Use of modern remote monitoring techniques to study five bird species of hunting and heritage interest in the French West Indies

 # community ecology # biodiversity assessment

Allenia fusca

STUDENT
Bryan Leborgne

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Guadeloupe

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CONTACT
bryan.leborgne@caribaea.org

Context

The forest ecosystems of the insular Caribbean host a rich avifauna, including several species of heritage interest. Some of these species, traditionally hunted, are part of the cultural heritage of Guadeloupe and Martinique. However, the sustainable management of these game species requires a detailed understanding of their distribution, abundance, population dynamics, and ecology.

In the French West Indies, the scientific data available for several forest bird species that are subject to hunting remain fragmented. This lack of information regularly fuels tensions between hunting stakeholders and environmental organizations, particularly regarding the relevance of current regulatory measures. In this context, the acquisition of robust and up-to-date scientific data is a key prerequisite for developing appropriate and scientifically sound management measures.

This doctoral research is part of the ESPACYPA programme (Monitoring of resident and erratic bird species of hunting and heritage interest in the Lesser Antilles), led by the association Caribaea Initiative.

Objectives

This PhD project aims to produce robust scientific data on five forest bird species that are hunted in Guadeloupe and Martinique:

- *Patagioenas squamosa* (Scaly-naped Pigeon)
- *Geotrygon mystacea* (Bridled Quail-Dove)
- *Geotrygon montana* (Ruddy Quail-Dove)
- *Margarops fuscatus* (pearly-eyed Thrasher)
- *Allenia fusca* (Scaly-breasted Thrasher)

The overall objective is to improve knowledge of the spatial distribution, reproductive phenology, and population dynamics of these species in order to formulate recommendations for adaptive and rational hunting management.

Methods

Within this doctoral research, two complementary non-invasive monitoring approaches are implemented: camera traps and passive acoustic recorders. These tools make it possible to document the presence, spatial distribution, and abundance indicators of the forest species of hunting interest being studied.

Camera traps are now an essential tool in ecology. They enable continuous data collection, both day and night, while greatly limiting disturbance to the environment. Their non-selective nature allows simultaneous monitoring of the targeted species as well as other species sharing the same habitat, including potential predators or competitors. This approach makes it possible to cover large areas with limited human effort while obtaining standardized information on space use and species activity.

Passive acoustic recorders continuously and non-selectively capture ambient sounds over long periods of time. This method considerably expands the spatial and temporal scales of study while reducing biases related to human presence. The recordings obtained can be reanalyzed for different taxa producing identifiable vocalizations and can also provide information on anthropogenic activities (noise, human presence) that may influence ecological communities. These data allow researchers to infer species presence, activity periods, and relative abundance indices.

One of the main challenges of these monitoring methods lies in the very large volume of images and audio recordings generated, which requires efficient processing tools and validation procedures to minimize identification errors. To address this challenge, artificial intelligence tools based on deep learning are used to automate image sorting and identification, complemented by human validation. Acoustic recordings are processed using semi-automated analysis workflows that ensure reliable and reproducible data processing.

Finally, in order to link observed biological responses to local environmental conditions, habitat and contextual covariates are integrated into the analyses (forest structure variables, topography, and altitude). This approach helps explain spatial heterogeneity in species detection and habitat use.

Results

Expected outcomes include the production of presence maps for all target species, the calculation of abundance indicators, the characterization of activity patterns, and the analysis of species co-occurrence. The final objective is to produce management recommendations based on quantified results.

The student and his team

Bryan Leborgne completed his undergraduate degree at Université de La Rochelle, during which he spent two Erasmus semesters abroad: the first at Umeå University (Sweden), mainly focused on forest ecology, and the second at the University of Zadar (Croatia), oriented toward marine biology. He then pursued a Master's degree at the University of Liège (Belgium) and conducted his thesis research in Cochabamba, Bolivia, in collaboration with Universidad Mayor de San Simón.

Geotrygon montana

He later joined Caribaea Initiative as a field technician within the ESPACYPA project in Guadeloupe, before becoming project officer for the same programme in Martinique. Building on the results obtained and the continuation of the research initiated, it was jointly decided with the association to further develop this work through a PhD project, co-funded by Caribaea Initiative and the Fédération Départementale des Chasseurs de Martinique.

The PhD is supervised by Prof. Alain Sandoz and co-supervised by Dr. Christopher Cambrone.