

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	Cecilia Simon
Project title	Participatory Monitoring of Ecosystem Service Tradeoffs in a Community Managed Forest: the Case of San Juan Lachao in Oaxaca, Mexico.
RSG reference	16811-1
Reporting period	29 th January 2015 – 31 st January 2016
Amount of grant	£4,998.00
Your email address	cecisimon@gmail.com
Date of this report	29 th January 2016

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
Develop capacity among community members to implement a long term monitoring plan.			X	A series of five workshops were held in San Juan Lachao covering theory and practice and ultimately developing the capacity among community members on a number of methods to monitor biological and physical forest attributes (including fauna presence/absence, temperature and rainfall, water quantity, carbon, natural regeneration and timber) and on how to consolidate and interpret collected data. The justifications for selecting these attributes were provided by participatory discussions and various monitoring methods were tried and tested in the field. The process was concluded with 18 community members (including three women) trained in numerous monitoring techniques and a fully community designed mid-term monitoring plan that will be implemented by a local community team.
Evaluate timber as a provisioning ecosystem service			X	Timber was evaluated using the community owned Forest Management Program and 301 permanent plots that were randomly selected within 2,388.75 ha of pine-oak forest and measured by the community monitoring team. Using the 301 permanent plots measurements and regression analysis it was found that the community has an estimated 222.56 m ³ per ha of timber stocked. In order to evaluate the provisioning service an economic analysis (cost-benefit) was implemented. Using the current annual growth rate (3.5%) and current harvest rate (1.16%), the Net Present Value for a 30-year horizon ranged from USD \$965,802 to \$2,051,436 for a rate of return of 9% and 3%, respectively. It was concluded that timber is an important provisioning service for the community given that it creates more than 80 jobs each year and has provided seed money for other projects.
Evaluate carbon sequestration as a regulating ecosystem service			X	Sequestered carbon and potential sequestration was calculated measuring 301 randomly selected plots in 2,388.75 ha of pine-oak forest. Three local teams that were trained by a carbon expert measured the plots in a 1 month period. These teams were remunerated for

				<p>a months work using profits from the forest management programme. It was concluded that the forest stores 320.74 tonnes of carbon (tCO_{2e}) per hectare. Projected sequestration was calculated using estimated growth and harvest rates, inferring that the forest can sequester between 5,000 to 15,000 tCO_{2e}/year between year 1 and year 26, and 6,000 tCO_{2e}/year in subsequent years due to an estimated decrease in forest growth. To valuate carbon sequestration as an ecosystem service current market prices were used (USD \$4.5) resulting in a profit of between USD \$124,355 to \$380,539 using a rate of return of 9% and 3%, respectively, over a 30 year horizon.</p>
Evaluate water quantity as a provisioning ecosystem service		X		<p>Community members were trained on the methodology to calculate water volume/sec in rivers and precipitation. Four rivers were monitored to create a baseline. Precipitation was measured in two locations for 1 year and is a current daily activity. Unfortunately, measuring water quantity in rivers to understand the effect of management practices was not accomplished. Given that this process is fully participatory, and funds and time from the monitoring team was limited, the community prioritised other ecosystem services over water quantity. For instance, the community decided to monitor fauna using camera traps to identify important species as well as to gather data to understand the impact of forest management on species distribution.</p>
Evaluate deer densities, impact on forest and hunting as a cultural ecosystem service		X		<p>Deer population within the forest management program (approximately in 2,300 ha) was assessed by setting 18 transects. Transects were monitored by members of the local monitoring team three times a year. Deer density was estimated to be on average 0.025 deer per ha. Hunting as a provisioning service was valued (note: provisioning service was valued instead of cultural value due to the sensitive nature of hunting in the community, which made it impossible to implement surveys, see section below). Given current deer density in the community, hunting would not be allowed at this point until deer numbers reach its carrying capacity. When and if this happens, the Net Present Value for a 30-year horizon could range from USD \$11,233 to \$29,887 for rate of return of 9% and 3%, respectively.</p>
Understand trade-offs and synergies		X		<p>This objective was partially achieved since water data has not been collected to fully comprehend the tradeoffs between water and timber management. To</p>

between ecosystem services				<p>assess tradeoffs between deer and livestock impact in the forest, the monitoring team designed an experimental study consisting of 12 plots controlling deer and livestock access. This objective was only partially achieved because conclusive results will not be available for another year (a baseline survey was conducted after installing, followed by resampling). This will continue every 3 months for one year).</p> <p>From the data collected of timber and carbon we can conclude that tradeoffs and synergies do exist between ecosystem services and that specific forest management practices and temporal scales influence these relationships. Commercial thinning, which is defined as harvesting trees between 20 and >40 years for commercial purposes, increased merchantable timber but compromised carbon stocks. Selective logging, also known as thinning from above, increased both services. Pre-commercial thinning, also known as thinning from below, reduced timber but increased carbon sequestration, maintaining carbon stocks over time. A significant difference between management practices and deer densities was not found, however there might be a compromise between carbon stocks and deer.</p> <p>These results will be reassessed once more data is collected by the community's monitoring team allowing for a deeper understanding of the relationship between ecosystem services.</p>
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

The main difficulties that arose during the project are described below.

- a. Time and funding constraints of monitoring team: During the first three workshops a monitoring plan was defined by community members that included the different biological and physical forest attributes described in the objectives hereby presented (and some others not included here) that were to be monitored by a community team (See Annex I for more details). Yet, the community monitoring team had other responsibilities and could not fully achieve the proposed objectives. To partially tackle this difficulty the team was economically remunerated during this year, partly using RSGF funds. Members then saw this as a job and not as a volunteer activity, which helped addressed this issue. With the results obtained by this project the community understood the importance of monitoring and has secured funding for two community members for 5 years to continue with the monitoring plan.
- b. Time constraints for data collection and analysis: The results here presented only reflect one year of data. In understanding the effect of management practices on ecosystem services, the study is only a snapshot in time and the temporal/spatial resolution is not large enough,

limiting its ability to generalise findings over space and time. Data to understand ungulate impact on forest regeneration is still to be collected in the following years. The team is now committed to continue to gather data for the next 5 years.

- c. Deer monitoring methodology: The methodology used for evaluating deer densities was challenged by a number of factors. Pellet group counting is complicated to monitor in a close forest with uneven terrain. The results varied between monitoring periods. This could be due to the different seasons when the monitoring took place or due to the methodology selected. Other methodologies will be further explored in the near future.
- d. Change in local government authorities: San Juan Lachao is a communal landholding ruled by an Agrarian Governing Body and a General Assembly (where most of the decisions are made). The Agrarian Governing Body, comprised of a commissary, secretary, treasurer and vigilance committee, changes every three years. A new governing body started as of 2016. With this change, members of the monitoring team were reassigned. To tackle this difficulty, the final workshop included a review of previous workshops for new participants and the project was presented to the current governing authority to ensure the permanence of the project.
- e. Deer as a cultural service: This proposal included valuing deer hunting as a cultural service. However, once the project was started community members decided that it would not be possible to implement surveys to assess its value given the sensibility of the issue being addressed. In the past deer hunting was a common practice among community members, who used the meat for consumption. It is now prohibited but hunting still takes place as an illegal activity. Asking about hunting practices would cause tension between community members. The community obtained a permit by the Ministry of Environment and Natural Resources to harvest a number of deer each year (i.e., sports hunting) but this has not been implemented given the low densities of deer. To tackle this difficulty, it was decided to quantify the economic value of deer as a provisioning service from sport hunting instead of a cultural service.

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

Outcome 1: Interest in monitoring and data gathering for decision-making has extended beyond the monitoring team into other components of the community (such as the new governing authorities, the forest management team, coffee producers and other residents).

The community has obtained important information in a short period of time that can guide future natural resource management. The results have reached community members beyond the monitoring team and have created interest among numerous stakeholders. The current governing authority has secured 5-year funding to pay salaries for two community members to lead the monitoring team and ensure the completion of the defined monitoring plan. The forest management team is now interested in working closely with the monitoring team to assess other biological and physical attributes. Among these, the community will now include the impact of different treatments on water quantity and monitoring of pests (which might include the impact of squirrels on pine cones). One of the most important results has been the validation of the presence of important fauna like puma (*Puma concolor*), margay (*Leopardus wiedii*), jaguarundi (*Puma yagouaroundi*), white-tailed deer (*Odocoileus virginianus*) and collared peccary (*Pecari tajacu*) among many others. Now many coffee producers would like to understand the fauna distribution within the community and specifically within the shaded coffee plantations. Results from the monitoring plan have also been used to develop outreach materials (pamphlets and posters) to share with potential tourists. These have also been distributed to local residents who knew about

the monitoring work but were unaware of its results.

Outcome 2: The project has generated robust and convincing information about the tradeoffs and synergies between different forest-related activities that are currently being undertaken by the community. Community members that initially were against any interventions in the forest are more supportive of the activities there and see the benefit it has brought to the community while maintaining (and perhaps even improving) ecological integrity.

The project shows that tradeoffs and synergies exist between ecosystem services. In the case of San Juan Lachao specific forest management practices affect ecosystem services differently since silvicultural regimes directly affect forest structure by removing trees of different ages and leaving a specific number of trees in the stand. Another important factor that influences tradeoffs and synergies is the time scale used. If a time snapshot is considered, management practices might generate immediate tradeoffs; however, for a longer period of time these relationships might change. For instance, given that carbon stocks and timber were positively correlated, as both are direct derivatives of tree biomass, immediate removal of trees increases merchantable timber, but compromises carbon stocks. Yet, it can be determined that even though carbon stocks and timber are immediate tradeoffs, in just a few years, these services can be synergetic. From these calculations, it can be stated that it is possible to achieve carbon sequestration and produce merchantable timber without compromising the sustainability of the system.

This study showed (using limited data) that current management practices should continue to focus on retaining dominant and co-dominant trees to increase forest growth and carbon sequestration. Focusing on non-commercial practices reduces income from timber. However, by incorporating carbon trading, this extra revenue could maintain/stabilise the forest management value. In that sense, It was also determined that managing ecosystem services conjointly can increase economic benefits without compromising the ecosystem's sustainability.

Another important outcome of this study has been a change in attitude of community residents towards forest management practices. When a forest management programme for timber extraction was firstly proposed in the community many members were against it. In the past their forest had been exploited unsustainably by an outside company, leaving them with an unhealthy forest and no revenue from timber sales. Community stakeholders were afraid this could happen again. This project has shown that a locally owned, well-managed forest under current practices, even though they might generate tradeoffs among some ecosystem services, could maintain the forest quality while creating jobs and profits for the community. Now that the relationship between ecosystem services is better understood, residents are more supportive of forest management activities.

Finally, this project has shown that empowering local communities to implement monitoring and data analysis to understand tradeoffs and synergies can lead to on-the-ground decision-making and social-ecological benefits.

Outcome 3: The project contributed to inter-generational transfer of local ecological knowledge.

A very important and key outcome has been the transfer of knowledge between community members. Elderly members, with a lot of experience in fieldwork (mostly from previous hunting practices) have worked closely with the monitoring team (mostly young community members), providing key insight on local ecological knowledge. This transfer of knowledge has been key in

obtaining the results presented in this study.

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

This project is 100% community driven with our involvement being more in the facilitation role. Leaders from San Juan Lachao Pueblo Nuevo (SJL) reached out to our team since they were uncertain if their interventions were having the desired benefits and whether there were tradeoffs between ecosystem services resulting from those management practices. Five workshops have been implemented to develop capacities on monitoring and data collection/analysis within the community in order for local stakeholders to answer (without external professional's assistance) these questions. A monitoring team was created within the community that reports their results to the communal governing authority and to the General Assembly where decisions are made by the entire community. Since it was a community driven project, a community team was involved from the beginning in the design and implementation of the project. This team decided what was to be monitored and organized themselves to be able to do so.

Eighteen community members (including three women) were trained in numerous monitoring techniques. A monitoring plan was fully designed by the monitoring team and is currently implemented. Along these tangible results, the process has promoted additional benefits, including intergenerational interactions and information exchange, appreciation of the forest by younger community members, demystification of the scientific process, and enhancement and appreciation of local ecological knowledge.

An important aspect is that the community has provided funding for this project. They provided food, lodging and transportation for our team, have paid for some materials and have provided some remuneration for the monitoring team for specific activities (e.g., carbon monitoring).

5. Are there any plans to continue this work?

This project is considered to be a long-term process. The community has a mid-term monitoring plan that is expected to be implemented within the next 5 years. Funding to pay the salaries of two community members to follow up on the monitoring plan has been secured for this time period. However, even though this part of the project is currently under full implementation and capacities have been developed on numerous monitoring techniques and methodologies, our team believes that the community still requires some assistance on data analysis and new monitoring techniques as well as funding for equipment and expert collaboration when needed. Given that this is a community driven process and our role in the project is limited and short-termed, our team will only continue to help facilitate the process in the future and help them secure more funding to make this a successful adaptive management project.

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

- The community has already developed some pamphlets and posters that are available for tourists and community residents.
- A short-term goal is to produce a biodiversity catalogue fully created by community members.
- The community is interested in using the project's information for environmental education in community schools.

- The monitoring team is interested in training other communities.
- This study contributed to the realization of an MSc Dissertation at the University of Edinburgh (*Understanding tradeoffs and synergies between ecosystem services to improve community forest management: the case of the San Juan Lachao Community forest in Oaxaca, Mexico*), which was passed in August 2015.
- The work was presented in the Mexican Ecology Congress in April 2015.
- At least two publications are expected to be developed for publication in peer-reviewed academic journals.
- The project is shared online on the *Integradora de Comunidades Indigenas y Campesinas de Oaxaca, A.C.* (a non-for profit) webpage.

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 grant was used over a year, when our team anticipated the capacity building and data baseline to be achieved. However, this is a mid to long-term project (5 to 10 years) that is fully driven by the community. Some funding to continue this process has been secured and more funding will be sought to ensure long-term outcomes and impacts.

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.

The exchange rate used was 21.69 Mexican Pesos (MXP) per £ sterling and 15.67 per US Dollar (figures are shown in both pounds and pesos).

Item	Budgeted Amount (£)	Budgeted Amount (MXP)	Actual Amount (£)	Actual Amount (MXP)	Difference (£)	Comments
Staff Costs	1,365	29,614	1,365	29,614		Three payments (July 7th, September 7th and 28th) were provided as compensation to local community members to implement some of the monitoring activities.
Experts Participation	736	15,967	691	14,984	45	Three experts were paid. PhD Tuyeni Mwampamba, PhD candidate Alejandra Larrazabal and Emiliano Guijosa. The three of them are part of the Institute of Ecosystems and Sustainability Research (<i>Instituto de Investigación de Ecosistemas y Sustentabilidad, UNAM - Campus Morelia</i>). The difference between actual and budgeted amount was due to the committed rate of

						Emiliano Guijosa at the beginning of the project.
Travel Costs (Air)	1,375	29,831	811	17,596	564	Two trips (for three experts each) took place (August 27th and Jan 22nd, 2016). The airfare cost was less than budgeted because we were able to obtain discounted airfares.
Travel Cost (Bus and taxi)	147	3,189	254	5,507	-107	This expense was larger than the budgeted amount because some journeys were not considered in the initial budget. Two receipts for taxis could not be obtained given the informality of the service.
Equipment - Fence for deer enclosure	786	17,052	1,189	25,787	-403	The cost of the fence was higher than the budgeted amount because it was bought in Puerto Escondido for transportation efficiency and not in Oaxaca City where it was cheaper.
Equipment - Posts for fence	589	12,778	380	8,250	209	The cost was less than the budgeted amount because they were obtained within the community.
Food and Lodging			117	2,545	-117	Even though the community covered most of the costs some were not included. The costs that are here presented include some of the experts' costs during their visit. Given that not all community members could provide receipts, only some are here presented. In Mwampamba's payment letter she can corroborate the expenses.
Equipment - Tablet protector			56	1,226	-56	Since money was left from airfares, some equipment was bought that was required for the effective use of the tablets during the cybertracker training.
Equipment - Garmin Portable Bluetooth GPS and GLONASS Receiver			148	3,211	-148	
Total	4,998	108,431	5,011	108,718	-13	Cecilia Simon provided the remaining -13.23 GBP.

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

The important next steps are described below and extracted from recent discussions with the authorities and monitoring team:

- a. Continue the implementation of the monitoring plan and data collection: It is essential that the monitoring team continue to gather data in a systematic manner. Given that funding is limited, the monitoring team will require effective monitoring and efficient handling of the data.
- b. Systematization and data analysis: So far a lot of data has been gathered but only a few has been analysed (carbon, timber and deer). Other monitoring data needs to be systematized and analysed to understand other tradeoffs and synergies from natural resource management.
- c. Continuous support by external team: Even though capacities have been developed and the monitoring plan is in place, our team is still required for support and facilitation of this process.
- d. Secure funding: Even though some funding has been secured for salaries, more funding is needed to continue to expand this project, within this community and among neighbouring communities with who they share the landscape and who also manage their natural resources.
- e. Communicate the results: Community members are hoping to communicate the results among residents, potential tourists and external stakeholders (including government agencies like the National Forestry Commission).

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 logo was used in the following places:

- A poster presented during in the Mexican Ecology Congress in 2015.
- In the minutes for those workshops that were supported by the Rufford Foundation
- In the workshop records.

The RSGF received publicity by being named as a funding source in the MSc Dissertation for the University of Edinburgh (*Understanding tradeoffs and synergies between ecosystem services to improve community forest management: the case of the San Juan Lachao Community forest in Oaxaca, Mexico*).

11. Any other comments?

The funding received from the RSGF has been extremely helpful for the successful implementation of this project.