

Final Evaluation Report

Your Details	
Full Name	Sonia Elsa Rocio Delphin Pérez
Project Title	Understanding synergies and trade-offs between conservation and development by integrating ecosystem services into land use planning
Application ID	32588-1
Date of this Report	4th January 2024

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
Identify relevant ecosystem services (ES) for each stakeholder group				We identified all the forest and river ecosystem services that are most important for two indigenous communities, urban residents of Bahia Negra, cattle ranchers, and local and national decision-makers.
Identify ecosystem services hotspots				We prioritised the mapping of ecosystem services hotspots with two indigenous communities, as they are the ones depending on the forest ecosystems. These communities are the most vulnerable and, most of the time, their voice is not heard. We aimed to fill this gap with our data collection. We also learned during the fieldwork that these communities are claiming the return of ancestral lands considered ES hotspots.
Identify potential areas of conflict between conservation and development				We used the mapping exercise with the indigenous communities to identify areas of conflict. We learned that the communities are claiming some ancestral lands that are now owned by private landowners. We also learned that part of the Indigenous lands has been cleared for cattle ranching by private landowners

2. Describe the three most important outcomes of your project.

This is the first project that identifies the most important forest and river ecosystem services for each stakeholder group in the project region using a participatory method to inform land-use planning processes.

The three main outcomes of the project include:

a). Relevant Ecosystem Services identified by Each Stakeholder Group. We collected 139 surveys distributed among five different stakeholder groups: indigenous community A, indigenous community B, residents of Bahia Negra, cattle ranchers, and decision makers.

Forest Ecosystem Services. The most important forest ecosystem services (ES) were food (24%), wood (14%), and firewood (13%) for indigenous communities A and B, residents, and cattle ranchers. We also analysed the relevance individually for each stakeholder group. For both indigenous communities, 35% of the participants mentioned that food (provisioning service) is the most important forest ES; however, for residents and cattle ranchers only 14% and 13% respectively listed food as important. For these two last groups, wood (provisioning service) was the most important forest ES with 25% and 20% respectively. Each group listed different forest ES depending on their interest. We conducted a chi-square test for independence, and we found that there is an association between the ecosystem services and stakeholder groups ($\chi^2 = 191.14$, $P=2.2e-16$). This means that the relevance of a forest ES is significantly different depending on the stakeholder group.

Indigenous Communities' Holistic View of Forests. When we tried to use the Best-Worst Scaling method with the indigenous communities, we asked them to rank the most important forest ES. However, they had a hard time making this distinction. We learned that the indigenous communities consider that all forest ES are of equal importance, since the forest is perceived as a whole/integral system, therefore, it is difficult for them to rank services. Indigenous communities have a more holistic/integrated vision to value forests. These communities identify forests as an entire system, and the major difference in how Western society sees the world is that nature and people are separate entities (Kandzior, 2016). Forests are one entity and for these indigenous people, it was a challenge to rank individual ecosystem services. However, when we asked this as an open question, they felt more comfortable listing ES.

River Ecosystem Services. The most important river ecosystem service for the two Indigenous communities was water for consumption. However, for residents and cattle ranchers, fish was the most important service. All the groups ranked recreation/cultural value as the least important.

b). Ecosystem Services Hotspots Mapped and Areas of Conflict Identified. We conducted 49 individual consultations in indigenous communities A and B. The indigenous communities identified four ecosystem services hotspots in the project region. These four areas are important as they provide food (plants and animals), raw materials for handicrafts, and religious/cultural values. We also learned that one of the hotspots used to be indigenous land; however, now, it is under private ownership. The indigenous communities are claiming the return of this ancestral land called Eshma (Puerto Ramos) for the conservation of the area. However, the private landowner aims to develop that area for cattle ranching. There is still a dispute for those lands. The indigenous communities also mentioned that a private landowner turned down part of the forests within their lands. Several conflicts arise in this area mainly between the indigenous communities and large cattle ranchers. Stakeholders also emphasised the decrease in forest ecosystem services mainly due to land-use changes in the region. Therefore, it is important to identify those competing interests to make better land-use decisions that can reduce land-use conflicts and ensure conservation.

c). Ecosystem Service Trade-off's and Synergies Identified: Several trade-offs and synergies were found in the region. ES trade-offs and synergies are common in multifunctional landscapes where different stakeholder groups coexist. ES trade-offs between wood versus honey and food exist. ES synergies between food, oxygen, climate regulation, and habitat for animals were found. trade-offs are the result of the different interests of each group. For example, only the indigenous communities listed honey (provisioning service), and cattle ranchers listed the following regulating services: climate protection for cattle, air quality maintenance, and fire protection, and one provisioning service: food for cattle. Indigenous communities put higher importance to raw materials for crafts compared to the other groups. The residents and cattle ranchers gave more importance to oxygen compared to the indigenous communities. The same trend can be seen in climate regulation which was only listed by residents and cattle ranchers. Biodiversity, scenic beauty, and soil thermoregulation were only listed by the residents. The two Indigenous communities have a very similar trend when selecting the most important forest ES. Both communities put more relevance on provisioning forest ES; however, residents and cattle ranchers give more importance to provisioning and regulating services.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

This project was implemented during the COVID-19 pandemic and due to this situation, there were delays in the activities. The fieldwork had to begin in November 2020; however, we were not able to travel to Paraguay to initiate activities due to the country and university restrictions. The country was in lockdown, and no one was allowed to enter the country by air. The University of Arizona also limited face-to-face interactions during the pandemic. To overcome this challenge, part of this research was conducted using online tools such as Qualtrics, which is a cloud-based platform to conduct surveys. However, this process was very challenging as we were not receiving enough responses. Therefore, fieldwork was extremely important. When the COVID-19 cases decreased in the country, we obtained all the permits from the University of Arizona and travelled to Paraguay for the first season of fieldwork in July 2021. We conducted in-person interviews under a very strict protocol to reduce any potential risk of infection. Even though, at that time, the number of cases was reduced significantly.

We implemented many measures in the field to reduce any potential risk, especially for the vulnerable indigenous communities. These measures impacted on our budget as we had to adjust some of our methods and could not carry out some of the activities. For example, we originally planned to conduct workshops to map ecosystem services hotspots; however, we decided to do individual consultations to avoid any agglomeration of people. We gathered the required information using this adjusted method. We also planned to conduct more trips with shorter stays. However, we decided to conduct fewer trips with longer stays in the communities to reduce any exposure to COVID-19, as we were coming from a more populated city, Asuncion. COVID-19 cases were higher in Asuncion compared to Bahia Negra.

In terms of the method proposed, we designed a survey using the Best-Worst Scaling method to identify the most important ecosystem services. Even though we pre-

tested the tool with local people, this method failed with the indigenous communities, and we had to quickly adjust this method while in the field. We decided to change this method and use an open-ended question. The respondents from the indigenous communities felt more comfortable listing the most important ecosystem services, rather than ranking the ES from a pre-existing list. The BWS method confused respondents, as it was difficult to discriminate from the ES list which was the most and least important services. However, the method worked well with decision-makers. Therefore, it is important to use methods that can be replicated with different groups and ensure that methods ensure indigenous research sovereignty (Tuhiwai Smith, 2021).

4. Describe the involvement of local communities and how they have benefited from the project.

Local communities were active participants during this project. They were willing to participate in this project by answering our survey. We used participatory methods to include and engage local communities. Without their participation we wouldn't be able to collect data. We also adjusted some of our expected outcomes to generate useful information for the indigenous communities. All the results of this project were presented to them in May-June 2022 during a trip to the project region. We prepared and printed specific reports that were delivered to them in order to respect the Indigenous Data Sovereignty. The indigenous communities have all the results and they stated they will use this information to highlight the importance of forests for the communities, and to keep fighting to reclaim their ancestral lands.

Additionally, we had the support of local people to conduct the surveys. We hired a local researcher who helped us get to the communities and places to conduct the surveys. He opened the door for us and having this support of local people is essential to build the connection with the communities and successfully implement the project. We also received support from a person who is part of the Yshir Native Community, and representatives of World Wildlife Fund (WWF)-Paraguay and the local NGO Eco-Pantanal.

While in the field, we were also engaged with the community in different ways. We experienced the forest fire season, and we provided support to the community. We also had several conversations with the locals about implementation of projects in the area, and we learned a lot about best practices that we adhered to our project. At the same time, we also shared our experience on implementing projects in the field.

5. Are there any plans to continue this work?

This project is part of my PhD dissertation, and we plan to share some information with NGOs that work in the area (e.g., WWF), so they can explore the outcomes of this project. We have many ideas for future projects based on our results and we expect to collaborate with local institutions that might be interested. We also look forward to continuing to support indigenous communities who are fighting to recover their ancestral lands.

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

Some of the results were already presented at the following events:

- On November 5, 2021, we delivered an oral presentation at the University of Arizona Tinker Roundtable Session 2. The title of the presentation was "Identifying synergies and trade-offs between ecosystem services and development." The online presentation can be found here (<https://www.youtube.com/watch?v=rxzNfuttFuw>).
- On February 22, 2022, we were invited to give an oral presentation at the Splendido Lecture Series. The presentation was titled: "Working towards conserving nature in Paraguay."
- On August 18, 2022, our work was accepted for poster presentation at the Ecological Society of America 2022 Conference in Canada. Unfortunately, due to visa delays, we were unable to attend in person, but our poster was shared online and was accessible to everyone who had register for the conference.
- On September 2nd, 2022, we shared part of the results in a guest online lecture at the National University of Asuncion in Paraguay. This happened at a graduate level class on Land Use Planning.
- On August 8th, 2023, our work was presented at the Ecological Society of America 2023 in Portland, Oregon.

Additionally, we already prepared and presented local reports in Spanish to share the results with the Indigenous communities. The communities have access to all the raw data collected during this fieldwork. They anticipate using it to highlight the importance of their lands in the provision of ecosystem services. We also shared the results with WWF that leads the development of land use plans in Paraguay. We also plan to publish scientific papers to disseminate our results. One publication is currently under review. This paper is entitled: "The integration of stakeholder's perspectives on the importance of forest ecosystem services in land use planning processes" by Delphin, Sonia.; Snyder, Katherine A.; Marsh, Stuart E.; Musálem, Karim; and Soto, José R.

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

One of the most important steps will be the dissemination of the results using scientific publications, policy notes in Spanish and informal and formal meetings in the field. In a later phase, we also aim to discuss the results with decision-makers to explore possibilities of including this information and method as part of the land-use planning process in Paraguay. Land-use planning is in very initial stages in Paraguay and therefore there are opportunities to influence this process if the buy-in from decision makers can be guarantee.

8. 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?

Yes, we are very thankful for the resources provided by The Rufford Foundation. Its logo was included in the printed surveys used to collect data, Power Point presentations and posters. The Rufford Foundation is also added to the funding section in the scientific papers we are working on.

9. Provide a full list of all the members of your team and their role in the project.

Dr. Jose Soto: PhD advisor. He provided support to develop the surveys following all the required standards. He also guided the University of Arizona Institutional Review Board (IRB) process. He is reviewing the scientific papers that will be produced with this project.

Dr. Katherine Snyder: PhD Committee member. She revised the survey and provided support to develop the protocols for its implementation in the field. She advised on the consultations done with the Indigenous Communities, as well as the process of disseminating results. She is reviewing the scientific papers that will be produced with this project.

Dr. Karim Musálem: PhD Committee member. He provided guidance on the protocols for implementing the project in the field. He is reviewing the scientific papers that will be produced with this project. He was the liaison with WWF-Paraguay.

Saul Arias: Field Research Assistant. He provided support in the field to conduct the surveys. He is originally from Bahia Negra, so he is very familiar with the region and people. He was the liaison with the Indigenous and rural communities.

Carmen Monges: She was the liaison with WWF-Paraguay and provided support for field activities.

10. Any other comments?

We want to thank The Rufford Foundation for its feedback on this proposal and providing the funds for this project. Otherwise, we would be unable to conduct an in-depth study in this very remote area. We also want to highlight and thank the flexibility of the trustees. This was key for the successful implementation of the project.

References

Kandzior, A., 2016. Indigenous People and Forests. Trop. For. Handbook, Second Ed. 4, 3311–3343. https://doi.org/10.1007/978-3-642-54601-3_269

Tuhiwai Smith, L., 2021. Decolonizing Methodologies: Research and Indigenous Peoples, 1st ed. Zed Books, London.