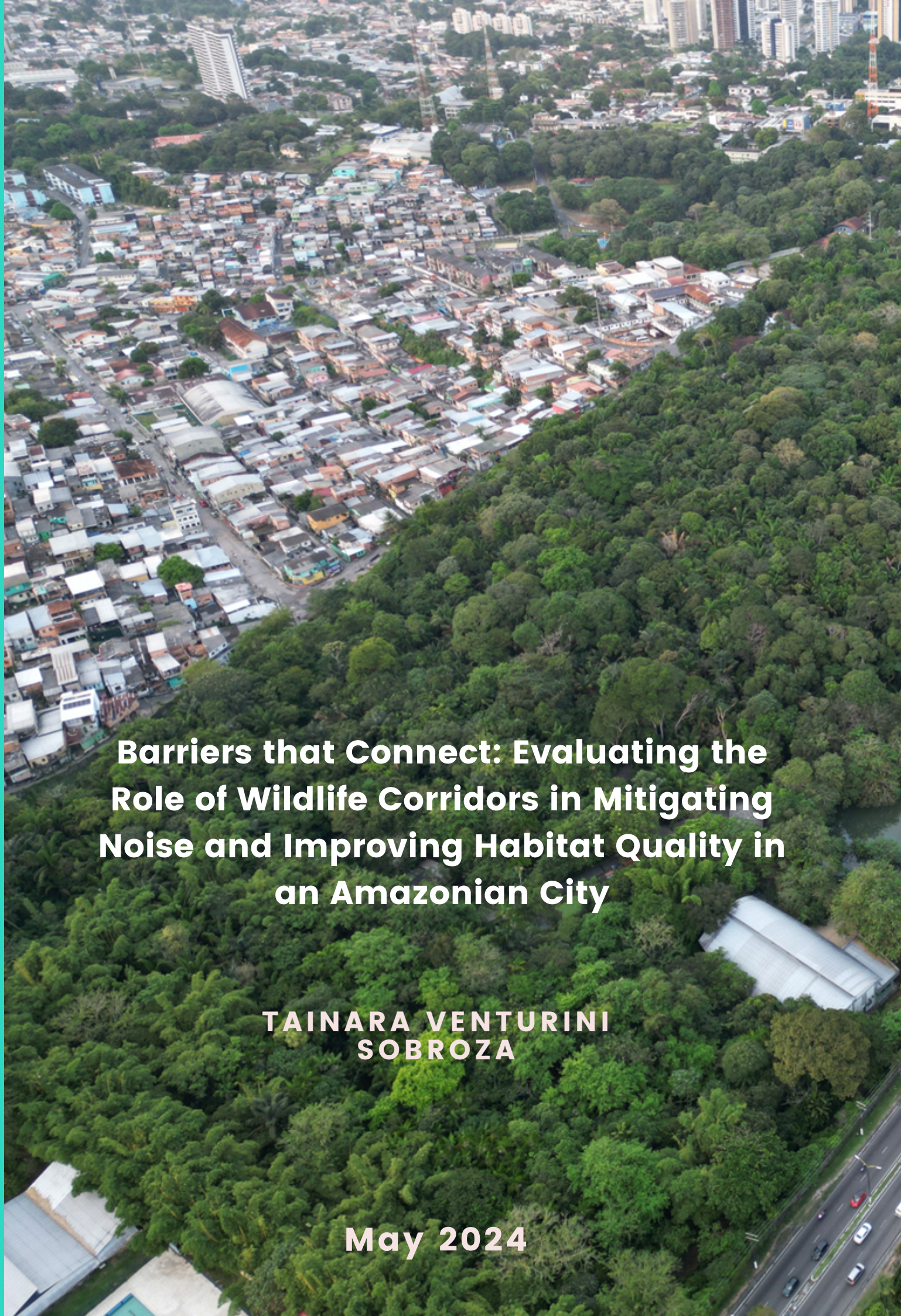

# Barriers that Connect: Evaluating the Role of Wildlife Corridors in Mitigating Noise and Improving Habitat Quality in an Amazonian City

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# Summary

Noise is everywhere. Sometimes, we don't even notice, but some animals do, and noise can negatively impact their welfare and conservation. Manaus is a large city on the Brazilian Amazon that houses forest remnants and endangered species such as pied tamarins. In this study, I aim to assess how different layers of the forest act to lessen noise in an ecological corridor. I will use automatic recorders and artificial intelligence to find pied tamarins in the forest.

By using in situ acoustic and environmental estimates it would be possible to have a good picture of the soundscape of an urban area that is home for the pied tamarin. In addition, autonomous recording and machine learning techniques could help us to monitor the population that occupies such places.

# Project updates

During the project's duration, I was hired as a professor at the Universidade Federal do Amazonas. Therefore, I had to reconcile the time preparing classes and teaching with research execution. A good thing is that, as a teacher, I now have the chance to involve more young students in the project.

The project had some initial delay, also because it took a while to buy the Audiomoth recorders, as they are not sold on a continuous base. I also had some delay in importing the equipment, which only arrived in August. Also in August, with the International Primatological Society's support, I had the chance to go to Malaysia to present my last study, also funded by Rufford (Fig 1).


Fig 1. Tainara presenting the results of the project on the effect of noise levels on pied tamarin behavior (Tainaras's 1st Rufford Small Grant)

# Project updates

From August until now, I had five interns who got the chance to get to know more about the pied tamarin and the conservation efforts that are ongoing. Also, I have been training students to use acoustic methods to access animal populations and soundscape quality (Fig 2). From August to March, we did a propagation experiment to assess the range that the equipment is capable of detecting pied tamarins. To do that, we made a playback experiment where we played pied tamarin sounds at ~74 dB at different distances from the autonomous recorder. Then, in the lab, the students accessed acoustic features, and the distance that the recorders were able to detect pied tamarin calls.

Fig 3. Juliana, Vitoria, Maria (and a colleague) evaluating propagation experiments using Raven.

Fig 2. Joyce (Joy), a biology student, happily installing an autonomous recorder.

# Project updates

Before recording installations and speaking with other group members (Dr. Marcelo Gordo), we decided that it would be interesting to redefine the sampling design. At first, we planned to use trails, install recorders, do propagation experiments, and install recorders along it. However, we agreed that a single trail in a fragment would not represent the role area depending on fragment size. Therefore, I created an inner buffer of 50m for the fragments and selected random points in each category of distances from the fragment (0m, 50 m, 100 m, 150 m, etc). Based on the propagation experiments, we detected that each recorder could detect pied tamarin sounds up to 80 m. Therefore, the points selected to install the recorders should be at least 160 m from each other (Fig. 4)

Fig 4. New selected points to install the autonomous recorders and conduct propagation experiments at the UFAM forest fragment, Manaus. The lines represent inner buffers of 50 m.

In February, we installed the 21 autonomous recorders in newly selected points at the University of the Amazonas forest (which is the large urban fragment in Manaus). Before installing it, the students I am tutoring also helped me to program and prepare the material (Fig 5).

The recorders were installed in trees at 5 m (Fig 6), to avoid thievery and because pied tamarins are arboreal. Even though, two of the two of the recorders were stolen. The recorders were collected at the end of March, and data is still to be uploaded at Arbimon Platform.

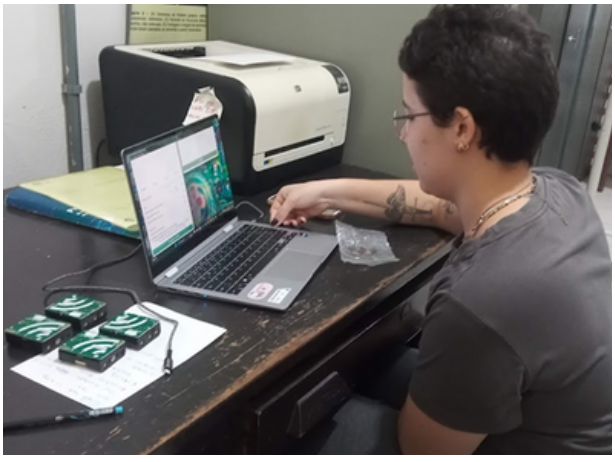

Fig 5. Julia is programming autonomous recorders.

# Next steps

Fig 6. Tainara and Anilton, the field assistant, installing the autonomous recorders.

The next steps for the project include:

1

## Detect pied tamarins in the recordings

This will include computational work and the use of machine learning to detect pied tamarin calls in hundreds of hours of the recordings already collected.

2

## Estimate noise levels

This will include both field and computational work. We will estimate noise using acoustic index in the recordings, and amplitudes estimates from the field.

3

## Estimate environmental variables

This will include fieldwork to estimate plant structure in the same places where we made the recordings.

4

## Perform propagation experiments

This will include fieldwork using playback experiments.

# The Rufford Learning Event

Fig 7. Tainara, Heloisa and Mariam in a fieldtrip during the Amazonas Rufford Learning Event

It worth mentioning that during this period, I also had the chance to organize the Amazonas Rufford Learning Event (LE) that happened in Manaus from 12 to 15th March. From August to March, we had several meetings to plan and organize the event. Deliverables included a written proposal, sending surveys to participants, selecting grantees, creating a program, contacting facilitators, contracting services, compiling waivers, elaborating pre and post surveys, and we are currently writing the report. The event was co-organized with another grantee, Heloisa Brum, and with all the support from the Rufford Foundation (Fig 7).The event was amazing, and I had the opportunity to exchange experiences with 17 other TRF grantees and facilitators (Fig 8). The pied tamarin was part of the logo and symbol of the Amazonas Learning Event (top page).

Fig 8. Participants of the Amazonas Rufford Learning Event on a canopy tower during the event fieltrip.

# Aknowledgements

I would like to thank all people and institutions envolved in the project.

- Anilton Neto for field assistance
- The students, Juliana, Maria Clara and Julia for the help during pre-tests and organization of equipment and data
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- CNPq for the facilitation of equipment importation
- Heloisa Brum and Mariam Weston, for the partnership during the organizarion of the Learning Event
- INPA and Juruá institute for their support during the learning event

**I thank the Rufford Foundation for the continuous support to the efforts to conserve the pied tamarin and its habitat**