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	Pedro David Fernandez
Project title	Evaluating the conservation value of silvopastoral systems in native woodlands of in the Argentine Dry Chaco
RSG reference	25426-1
Reporting period	December 2018 – December 2019
Amount of grant	£5000
Your email address	pd.fernandez91@gmail.com
Date of this report	13-01-2020

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 Assesses biomass stocks, aboveground productivity, diversity and forest structure of silvopastoral systems in a gradient of tree cover and rainfall.				Thirty-four sites on seven farms with different rainfall regimes were analysed, including woodlands and different types of silvopasture. These constitute the largest and most representative set of silvopasture data in the dry chaco, covering 136,000 m² with trees and 16,700 m² with shrubs and saplings.
To Evaluate medium-large mammal richness, composition and individual patterns of activity in different forest structures of silvopastoral systems, using native forests as reference				170 camera trap surveys were analysed with more than 5000 photos of mammals in different silvopastures and woodland structures.
To analyze soil quality variables of such systems including physic, chemical and microbiological indicators;				More than 350 soil samples were taken and analysed.
To analyze the consistence of the responses found in 1-. 2- and 3- at different spatial scales, to identify better conditions for cattle development and ecosystem conservation.				We analysed, and we are still analysing such amount of information to provide evidence of silvopastures as sustainable land-use in native woodlands of dry chaco.

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

None.

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

We found that silvopastures systems can keep from 50% to 70% of the above-ground biomass (70% to 90% of tree biomass) of native forest, while producing up to 10 times more food. However, trees tend to decrease with successive shrub controls, which require urgent improvements in vegetation management.

We estimate that silvopastures hold an average of 45% of the relative richness of the medium to large mammals in each site. Producer interviews also allowed us to understand many of the conflicts between ranching and wildlife.

Our results show that the adequate implementation of pastures in silvopastures may increase carbon stock compared to native forest, offsetting the reduction of carbon by roller chopping.

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

As a key point, we were able to approach producers and evaluate their perception of the environmental assessments of their productive systems. During the report's presentation and interviews, we also had the opportunity to discuss with their peers about the benefits of implementing silvopastures compared to total deforestation. Local articles will help to expand this information to a broad range of landowners.

5. Are there any plans to continue this work?

To continue with the environmental assessments of silvopastures in the dry chaco, three main lines will be developed with the intention of further advancing the understanding of the sustainability of the land systems.

First, we will carry out a regional evaluation of the conservation status of silvopastures in more than 150 fields throughout the region. We will tackle this issue with a remote sensing approach using Baumann *et al.* 2018 tree and shrub cover maps and governmental information of silvopasture fields. We will validate this information.

In addition, at a microsite level we will evaluate how pastures are affected through different levels of trees and shrub covers. This will be tackled for the two main grass species *(Megathyrsus maximum cv. gatton panic* in northern chaco, and *Pennisetum ciliare* in southern chaco). With this evaluation we would complete a multi scale assessment encompassing regional, site and microsite levels.

Finally, we will start to evaluate the natural grasslands and savannahs of the region. In our last study our state of reference was woodlands. However natural grasslands are also part of the dry chaco landscapes and have been neglected in terms of conservation policies, which largely focus in the woodlands. We will evaluate biodiversity and biogeochemical variables in these systems.

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

Reports on vegetation physiognomy, soil quality, and carbon stocks assessments have been provided to all producers in personal reports. Reports on medium and large mammals will be delivered until March 2020.

A peer-reviewed article in which I am the first author was submitted in the international journal *Agriculture, Ecosystem and Environment* and is now under corrections pending to be accepted. This article is named "a hard-to-keep promise"

Three more manuscripts are being written in this moment:

1. An article led by Dr Murray that will be submitted to a local Spanish language journal. This article presents an overview of the results of all the field evaluations. In addition, we will discuss the current state of knowledge on the sustainability of silvopastures and the next challenges to be addressed.

2. An article led by Dr Nanni, in which we evaluate how vegetation structure (in particular tree and shrub cover gradients), and livestock management (water bodies, fences, stocking rates), affect different mammals, and whether landscape management is more important than the social environment for their persistence in these social ecological systems.

3. An article led by Dr Banegas. In this article we will evaluate the effect of recurrent management practices (particularly shrub controls) on soil quality.

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 from January 2019 to January 2020.

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	1000	1400	+400	Inflation in Argentina reach one of the historical records in last two years, making hard to sustain efforts in field assessment.
Vehicle maintenance	1000	1200	+200	Including 4 car services
Food	1050	1050		We adapted this cost as is the more

				flexible
Motorway tolls	50		-50	
Cameras	900	600	-300	Only two cameras were bought.
Chemical soil analyzes	250	250		
Microbiological soil analyzes.	350	350		
Workshop with cattle ranchers.	400		-400	It is still pending
Total	**5000**	**4850**	**-150**	

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

We hope to communicate our results to the national government, local producer associations and the scientific community through peer-review articles.

We intend to continue evaluating critical environmental aspects of silvopastures, particularly at a regional and microsite level (two levels of perception that are complementary to the first step of the project).

As a long-term objective, we feel that our contributions should aim to fill the key information gaps needed to develop a certification process for farms that manage silvopastures in a sustainable way. This process will have the objective to guide environmental assessments and support strengthening of a sustainable ecosystem stewardship.

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?

We used the logo on data presentation, as well as in the reports for landowners, and we also included and will include the Rufford Foundation in the acknowledgments section of the submitted paper and the papers to be submitted.

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

Francisco Murray coordinated the south to make and assessments in San Luis Province.

Sofia Nanni was the main support in camera traps surveys and analyses.

Natalia Banegas and **Emilce Viruel** were in charge of soil laboratory determinations and result analyses.

Ignacio Gasparri helped in sampling design and supervised the project goals, while also helping in manuscript redaction.

12. Any other comments?

We are particularly grateful to the Rufford Foundation, because their support allowed an unprecedented regional evaluation of a productive system prone to dominate in millions of hectares along the dry chaco, one of the most threatened ecoregions due to land use change. This study confirms that silvopastures may retain a big proportion of the aboveground biomass that still maintains an appropriate environment for biodiversity in general. Better practices to sustain these ecosystem services, and institutional support as control, and promoting these land systems are really needed to develop quality productive systems that reconcile production and conservation.