

Study of invasive exotic mammals in insular environments: impacts on health and biodiversity in the West Indies

endemic species # exotic invasive species



Herpestes javanicus © Carla Kishinami

DATES

2024 - 2027

COUNTRY

Guadeloupe

STUDENT

Yuna Mélane

EDUCATION LEVEL

Doctorate



CONTACT

yuna.melane@gmail.com

Context

Island ecosystems are currently under threat from several factors, with biological invasions by exotic species being one of the most significant dangers. Invasive alien species (IAS) affect biodiversity in various ways (competition, predation, hybridization, etc.), and also impact island economies by disrupting human activities and incurring high costs in management and control efforts. This is a critical issue for Caribbean biodiversity, as many—if not all—islands are affected by at least one invasive species.

In the Caribbean, the first introduction of exotic species by humans dates back to the Amerindian era, which intensified with the arrival of European settlers and the expansion of intercontinental trade. Today, globalization plays a major role in biological invasions through mechanisms such as the transport of goods, tourism, and the trade of species.

Most invasive mammals were deliberately introduced, either as a food source, pets, or to control other species. The most common invasive mammals in the Caribbean are: (i) the rat, introduced accidentally by European colonists; (ii) the mongoose, introduced in Guadeloupe to control rat populations; (iii) the raccoon; and domestic species such as (iv) goats, (v) dogs, and (vi) cats. These species can spread diseases and degrade biodiversity by overexploiting resources or preying on native species.

Objectives

This doctoral project aims to study two invasive alien mammals in the West Indies: the mongoose and the cat. The goal is to understand their impact on Caribbean biodiversity and assess the associated health risks for animals, the environment, and humans (One Health approach). The project will focus on three key questions:

- What is the spatial distribution of invasive mammals in the West Indies?
- Which local species are most affected by predation from these invasive mammals?
- What are the risks of pathogen transmission from mongooses and cats to native biodiversity and humans?

Methods

To comprehensively assess the threats posed by invasive mammals in an island territory like the West Indies, several studies will be conducted. These studies will provide in-depth insights into the impact of these species on the biodiversity and ecosystems of the West Indies.

The demographic study of invasive mammals in the West Indies will be conducted using camera traps, an effective method for identifying, counting, and observing animals. Demographic and behavioral data will be analyzed, along with data on species presence and their habitats. Further studies on the behavior and diet of these species may also be undertaken.

Camera traps will be used to understand the interactions between IAS and their meso-predatory effects on local species. Additionally, animal captures will be conducted to collect stomach content or feces samples for DNA extraction. Genomic analysis of these samples using both targeted and non-targeted metagenomics will enable the identification of (i) the prey consumed by these species and (ii) the microbial elements (bacteria, viruses, and antibiotic resistances) carried by these animals, which could potentially be transmitted to humans.

Expected Outcomes

The main objective of this thesis is to provide data on the presence and distribution of invasive mammals in the West Indies across different ecosystems, which will facilitate the development of action plans against these species. The study will also evaluate the impact of their diet and interactions with local species, as well as the potential for pathogen transmission to native fauna and humans.

About the research team

Yuna Mélane completed her entire academic journey in Guadeloupe, where she completed her master's degree in Tropical Biodiversity Management at the Université des Antilles. She joined Caribaea Initiative team during her second-year master's internship, working on the MERCI project to assess the invasive potential of reptiles in the Caribbean. She later continued as a field assistant on the ESPACYPA-G project, funded by the Federation Départementale des Chasseurs de Guadeloupe and the DEAL of Guadeloupe, before starting her PhD at the Université des Antilles. Her thesis, conducted with the support of the Conseil Régional de Guadeloupe and Caribaea Initiative in partnership with the Pasteur Institute of Guadeloupe, is supervised by Dr. Etienne Bezault (lecturer at the Université des Antilles, BOREA laboratory), Dr. Christopher Cambrone (scientific coordinator at Caribaea Initiative), and Dr. Séverine Ferdinand (Pasteur Institute of Guadeloupe). The doctoral research is part of the CIMBA project, dedicated to the study of invasive mammals, conducted by Caribaea Initiative with financial support from the Interreg-Caribbean programme.

