

Project title: Extinctions in Paradise? The impacts of climate change on endemic amphibians of the Seychelles Archipelago

Ref: OP2462

Keywords: Amphibians, Climate Change, Extinction, Conservation

One Planet Research Theme: Climate & Climate Change | Earth System Processes | Anthropocene | Environmental Informatics

Lead Supervisor:

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Key Research Gaps and Questions:

- What are the current climatic conditions of the granitic Seychelles and how will this change with climate change?
- Will geographically restricted, globally important, endemic amphibians be able to adapt to a changing climate?



Project Description:

The isolated granitic Seychelles are continental in origin, once forming part of the supercontinent Gondwanaland, and home to 13 endemic amphibians—12 ancient and one more recent arrival (the Seychelles treefrog). The Sooglossidae are an endemic family of four frog species, and the limbless caecilian amphibians form a radiation of eight species, both of which have been isolated from their closest relatives for upwards of 65 million years, and are thus globally important.

Island organisms are at particularly high risk from climate change because they are latitudinally, longitudinally, and elevationally restricted, making them unable to escape changing climatic conditions. Many of the Seychelles endemic amphibians have tiny distributions and occur in small, specialist habitats. For example, the Seychelles caecilian *Hypogeophis montanus* has a distribution of <2km² on Mahé island, only occurring on the two highest Seychelles mountain peaks. Restriction to a 180m elevational window (undoubtedly further reduced due to expansive exposed rock habitat across peaks) likely positions *H. montanus* as the vertebrate species most threatened by climate change, placing this species in ‘imminent danger of extinction’ (Maddock, 2018).

The climate of the granitic Seychelles varies at the inter- and intra-island level, yet climate data to inform the threat posed by climate change to the island’s fauna, flora and human population, are lacking. Official climate data are collected on reclaimed land at the international airport which is barely above sea level, and unrepresentative of the thermal and climate gradients present across Seychelles. We have been collecting climate data from tens of data loggers since 2018 in an attempt to fill this important knowledge gap. A crucial aspect of this PhD will be to extend our baseline climate data collection across many more localities, and to identify how climate varies with island and habitat. This will inform measures for climate change mitigation with our in-country collaborators.

The student will also use genetic approaches to identify and test markers that can provide insight into climate change adaptive potential in Seychelles amphibians (e.g., incorporating the CASSANDRA database www.cassandra-genes.org). These data will combine with truth-modelled climate predictions to infer climate-response by assessing the vulnerability of Seychelles amphibians to climate change, inform potential species, community, and ecosystem impacts, and measures for climate change mitigation.

Prerequisites: Student must be interested in combining fieldwork, lab work and handling of large datasets. Genetic expertise and amphibian fieldwork experience are desirable. For more information, please contact Simon Maddock (simon.maddock@newcastle.ac.uk)

