E. coecum © P.M. Beaujour

Relationship between the diversity of Odonata assemblages and the quality of freshwater aquatic environments in the West Indies: practical implications for habitat management and species conservation

 # community ecology # biodiversity

DATES
2019-2022

COUNTRY
Haiti

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EDUCATION LEVEL
Doctorate

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Context

The Caribbean region is home to 108 species of Odonata, 36 of which are endemic to one or a few islands. This region is a priority for the conservation of Odonata in the neotropical ecozone, since many of the endemic species it harbours have limited geographical ranges and face a strong anthropogenic pressure. In Haiti, Knowledge about the Odonata living in Haiti is still limited. Fifty-eight species, including at least five species endemic to the island of Hispaniola, have been counted in this country. However, the status of the different species and their relative abundance remain very poorly documented. Given the persistent degradation of the environment, especially aquatic environments, it is urgent to increase the knowledge about Odonata assemblages in Haiti and about the influence of the quality of their environment on their diversity. A better understanding of their behaviour, habitat and demography is also important. Two species, *Scapanea frontalis* and *Enallagma coecum*, classified respectively as Not Evaluated (NE) and Data Deficient (DD) by the International Union for the Conservation of Nature (IUCN), are studied for this project. Their populations will be monitored using a Capture-Mark-Recapture protocol that will be soon implemented in the town of Kenscoff, in the Furcy area.

Objectives

The project has the following objectives:

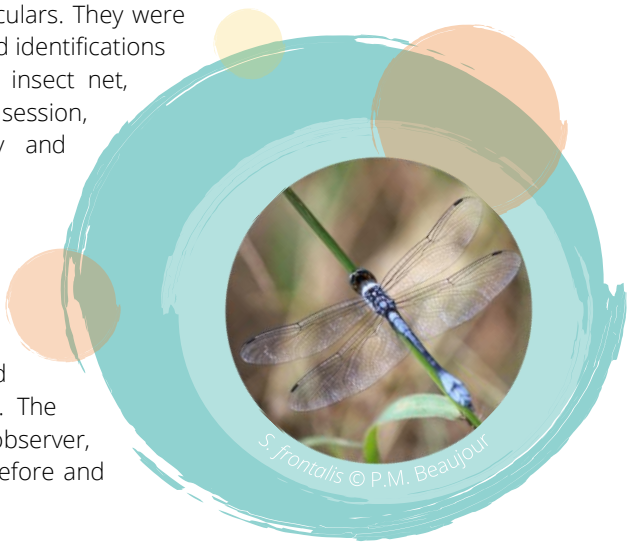
- Increase the knowledge on the status of Odonata populations in Haiti, in particular for species with a high heritage value;
- Determine the relative contribution of anthropogenic disturbances and natural environmental variables in the diversity and specific richness of Odonata assemblages in Haiti;
- Complete the knowledge and assessment of the conservation status of two Odonata species: *Scapanea frontalis* and *Enallagma coecum*, classified respectively as a species Not Evaluated (NE) and Data Deficient (DD) by the International Union for Nature Conservation (IUCN);
- Create a quality index for freshwater environments that takes into account the heritage value of Odonata species

Methods

Sampling method and study site

The sampling of a large part of the national territory was initially implemented, targeting the main freshwater environments (rivers, lakes, ponds, temporary and permanent ponds) in the country. The prospected sites were selected based on their accessibility, their ecological characteristics and their level of anthropogenic disturbance.

In each sampling station, data were collected along 10 m long transects, separated between each other at least by 100 m, using conventional methods of monitoring for Odonata populations: observation of adults, sampling of larvae and collection of exuviae. Adults were observed with the naked eye and using binoculars. They were also photographed, when possible, thus making it possible to verify field identifications a posteriori. Some adults, hard to identify, were collected with an insect net, preserved in ethanol and identified later. During each sampling session, different parameters were measured such as pH, conductivity and temperature.



For the implementation of the Capture-Mark-Recapture (CMR) method on the species *S. frontalis* and *E. coecum*, two study sites were selected in the in the town of Kenscoff (Furcy area), upstream and downstream of the cold river. These sites will be randomly investigated with no time limit. All individuals encountered will be captured using a net and marked on the upper side of the forewings before being released. The following information will also be recorded: date, name of the observer, geographic coordinates, individual code, time of capture, condition before and after capture.

Data analysis

Species richness and the relative abundance of the different species will be evaluated with indices conventionally used in community ecology. Generalized linear mixed-effect models will be used to study the influence of environmental factors on species richness and abundance for the whole dataset, and for Zygoptera and Anisoptera considered separately.

The CMR data collected on the two species will be analysed using E-Surge software and an open population model in order to estimate theoretical numbers for each sampling session as well as for the entire sampling season. Several parameters of detectability and local survival of populations related to the sampling sessions will also be calculated.

Results

Nearly 2,500 individuals have already been observed on the 300 sampled stations spread over 86 sites, including 178 individuals that have been captured and stored for molecular analyses. The data collected on all the stations concern 52 species of Odonata, representing 90% of the specific diversity currently known in Haiti. Among these species, five (8.6%) are classified as “Not Evaluated (NE)” by the IUCN, five (8.6%) are “Data Deficient (DD)”, one species (1.7%) is classified as “Endangered (EN)”, and the remaining 47 species (81%) are considered as “Least Concern (LC)”.

About the research team

Pierre Michard started his PhD research in January 2019, at the Université des Antilles, in Guadeloupe. It is co-directed by Prof. Frank Cézilly and Dr. Gladys Loranger-Merciris, respectively from the UMR CNRS 6282 Biogéosciences (Université de Bourgogne Franche-Comté, Dijon) and the UMR BOREA (Université des Antilles), and funded by Caribaea Initiative.

Pierre Michard joined Caribaea Initiative in 2017, when he began his master's degree with an internship on the theme of pollinating insects, which was also funded by Caribaea Initiative.