A global assessment of functional biodiversity loss in the Anthropocene

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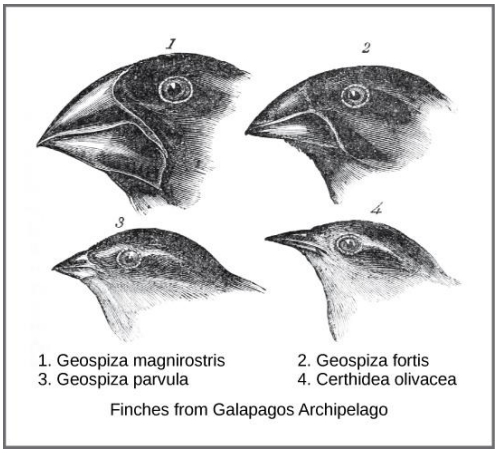
Human activity has led to widespread loss of biodiversity globally. Changes in biodiversity have traditionally been quantified based on the disappearance, that is the extinction, of species, but this approach can overlook changes to other dimensions that describe the functional and evolutionary biodiversity on the planet. Functional biodiversity captures the variety of forms and functions (traits) among organisms that shape species interactions and ecosystem services, including those that directly benefit humans. For example, the shape of a bird's beak determines which seeds it can disperse, and thus, which plants will successfully reproduce and colonize new habitats.



Finches from Galapagos Archipelago

This PhD will contribute to address a real-world problem evaluating how human activities threaten and could further erode the global functional biodiversity of birds and mammals. Assessing how the Anthropocene is shaping the trait diversity of these two large and charismatic vertebrate groups will improve our understanding of changes in an important, but understudied dimension of biodiversity and help us anticipate potential disruptions of ecosystem processes that can occur with the loss of trait diversity.

In particular, the project will address four main goals that will be developed as thesis chapters and manuscripts to be submitted for publication:

1. Global characterization of the current mammalian and avian functional biodiversity. This chapter will provide a description of existing functional diversity and allow us to identify vulnerable forms and functions currently represented by one or few organisms as well as redundant or resilient traits found in many organisms and therefore less likely to disappear.
2. Mapping of the regional variation in functional biodiversity in mammals and birds. Describing regional variation will reveal hotspots and at-risk regions with high and limited and/or threatened biodiversity respectively. This chapter will also test the role of different environmental and anthropogenic factors (e.g, climate and land use) in shaping observed regional variation.
3. Global predictions of future mammalian and avian functional biodiversity loss. This chapter will explore scenarios of future extinction to quantify potential losses of diversity and how these may disrupt ecosystem functions that depend on that diversity.
4. Assessment of the loss of functional biodiversity associated with different human activities (eg, hunting, deforestation). This chapter will explore if different activities affect distinct forms and functions to partition biodiversity vulnerability across threats and also identify the most damaging activities. This chapter will also forecast potential losses of biodiversity exploring scenarios of future human development.

Training opportunities:
Training in proposed methods and data management will be available via the University of Reading and NERC short courses. Learning will be supported by a supervisory team that includes world leading experts on trait-based and functional diversity methods and mammalian and avian biodiversity.

Additionally, the student will spend three months at the University of Tartu in Estonia with co-supervisor Dr. Carmona. This training period will focus on gaining expertise and practice with methods to assess and quantify functional biodiversity, including those developed by Dr. Carmona. Additionally, this international visit will provide the student with the opportunity to interact and network with PhD students, postdocs and faculty in a different department and university. All communication and day-to-day activities will be in English facilitating integration of the student.

Student profile:

Candidates should have an interest in conservation and quantitative ecology, with knowledge of current conservation issues. They should hold a BSc (MSc/MRes desirable) in Zoology, Ecology or related discipline.

Required skills: basic knowledge of quantitative methods in ecology and conservation, ability to learn independently and to work in groups, good time management and oral and written communication skills, willingness to take on new challenges.

Desirable skills: familiarity with functional biodiversity metrics and phylogenetic analyses, experience working with R and/or other programming languages, experience working with trait data, familiarity with bird and mammalian biodiversity.

References:

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https://research.reading.ac.uk/scenario/