

Final Evaluation Report

Your Details	
Full Name	Camila Miguel
Project Title	Juvenile Chelonia mydas health status from a foraging area affected by the iron ore tailings of the collapsed dam in southeast Brazil
Application ID	35405-1
Date of this Report	April 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
Field work to capture green sea turtles and collect blood samples				We were able to capture and collect blood samples from 45 animals in each field campaign, totaling 90 green sea turtles from Santa Cruz and 90 green sea turtles from Coroa Vermelha island per year.
To assess the health status of the animals (body condition, haematological and biochemical parameters)				A physical examination was performed in all turtles to determine the health status and blood samples were analysed for haematological and biochemical parameters
To determine levels of heavy metals in green sea turtles from Santa Cruz and Coroa Vermelha island				Metal concentrations (As, Cd, Cr, Cu, Fe, Hg, Mn, Pb, and Zn) were quantified in all blood samples
To verify the seasonal variation of the health parameters and heavy metals levels				Some variations were found between seasons.
To investigate the heavy metals effects on health parameters				Many correlations between health parameters and heavy metals levels were found.
To identify the human impacts that may be affecting the sea turtles that feed in that region				We were able to identify some anthropogenic impacts in the areas, but satellite tracking research could allow us to know if these turtles are residents, the total area they are foraging and the extent of the human impacts.
To involve local members in the field of the project.				During our fieldwork we counted on the help of local fishermen to identify the best places to find sea turtles. We took them with us on board and leveraged all their experience and knowledge while we made them aware of the importance of the sea turtles and our research. This

				<p>exchange of experience and knowledge was valuable for both sides. We realised that they became empathetic with animals and ended up passing on what they learned from us in the field to other people in the community.</p>
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2. Describe the three most important outcomes of your project.

- a).** Sea turtles from the area directly affected by the tailings (Santa Cruz) had worse nutritional condition, anaemia, immunosuppression, higher fibropapillomatosis tumour score and ectoparasite load, and a possible hepato-renal pathology compared to animals from the not directly affected area (Coroa Vermelha).
- b).** Animals from Santa Cruz also had higher levels of heavy metals and many correlations were found between contaminants levels and health parameters.
- c).** There is evidence that the pollution caused by the tailings is endangering the sea turtles, therefore it is important to continue monitoring the exposed area to assess the short and long-term impact on the health of these animals.

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

We encountered some issues in the field while capturing the sea turtles in Santa Cruz. We set the nets to capture the animals, but there were some days that no turtle was captured. We don't know the reason since there was a day that we captured 15 animals. This delayed our field campaign by a week. In Coroa Vermelha we contacted local fishermen to help us, and all the turtles were sampled within the planned period.

In the lab we also had some problems since the instrument used for metal analysis broke down. We had to wait months for its repair which delayed our results and the final report.

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

During our fieldwork we counted on the help of local fishermen to identify the best places to find sea turtles. We took them with us on board and leveraged all their experience and knowledge while we made them aware of the importance of the sea turtles and our research. This exchange of experience and knowledge was valuable for both sides. We realised that they became empathetic with animals and ended up passing on what they have learned from us in the field to other people in the community. We also knew some important community's residents (like old teachers and fishermen) and we always tried to strengthen the relationships between researchers and residents.

We carried out educational actions through lectures in schools to talk about the importance of that area to sea turtles and the anthropic problems they face there. In addition, we will also discuss the research results at scientific meetings with government officials in the study areas to assist in guidelines for species conservation.

5. Are there any plans to continue this work?

Yes, based on the results obtained and the growing global concern about contamination, we are planning to continue monitoring the populations of green sea turtles and to expand studies to better understand the environment and its use by the turtles. To carry out this project, however, funding with a 2nd Rufford Small Grant will be critical. To this end, we have a proposal ready for submission once this report is reviewed and approved.

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

Scientific publication: The results presented here are being enhanced with further statistical analysis to be published as a high impact scientific publication.

Events: Toxi-Latin is an international event that will be held in Brazil this year to discuss the challenges of toxicology facing environmental risks and human health. Additionally, the Conference on Conservation and Research of Sea Turtles in the Southwestern Atlantic (Jornada de Conservación e Investigación de Tortugas Marinas en el Atlántico Sur Occidental- RED ASO TORTUGAS) will also be this year in Uruguay. We intend to participate in both events to show our results and spread the risk of mining pollution on sea turtles' health.

Social media: Our results will be shared on our social media channels.

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

- To publish the articles.
- To spread the results to the community.
- To contribute with conservation strategies to reduce anthropogenic threats in feeding areas, increasing the survival of juvenile sea turtles, and enhancing their chances to migrate to reproductive areas.
- To develop a health index to classify each individual and have a summary of the population to better understand the health issues they are facing and what could be done.
- Broaden the scopenalysis: research to identify the green sea turtles diet in both areas; to quantify the heavy metals in those food items to verify the biomagnification; to investigate ontogenetic diet shifts of green sea turtles by stable isotopes analysis; to track the green sea turtles by satellite telemetry to

know if these turtles are residents, the total area they are foraging and the extent of the human impacts.

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?

The logo has been used in all presentations related to the project (lectures, workshops, posters...). The logo is also in our website page (<https://www.imd.org.br/en/chelonia-mydas>)

The respective acknowledgments will be given in the manuscript that will be published.

In the future, it is planned to continue recognising Rufford Foundation's vital contribution by placing the logo on all presentations and activities linked to this project, and future projects that we have in common.

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

Dra. Camila Miguel participated in the drafting and direction of the project, contributing, and carrying out the field methodology, obtaining samples and analysing the health and ecotoxicological parameters.

Dra. Thyara Noely Simões participated in the drafting of the project, contributing, and carrying out the field methodology and obtaining samples.

Dr. Marcelo Renan de Deus Santos participated in the drafting and direction of the project.

Larissa Hasnah Queiroz dos Santos participated in obtaining samples in the field.

Jacqueline Meyer participated in obtaining samples in the field.

Carlos Henrique Duarte Junior participated in obtaining samples in the field.

José Custódio Falcão (local community) participated in sea turtle capturing.

10. Any other comments?

I believe that all the objectives set during the planning of this project were achieved. Therefore, we obtained good results that contribute to the research and conservation of sea turtles in Brazil. The financial Rufford support has been fundamental to monitor the sea turtle's health and the impacts of contamination in important feeding areas.



Thank you very much Rufford, to make this research possible!