

Ecological and heritage importance of parkland estates

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Project partner(s): [Harewood House Trust](#)

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Large stately homes and their accompanying gardens provide a unique ecosystem with characteristic flora, fauna and soil function. Across the UK the Historic House Association supports over 1600 historic homes and their associated gardens. These gardens are of huge ecological importance. Not only for the diverse plant species they support, both native, wild and cultivated species and hybrids, but also for their potential to store significant amounts of carbon in their soils. Many such homes are on the edge of urban environments and they can help mitigate human impacts through the ecosystem services they provide.



Working with Harewood House as the lead partner but also the Treasure Houses of England network will provide ideal locations to assess the management practices on plant and soil function and to assess its resilience to ongoing threats including climate change and disease outbreaks. We currently know nothing about how the introduction of non-native species and soil management of large gardens impacts on the main soil quality indicators, such as soil organic carbon (SOC) and soil pH. For example, are higher SOC stocks maintained under perennial woody bushes and trees, where soil may be less disturbed, compare to frequently dug ground used for herbaceous borders? By developing a database and accurate maps of plants, their traits and associated soil characteristics including soil organic carbon storage, total nitrogen, pH, C : N ratio and bulk density at Harewood and other Treasure Houses an understanding of carbon storage in these estates will become clear in addition to the impacts of the different vegetation and management practices.



In many estates such as Harewood the true value of their unique flora is not known, with Peacock, Ting and Bacon (2018) having just produced a first estimate of the value of the trees. However, with no complete record of species and hybrids; this study will provide those details. The Aichi Biodiversity Target 13 (2011), recognises the value of cultivated species, including those which have socio-economic or cultural value or species that are now rare in their native locations, making the

estates living plant libraries. These plants have been collected from around the globe and many local hybrids have been developed. The natural historical value of gardens at stately homes is as important as their art or the homes themselves, and they are interconnected with our social and cultural history but is far less comprehensively understood.



Understanding the value of the plants could be enhanced by the social value of sites such as Harewood House. To engage the public with the ecological values of Harewood House estate, a citizen science-based database of photographs providing ecological information will be created. This, combined with metrological data and estate records, will help to investigate longer-term responses of plants to changing management practices or climate regimes and provide a detailed historical repository/ resource of local photographs for the wider community.

Objectives:

In this project, you will work with scientists at Leeds and specialists at Harewood House to determine best practices for sustainable management of the ecological resources of stately homes and the impacts of climate change on plants and soils in these estates. In particular, according to your particular research interests, the studentship could involve:

- Assess the range of plants and soil types in the estate
- Assess the biogeochemical characteristics of the estate soils
- Assess the physical and physiological status of selected plant species
- Determine resilience of native and non-native plants within the estate and compare this to natural populations of selected species
- Determine the impact of management practices on soils within the estate and make recommendations for future strategies in relation to sustainability of both plants and soils
- Create an online resource to document plants and soils and their characteristics and make this available to the general public and other interested parties. Manage a citizen science resource linked to the estate.
- Utilise the findings of the investigation to inform sustainable practices for estates on a national and international scale.

Potential for high impact outcome

There is significant scope for impact within this project, both in terms of research output and public outreach. This project will assess the role that the estates of stately homes can have in ecological protection of native and non-native species and how such sites can be used as an ecological heritage resource. The research topic has immediate policy-relevant findings, and we therefore anticipate the project generating several papers with at least one being suitable for submission to a high impact journal.

In addition, NERC have recently outlined their commitment to public outreach as a tool for research impact. There is strong potential for public outreach informing the public of ecology of relevance to them. In addition, the data would be made available for all interested bodies through an open access online database. Citizen science element with the database, members of the public could add photos and species identifications from the estate and formal gardens which would serve as a test case for engaging the public more interactively with estate gardens.

Training

The student will work under the supervision of Dr. Karen Bacon and Dr. Julie Peacock within the EGC research group and of Prof. Pippa Chapman in the River Basins Research Group in the School of Geography. The project provides a high-level of training in (i) ecology and ecological sustainability; (ii) project planning, design and implementation; (iii) statistics and analytical skills. The student will be supported throughout the studentship by a comprehensive PGR skills training programme that follows the VITAE Research Development Framework and focuses on knowledge and intellectual abilities; personal effectiveness; research governance and organisation; and engagement, influence and impact. Training needs will be assessed at the beginning of the project and at key stages throughout the project and the student will be encouraged to participate in the numerous training and development course that are run within the university to support PGR students, including statistics training (e.g. R, SPSS), academic writing skills, grant writing etc (<http://www.emeskillstraining.leeds.ac.uk/>). Co-supervision will involve regular meetings between all partners and regular visits to Harewood House.

Student profile:

The student should have a strong interest in plant and soil ecology, a strong background in a physical geography, plant sciences, environmental sciences or related discipline. Strong analytical/statistical/fieldwork skills are desirable but not essential, as full training will be provided during the PhD. An interest in communicating science to the public is also desirable.

References

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