Final Evaluation Report

Your Details	
Full Name	Guadalupe Pacheco
Project Title	Remnant *Quercus* trees as ecological resilience factors in temperate forests impacted by bark beetle in southern Mexico.
Application ID	24129-1
Grant Amount	£5,000
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Date of this Report	14th February 2020

1. 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
Community Workshops and Capacitation				The workshops were held in different communities. Some workshops were specific for the forest owners (young people and men and women adults), with two main topics: forest health and the importance of the genus *Quercus*. Some workshops were aimed at children to highlight the importance of environmental goods and services. In addition, there was the active participation of guides and young people from the community during the data collection in the forest. These participants learned how to measure the trees and identify the presence of pests in the trees. Some of the limitations was to synchronise times between forest owners and children.
Evaluate the impact of bark beetle (BB) on forest composition by identifying affected and remnant and residual affected tree species				All the sampling sites considered in the project were established, the stumps of affected trees were measured, and the tree species genus of both *Pinus* and *Quercus*, were identified. During the rainy season the study area was inaccessible, so the routes to the forest were rescheduled.
Evaluation of presence of beetles and identification in the laboratory.				There was no presence of new outbreaks in the evaluated areas, thus, no collections were made in the study area.
Socialization of results				A video compiling the importance of the genus *Quercus* was recorded. Also, to show the ecological and economic-social importance of oaks, and the mitigation of climate change, a catalogue was developed. These materials were delivered to the community and uploaded to social networks for better dissemination. In addition, preliminary results of the

				project were presented at the Mexican Congress of Ecology.

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

In the rainy season the accessibility to the study area was complicated, so we had to reschedule the field trips to days with better weather conditions.

Because of the type of the road, a band of the truck in which we were moving, broke, so we had to paid for its reparation, since the truck belongs to the community.

It was difficult to schedule the workshops with the forest owners due to their daily occupations. The same happened when programming the workshops with the children, because it is necessary to go to the classroom to carry out the workshops.

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

1. Recognise that the genus *Quercus* is an important component of the canopy in the areas affected by the bark beetle, since it allows maintaining the coverage, stores carbon, and generates proper conditions for other organisms. A list of oak species from the study area was made, contributing to the local knowledge of the tree species of its temperate forests.

2. Demonstrate that the pest of the bark beetle modifies the structure of the forest and decreases the number of individuals of species susceptible to attack by this pest.

3. The teaching of local communities, both men and women (adults, young people, and children) about the importance of monitoring the health of the forest and how the genus *Quercus* can be an important element to increase resilience to pests.

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

The inhabitants of the local communities were the key to recognizing the history of bark beetle effects and to define the area to establish sampling sites. They participated as guides during the gathering of information in the field and supported the measurement of the forest. Hence, they developed skills to handle different measuring instruments such as GPS, tape, clinometer and compass. In addition, dissemination material (video and oak catalogue) was developed to show the ecological, economic, and social importance of the oaks. Elaborating a list with the species of this genus found in the study area provides to the community people the knowledge about their forests. Additionally, a series of workshops were given in order to show how to identify pests in a timely manner and what to do if presented. Likewise, they worked with the children of the localities to instill in them the care of the forest, since they will be the future generations that will decide on the forest conservation.

5. Are there any plans to continue this work?

In my future professional life, I would like to develop research projects that address the conservation of temperate forests, through the following aspects:

1) The ecological role of the genus *Quercus*.

• Study of the functional diversity of species of the genus *Quercus*, to show the role they have in the temperate forests of one of the most biodiverse states of Mexico.

• Implementation of strategies to teach local communities how to reproduce seedlings of the genus *Quercus* (seed collection, substrate preparation, establishment in the field).

• Increase the sampling effort to increase the list of species of the genus *Quercus* identified. Since it is considered that in the Sierra Norte there are 22 species of this genus, and according to the specialist Taxonoma, there are probably some species to be described.

2) Monitoring of temperate forests affected by forest pests

• Use of technologies to monitor changes in the forest.

• Evaluation of environmental services in areas affected by debarker (carbon storage, soil protection and biodiversity of other organisms).

• Description of the effects of other forest pests such as defoliator and mistletoe.

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

The video was delivered to the community on a CD, and the catalogue was delivered printed. In addition, the video was published on the NGO website with which I have collaborated. Also, I attended to the Mexican Congress of Ecology on October 2019, where I showed preliminary results of the work I do. Currently, I am preparing a science article to share the results of this work with the scientific community. To achieve this goal, I will also share this publication on the ResearchGate site and be able to link with other researchers.

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

The grant was used for 12.5 months, because there were delays in the delivery of results to the community, related to the delay in printing dissemination materials and due to the times of the schools.

8. Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Payment to local guides	300	300		
Food and lodging for the teamwork	1400	1400		
Gps	300	300		
Community workshops supplies	500	510	+10	Workshops for children were attached.
Travel to research sites (gas)	2000	2010	+10	The cost per liter of gasoline was variable over the period in which the project was carried out, so the total cost was higher than expected.
Design and printing of dissemination materials	500	500		
TOTAL	**5000**	**5020**	**+20**	**Note: 1 £ sterling = 24.85 pesos**

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

First, to publish the results in an international journal to inform about the problem of forest pests in temperate forests and how other genera of species can cushion the effect of these pests, especially carbon sequestration and water supply.

The, to reproduce the workshops and talks in other local communities involving young people and children.

Finally, that the public policy makers in Mexico, recognize the role of the genus *Quercus* as a resilient element to the occurrence of forest pests.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

A local media conducted an interview with the work team of Dr Elvira Duran to know what has been done in relation to the issue of forest pests. In this interview we talked about the grant we obtained from the Rufford Foundation.

https://newsweekespanol.com/2019/03/cambio-climatico-incentiva-plaga-escarabajo-descortezador-sierra-norte-oaxaca-ciidir/

The Rufford Foundation logo was used, in a presentation presented at the Mexican Ecology Congress.

In the audio-visual and printed materials delivered to the community, the Rufford Foundation logo was used.

During the workshops and talks, the Rufford Foundation logo was also used.

Reference was made to The Rufford Foundation project in the following interview https://www.facebook.com/AztecaOaxacaOficial/videos/399974854149168/?v=399974854149168.

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

Dr. Susana Valencia Avalos. National specialist in taxonomy of the genus *Quercus*. Support in the identification of the species of the genus *Quercus*.

Dr. Elvira Duran Medina. Support in the design of the methodology to be implemented in the forest and the statistical analysis of the information collected.

Ing. Elber Miguel, Biól. Sergio Pérez Contreras. Support in the collection of information in the field and in the preliminary design of audiovisual and printed material.

Ing. Dalia Vasquez. Support in capturing information in databases.

12. Any other comments?

This grant has been valuable in achieving the objectives of this project and helped me strengthen my abilities as a project leader and researcher. But the most important thing was that the forest owners understood that *Quercus* trees are a key element in the forests due to the imminent presence of forest pests that have mainly attacked the genus *Pinus*. With this resource, children, who are an important component of the communities, should be aware of the forest care, since they will be the future stakeholders for forest conservation. I am infinitely grateful for the opportunity of this financing.