a final phase of fieldwork in order to collect the information necessary for modelling and mapping of ecosystem services. I hope to obtain enough information to propose strategies of conservation that can favour the synergy between food (meat) production and the provision of ecosystem services.

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?

I have used the RSGF logo in every presentation made in connection with this project over the past year, including in different institutions (Instituto de Ecología A.C, local livestock producers and NGOs). I intend to continue using the logo and name of this organisation at future conferences and/or scientific events where the final results of the study will be disseminated. I will also fully and gratefully acknowledge the foundation in the articles that will be submitted for publication in scientific journals.

11. Any other comments?

I am extremely grateful to Rufford Small Grants Foundation for helping me in this important phase of my research. Without this invaluable economic support, the collection of data would not have been possible. Thank you very much.