

Research Experience Placement (REP) Scheme Project

Project Supervisors:

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Host Organization and Department (if applicable):

University of Glasgow / Institute of Biodiversity, Animal Health and Comparative Medicine

Project Title:

Visualising the impact of climate and land-use change on UK plant biodiversity

Project Description:

Computer simulations provide a versatile tool for simulating species-specific responses to climate change and, as such, provide valuable information and insight into important conservation and management questions. We recently developed a simulator of UK plant biodiversity that incorporates information on climate, soil and other environmental preferences for all terrestrial plant species. These descriptions of environment inform models of plant competition, reproduction, dispersal and death, providing a simulation framework for predicting plant biodiversity across the UK. The aim of this REP project is to produce a visualisation tool, which will then be made freely available via GitHub. The tool will be used to visualise output of the plant simulator, facilitating effective communication with key stakeholders such as Peatland Action, Scotland's Plant Heath Centre and Natural Resources Wales. The project will look at a number of possible scenarios and applications including: distributions of at-risk populations – i.e., the distribution of plant hosts of key plant diseases or pests, and the impacts of landscape decisions and/or climate change on peatland habitat. The project will provide the foundations for future knowledge-exchange activities.

Skills and Career-Development Opportunities:

The student will develop a working knowledge of the plant biodiversity simulator and how this can be applied in ecological research into conservation and invasive biology. Other training activities include: coding of visualisation tools, engaging with ecologists, presenting at a workshop and report writing. The workshop will provide an excellent learning experience for the student, as they will see how simulator models can be used in real-world applications and engage with ecologists. Weekly meetings will be held with Dr Reeve, Dr Harris and Prof Cobbold, most likely via videoconference, though in person if appropriate. This will also be a career development opportunity for Dr Harris, who has recently completed her PhD and is an Early Career Researcher in her first post-doctoral post on a NERC-funded project with the other supervisors leading the development of the simulation software.

Wider context of research:

The student will take part in a knowledge exchange workshop at the end of the project with stakeholders who are connected to the supervisory team's NERC Landscape Decisions grants to understand the context in which their work will be used, and to demonstrate how the visualisation tool that they have developed can be of value to end users. The data collection component of this project will two-fold: on the one hand, there will be software-based data generation, running the ecological simulator to generate data suitable for visualisation. On the other hand, the student will be collecting feedback from the end users in conservation that we are

working with on what visualisations are most meaningful, useful and intuitive to them to develop this work further in the future.

Project Timeframe:

The student will:

1. Learn about the plant biodiversity simulator model components: how to simulate the model outputs; and how they can be used in real-world applications. (2 weeks)
2. Perform a literature search of visualisation tools and identify appropriate approaches. (1 week)
3. Develop code in Julia, R or Java to visualise the model output. (3 weeks)
4. Write a short report on the findings. (1 week)
5. Present the findings of the project at a workshop (most likely a virtual meeting) to a select group of ecologists and modellers, with participants invited from the NERC Landscape Decisions Large grant team who developed the plant biodiversity simulator. (1 week, allowing for presentation preparation)