

**Project title:** Connecting the plots - A biodiversity and functionality assessment of urban allotments and their management

**Ref:** OP2471

**Keywords:** Biodiversity loss, urbanisation, climate change, pollinators

**One Planet Research Theme:**

Climate & Climate Change  | Earth System Processes  | Anthropocene  | Environmental Informatics

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**Key Research Gaps and Questions:**

- (1) How do environmental factors and management practices impact above and below ground biodiversity across allotment urbanisation gradients?
- (2) What historic and current management practices of allotments promote below ground soil functionality and health?
- (3) Can certain strategies and connective management of allotments maximise their potential as biodiversity networks?

**Project Description:** Popularity and demand for allotment plots continues to grow, partially driven by urban horticulture, food security issues<sup>1,2</sup>, and the social, health and recreational benefits allotments can provide<sup>3</sup>. Understanding how allotment management impacts soil health and productivity is vital to maintain and promote their benefits. Whilst for some allotments, contaminant legacy effects need consideration, this is not the case for all<sup>2</sup>. Indeed, allotment soils have been shown to contain high concentrations of soil organic carbon, support a range of ecosystem services<sup>4,5</sup> and provide a refugia of biodiversity.

Urban allotment soils are ready-made tools to study the major global issue of biodiversity loss, and if managed correctly, allotments could provide vital biodiversity hotspots within otherwise urbanised areas<sup>5</sup>. Whilst elements of allotment biodiversity have previously been explored<sup>6,7</sup>, the simultaneous and robust assessment of above and below ground biodiversity and functionality is missing, with the microbiomes of allotment soils unknown. Through the omission of microbial taxonomic and functional data, a large portion of what drives aboveground botanical and insect biodiversity as well as biogeochemical cycles within allotment soils is unaccounted for<sup>8,9</sup>.

This project is linked with the UK National Allotment Society. It aims to study the past and present management and health of allotment soils, to raise awareness of the ecological benefits of allotments and best practice. Key analysis and skills will focus on above and below ground soil biodiversity assessments (using surveys for aboveground and molecular techniques for belowground) and soil functionality (e.g., soil enzyme and decomposition assays, nutrient analysis and physicochemical characterisation). The evolution of this project will develop additional links with the UK National Allotment Society and international allotment groups.

**References:** 1. [Edmondson, J et al., \(2020\). \*Nature Food\*, 1\(3\)](#). 2. [Entwistle, J.A et al., \(2019\). \*Environment International\*, 122](#). 3. [Poniży, L et al., \(2021\). \*Sustainability\*](#). 4. [Dobson, M et al., \(2021\). \*Sci. Total Environ.\* 777](#). 5. [Haase & Gaeva \(2023\). \*People & Nature\*, 5\(4\)](#). 6. [Tresch, S et al., \(2019\). \*Scientific Reports\*, 9\(1\)](#). 7. [Cabral, I et al., \(2017\). \*Urban Forestry & Urban Greening\*, 23](#). 8. [Babikova, Z et al., \(2013\). \*Ecol Letters\*, 16\(7\)](#). 9. [Bardgett, R.D et al., \(1998\). \*Soil Biol. Biochem.\*](#)

**Prerequisites:** eDNA extraction, molecular biology, NGS, soil biochemistry, bioinformatics. For more information, please contact [kate.randall@northumbria.ac.uk](mailto:kate.randall@northumbria.ac.uk)