

Final Evaluation Report

Your Details	
Full Name	Carlos Mauricio Delgado Martínez
Project Title	Setting the Basis to Mitigate a Wildlife Climate Crisis: Analysing the Spatio-Temporal Variation of Water Availability for Birds and Mammals in Calakmul, Mexico
Application ID	34365-2
Date of this Report	27/07/2023

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
Introducing the project to the community				We introduced the project to the local authorities and to people interested in engaging in the project.
Searching for water bodies				During the first months of the project, we located 27 sartenejas, 66 water-filled tree holes, and even two small waterholes.
Monitoring of water bodies				Over 14 months (August 2021 to September 2022), we monitored 64 water bodies using camera traps. We recorded 55 bird and 24 mammal species, including species of conservation concern such as the white-lipped peccary, tapir, jaguar, Yucatan brown brocket, margay, king vulture, and ocellated turkey.
Setting up a pilot system of rainwater collection for wildlife				This objective was adjusted to align with the interests of the local participants in the project. With the help of the Ocelot Working Group, we established artificial water sources (troughs) in proximity to certain apiaries. This measure was taken to mitigate the human-wildlife conflict stemming from wildlife visiting the apiaries for water. The endeavour has proven successful in diverting the fauna's activity toward the troughs rather than the apiaries.
Building a Zooniverse project				Unfortunately, we were not able to build the Zooniverse project. This was because we found some server restrictions that did not allow us to upload our records as videos.
Writing scientific papers and reports				We have prepared reports for the National Commission of Natural Protected Areas (CONANP). Additionally, we have already submitted the first scientific paper stemming from this project, and we anticipate

			submitting at least two more papers in the upcoming months.
Sharing results with local people and society in general			<p>This was one of the most successful aspects of our project. We shared our findings with the local community through two workshops tailored for children and another occasion with local Bachelor's degree students. In partnership with residents from the Nuevo Conhuas village, we established a permanent photo exhibition showcasing wildlife at the reserve entrance, serving as a captivating introduction for tourists.</p> <p>Furthermore, we showcased two of our camera trap videos in the camera trap video contest at the National Congress of Mastozoology (2022), where they secured both the first and second places. Collaborating with the National Commission for the Knowledge and Use of Biodiversity (CONABIO), we produced a brief documentary film highlighting the significance of waterholes for wildlife, primarily utilising video footage from our project.</p> <p>Additionally, we created a poster featuring the diverse water bodies and wildlife of Calakmul. This poster has proven invaluable for our dissemination efforts, aiding us in reaching a wider audience.</p> <p>Lastly, we disseminate our videos and information about water bodies and water sources via social media.</p>
Engaging undergraduate students			<p>This was not part of our original objectives. However, over the course of the project, three undergraduate students have actively engaged in the project. One of them has already obtained her Bachelor's degree a couple of months ago using a portion of the data derived from this project. The other two students are in the process of completing their theses.</p>

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

a). For the first time in the Neotropics, we have generated baseline data about how birds and mammals utilise surface and arboreal water bodies simultaneously. As far as our knowledge extends, this study is the pioneer in producing such data. This information has shed light on the resource partitioning of water sources by wildlife within the context of seasonally dry tropical forests. This holds significant relevance not only from a fundamental ecological standpoint but also in terms of practical implications. The data we have generated will aid in predicting the potential impacts of heightened human water demand and the influence of climate change on wildlife viability in this ecosystem and analogous ones.

b). The project garnered significant attention and engagement within the local community. Through presentations made to children and local undergraduate students, along with the establishment of a permanent photo exhibition and collaboration with beekeepers, we successfully heightened the awareness of local residents regarding the significance of biodiversity and its conservation. Our talks enabled children to become acquainted with local species that they had not previously encountered, such as the Central American woolly opossum. Furthermore, these presentations provided us with the opportunity to underscore the importance of water-filled tree holes as vital water sources.

c). We achieved extensive dissemination of the results within the broader society. Despite the study of waterholes in Calakmul spanning over a decade, only a few audiovisual materials existed showcasing their pivotal role in supporting wildlife. As part of our project, we created the following materials: 1) a video, in collaboration with CONABIO, illustrating the significance of waterholes and the challenges they face (<https://youtu.be/JELgsKtpR0U?si=BGHgv6D4QilbzHF2>), 2) a poster featuring waterholes, sartenejas, water-filled tree holes, and the associated fauna (<https://ecocalakmul.wordpress.com/2023/04/14/fauna-silvestre-y-cuerpos-de-agua-en-calakmul/>), and 3) a selection of our best records uploaded to our blog for open access (<https://ecocalakmul.wordpress.com/2023/02/15/fotos-de-libre-acceso/>).

Moreover, in collaboration with the BWILD organization, we expanded our reach by sharing our wildlife records across their social media platforms. To date, our videos have garnered a total of 24,391,200 views. You can watch the most widely viewed video at <https://www.facebook.com/thebwildsite/videos/368686408694840/>.

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

This project began during the COVID-19 pandemic, and regrettably, an outbreak in the community occurred at the project's outset. This compelled us to initiate field activities some months later and to modify the sequence of certain tasks.

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

Four individuals from the *Nuevo Conhuas* community actively participated in field activities within the Calakmul Biosphere Reserve. They underwent a brief training session on GPS usage and camera traps operation and received compensation for their contributions. Furthermore, three beekeepers received benefits from this project through the installation of a trough near their apiaries.

The most significant community benefit emerged from the establishment of a permanent photo exhibition that showcases some of the best wildlife images captured during the water body monitoring. This exhibition is situated at the entrance of the reserve, thereby accessible to a considerable number of tourists. The residents of *Nuevo Conhuas* expressed profound satisfaction with this photo exhibition.

5. Are there any plans to continue this work?

We intend to continue our project, although with a shift towards activities primarily centred on community-based conservation, as opposed to predominantly research-oriented endeavours.

Unfortunately, due to the Maya Train project, the Mexican government is in the process of constructing a hotel within the heart of the Calakmul Biosphere Reserve, situated in close proximity to both the archaeological site and some of the water bodies we have surveyed. This development introduces a new challenge to the conservation of Calakmul's biodiversity. Our project's continuity can be facilitated by evaluating the impact of this newly established infrastructure and proposing potential mitigation strategies such as signage and the creation of wildlife crossings.

An alternative approach for extending the project involves collaborating with beekeepers across diverse communities to reduce human-wildlife conflicts while simultaneously fostering the production of wildlife-friendly honey. As part of our future plans, we are preparing to seek funding from the next level of The Rufford Foundation in conjunction with the Conservation Leadership Programme.

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

In addition to the results dissemination we previously mentioned, we intend to present our findings at the upcoming National Congress of Ecology and the Annual Meeting of the Association for Tropical Biology and Conservation. The first article stemming from this project has already been submitted, and we anticipate submitting two more in the coming months. Lastly, we have plans to share our results, particularly those concerning water-filled tree holes, in a popular science magazine with national circulation.

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

At this stage of my career, I believe the most crucial step is to transition towards activities that primarily centre on community-based conservation, real conservation efforts. While I have a deep passion for scientific pursuits, if our goal is to safeguard our biodiversity, it is imperative to develop projects that actively engage local communities and address their needs. With this perspective, in collaboration with other biologists and residents of Calakmul, we are planning to establish a non-governmental organisation dedicated to community-based conservation, with a particular emphasis on the inclusion of vulnerable groups.

Furthermore, our data was collected just before the commencement of the Tren Maya project in Calakmul and the construction of a hotel within the reserve. As a result, our data serves as a baseline for evaluating the impact of this new infrastructure. A pivotal upcoming step involves collaborating with local authorities to assess and propose mitigation measures.

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?

We used the Rufford Foundation logo in our dissemination activities and academic presentations. We are ensuring that the appropriate acknowledgments are included in our publications.

The Rufford Foundation received visibility through posts on my personal Facebook profile. Additionally, I have been encouraging postgraduate students to consider applying for a Small Rufford Grant.

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

Carlos Mauricio Delgado Martínez. Grantee and project leader.

Eduardo Mendoza. Principal PhD thesis advisor. He assisted with study design, data analysis, and manuscripts preparation.

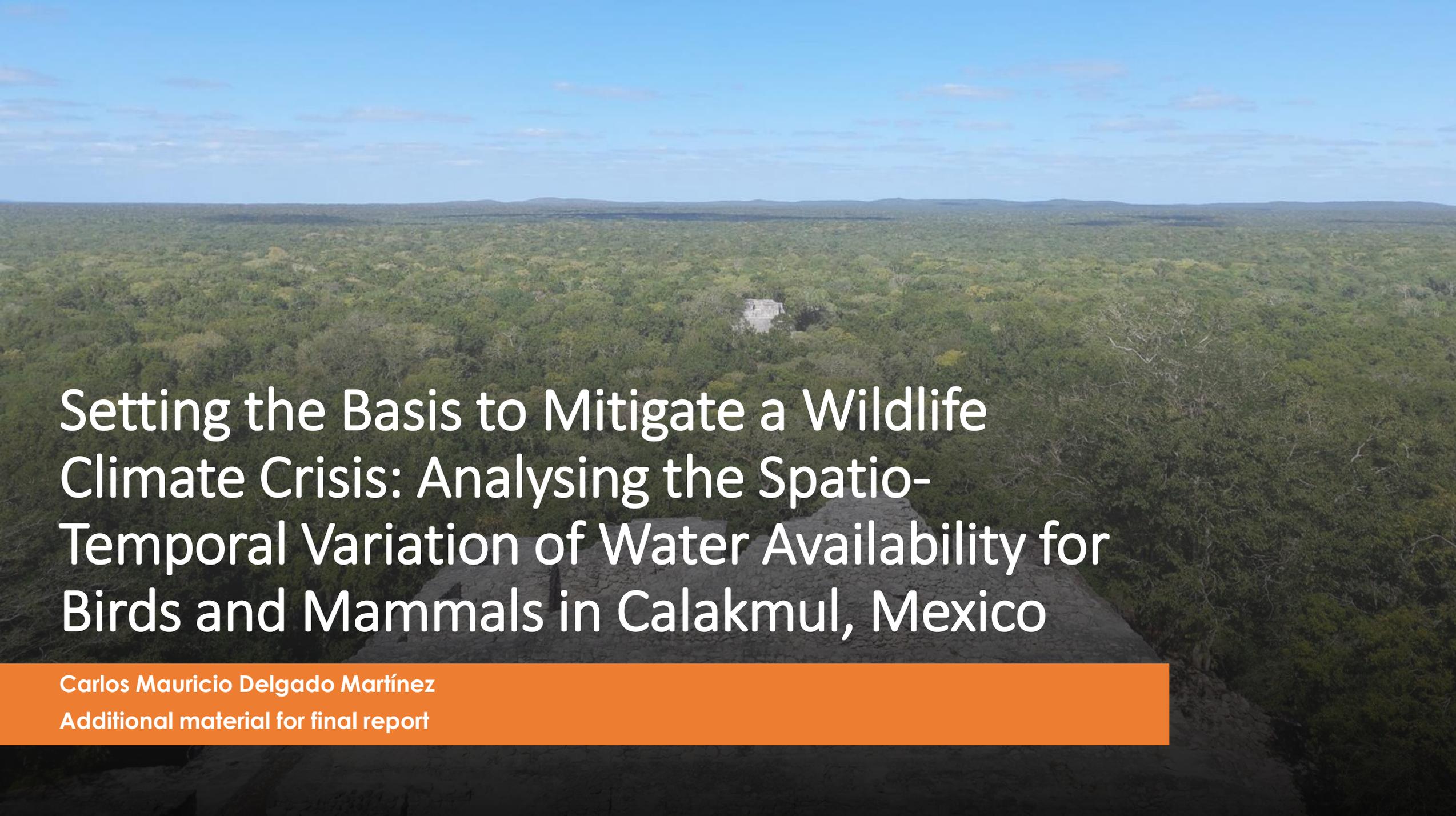
Melanie Kolb. PhD co-advisor. She assisted with study design, analysis of temporal distribution of water bodies, and manuscript preparation.

Andrés Barrientos and Octavio Santiago. Field assistants from Nuevo Conhuas. While more individuals were involved in the field activities, they were particularly engaged in the project, providing support throughout all stages of fieldwork.

10. Any other comments?

I sincerely thank The Rufford Foundation for their support of both this project and my previous project. Your assistance has proven essential to my personal and professional growth throughout my Master's and PhD studies. Engaging in scientific

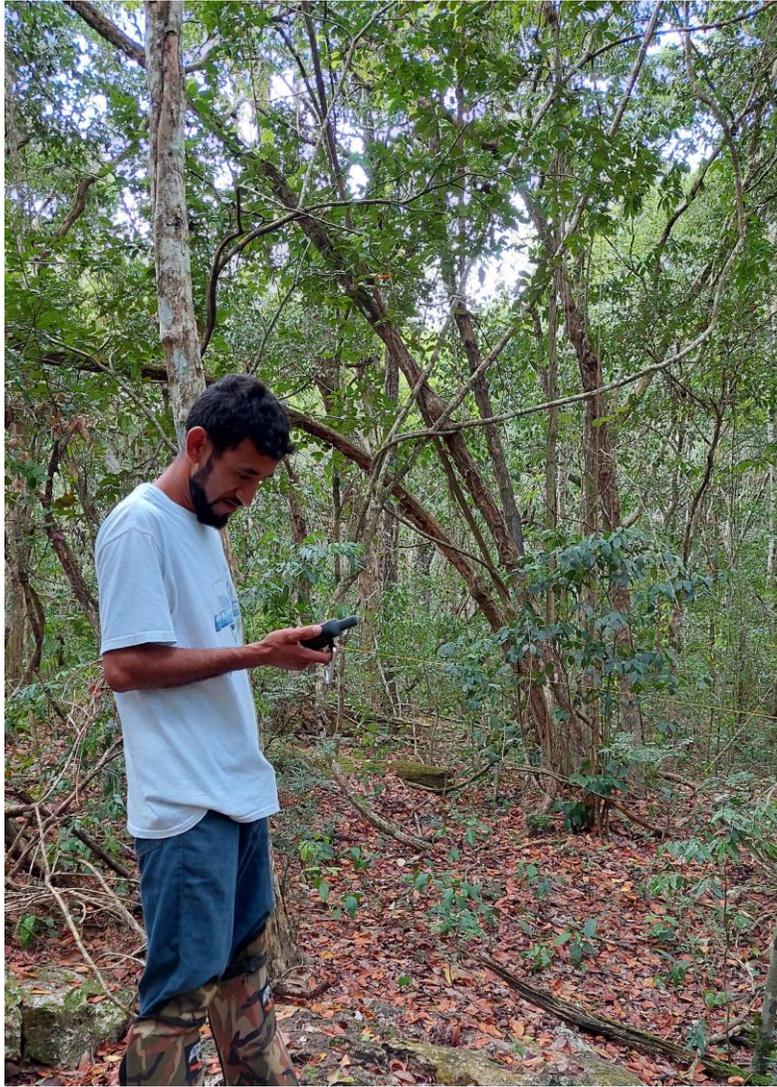
research and conservation efforts in Mexico is becoming increasingly challenging due to the reduction in national funding for such projects.



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Additional material for final report



Activities in
the field



Permanent photo exhibition in the Nuevo Conhuas community



Presentations aimed at children



Presentation aimed at local undergraduate students
