

Final Evaluation Report

Your Details	
Full Name	Brayan Eberth Zambrano Gómez
Project Title	Disease's Ecology and Ecosystem Services of Scavenging Raptors in Rubbish Dumps, Street Markets and Wild Areas of the Mediterranean Ecoregion of Chile
Application ID	34330-1
Date of this Report	28-12-2022

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
Observation stations, capture scavenger raptors, and their marking				<p>We implemented additional biosecurity measures to prevent potential transmission of microorganisms and to obtain permits to capture raptors. We were also changing the type of traps used, to increase capture efficiency.</p> <p>The observation stations and the captures of individuals of scavenger raptors were carried out in different terms than those established, due to the sanitary restrictions associated with the SARS-CoV-2 pandemic, which delayed the delivery of capture permits, mobility between cities and made it difficult to obtain access permits to study sites.</p>
Cloacal and oropharyngeal swab samples will be processed for microbiological and molecular analysis for detecting				<p>They were also carried out in periods different from those previously established, due to access restrictions to university laboratories, to avoid the transmission of SARS-CoV-2. Blood smear samples have been analysed for pox virus - swab samples are awaiting laboratory results.</p>
Camera traps will be installed with the carcasses				<p>There were also delays with respect to the previously established periods. This occurred due to the restrictions on the free movement of people between the cities of Chile, prevention measures established at the national level to prevent the transmission of SARS-CoV-2</p>
Training, education and dissemination actions				<p>Some communication activities with an environmental education focus had to be carried out virtually, but to make them more didactic we showed videos that we filmed in the field, where the interaction between scavenging raptors, domestic dogs</p>

			and people around animal carcasses is observed. Training and meetings were held for a smaller number of actors than we initially expected, due to the lack of interest of some and different time availability
--	--	--	---

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

a). Within the results, we highlight the interaction observed in experimental and natural carcasses between scavenging raptors, domestic dogs and people. We found a strong effect of anthropogenic food sources (e.g.: rubbish dump, public markets, fishing coves) on the abundance of scavenging raptors (*Cathartes aura*, *Coragyps atratus*, *Phalcoboenus chimango*) and the intensity of their carcass removal role. We also found an increase in competition interactions due to interference with domestic dogs, associated with the greater urbanisation of the evaluated sites.

The results of this project allow us to determine that the ecosystem services of carcass removal are being significantly affected and, therefore, also the processes that derive from it, such as nutrient recycling.

b). After the veterinary evaluation of the captured individuals, we observed skin and muscle lesions, although we determined that the latter were mainly due to electrocution or fighting injuries and we detected inclusion bodies in the blood smears (suggestive of pox virus).

c). We also consider it important to mention two findings that were not part of the objective of the project: 1) We unexpectedly found individuals of rufous tailed hawk (*Buteo ventralis*) at observation stations and scavenging; the latter detected by camera traps. This scavenging and camera trap record of this species, categorised as Vulnerable by IUCN, is the first known. We are writing a document for publication. 2) During the field activities, we gave environmental education talks to the community, among them fishermen who were present, within the information that they mentioned to us regarding their relationship with scavenging raptors, was hunting and use of *C. atratus*, with alleged medicinal purposes. This information is highly relevant from a health point of view due to the potential risk of transmission of zoonotic diseases.

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

The main difficulties derived from the SARS-COV-2 pandemic, generating significant delays in the execution of the project, both in field activities, as well as in meetings with public or private organisations and the community, given that national sanitary regulations led to the temporary closure of universities, laboratories, impediment to free movement between cities, difficulties in obtaining wildlife capture permits and limitations on the capacity of people. This complex scenario led us to postpone

activities until periods where restrictions were reduced and to increase our biosecurity measures in the capture of scavenger raptors, to protect ourselves and obtain permits for their capture. Another difficulty was associated with situations of insecurity and theft of three of our trap cameras. These situations led to the modification of the location of the study sites to develop the project within the deadlines.

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

The results of this project have served as the basis for meetings with public service officials: the Agricultural and Livestock Service (SAG) and the Municipal Secretary of the Environment. In these meetings we have discussed the need to evaluate action measures to avoid interaction between scavenging raptors, domestic dogs and people in areas with human food resources such as free markets or from household sources such as rubbish dump, in order to avoid the possible transmission of zoonoses and anthroozoonotic microorganisms.

We work with teams of park rangers and administrators of four protected wilderness areas: Oncol Park, Punta Cóndor Park, Valdivian Coastal Reserve and Alerce Costero National Park. Both in Parque Oncol and Parque Punta Cóndor we transfer technical capacities for the identification and methodologies for monitoring scavenger birds of prey in a theoretical and practical way. In the latter we were also able to ensure the continuity of monitoring by its own owners and/or park rangers, and it was equipped with two sets of camera traps for monitoring scavenger raptors. In the Valdivian Coastal Reserve and the Alerce Costero National Park, we will continue with the practical activities in January (mutual time availability).

Young people and adults virtually attended a public presentation where they were taught about what scavenger raptors are, biodiversity, ecosystem services, and how the conservation of these birds is linked to human well-being and health. This presentation was made available on the internet (<https://www.youtube.com/watch?v=LaNXsuXPP-Q&t=61s>).

Our project was also shown in different press releases such as "Science in Chile" <https://www.cienciaenchile.cl/ni-carismaticas-ni-conocidas-aves-rapaces-carroneras-y-forestales-los-esfuerzos-por-su-conservacion/>, "Journal of the Faculty of Forest Sciences of the Austral University of Chile".

And we believe that one of the greatest beneficiaries will be people and scavenging birds of prey, since the scientific publications derived from this project will show this problem at a national and international level and will contribute to giving greater support to our work with organisations and decision-making people. Our objective is to establish management based on scientific evidence in rubbish dump and public markets, which ensure the health of people and scavenger raptors.

5. Are there any plans to continue this work?

Yes, we are collaborating with a scientist from the Universidad Austral de Chile, to deepen our knowledge about the virome of scavenging raptors. This collaboration will allow for additional information with the samples obtained in this project, with the aim of seeing at the molecular level the viruses involved in rubbish dump, free markets and wild areas.

We want this project to continue growing with an important focus on citizen science for the long-term monitoring of individuals of marked scavenger raptors, with the aim of monitoring their population trends and linking this potential information with management such as exclusion fences in areas of high abundance of domestic dogs, vulture feeding areas in areas surrounding free markets, to avoid the presence of these birds in the markets.

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

Two studies are in the process of being published in scientific journals and, additionally, we are preparing micro-documentaries for communication to the community, both in Spanish and English. We have also presented at the Chilean Ornithological Congress, as well as in meetings with public organisations and we hope to also participate in international congresses to show this project.

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

Parallel to the communication of our results, we believe that it is important to start carrying out short-term procedures such as the installation of exclusion fences and feeders where organic waste from the markets is deposited in the immediate vicinity of these, while in the long term, we believe that it is important to achieve changes in the behaviour of the community with respect to the elimination of household garbage and the responsible ownership of domestic dogs, as well as that it is necessary to improve our communication strategy to increase the interest of the public sector.

We will also continue with the captures, markings and monitoring of scavenger raptors, which will form part of the indices or measures, which we will later interpret as success or failure in our management.

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 Rufford Foundation logo was used in diptychs and posters delivered to the communities throughout the sample sites, it was also used in slides of environmental education talks and meetings with key stakeholders, where this project was announced. It was also used in videos and posts shared on social networks by our NGO, in the presentation made at the Chilean Ornithology Congress. And the name of the foundation was mentioned in press releases "Science in Chile".

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

Brayan Zambrano Gómez,	Project and field work director
Lisell Araya Correa,	Accounting and laboratory work
Macarena Rojas,	Field Assistant
Scarlett Arasol,	Field Assistant
Daniela Doussang,	Coordination and analysis
Javier Godoy Güinao,	Fieldwork
Felipe Muñoz Salgado,	Field Assistant
Luciano Porte Cuevas,	Fieldwork

10. Any other comments?

Many thanks to The Rufford Foundation for funding this project. This experience has allowed us to significantly expand our contact network and significantly increase our technical expertise in the study of wildlife, as well as in working with people from communities or public agencies. It has also made it possible to create a learning space for students of veterinary medicine and engineering in the conservation of natural resources, who have told us that they hope to continue working in the future in relation to research and conservation of wildlife.

In the following link we leave available a draft of the micro-documentary that we are hoping to release in January, it will be in Spanish and English:

<https://youtu.be/P5m6DNNxapk>