Project Proposal Form – 2020 entry

<table>
<thead>
<tr>
<th>Project Title</th>
<th>OU16: Understanding the impacts of urbanisation on ancient woodland.</th>
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<tbody>
<tr>
<td>University (where student will register)</td>
<td>The Open University</td>
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<tr>
<td>Which institution will the student be based at?</td>
<td>As above</td>
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<td>Theme (Max. 2 selections)</td>
<td>Climate &amp; Environmental Sustainability ☐</td>
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<td>Organisms &amp; Ecosystems ☒</td>
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<td>Dynamic Earth ☐</td>
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<td>Key words</td>
<td>Ancient woodland, urbanisation, environmental change.</td>
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<tr>
<td>Supervisory team (including institution &amp; email address)</td>
<td>Lead supervisor: Philip Wheeler (The Open University; <a href="mailto:philip.wheeler@open.ac.uk">philip.wheeler@open.ac.uk</a>)</td>
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<td>Co-supervisor: Kadmiel Maseyk (The Open University; <a href="mailto:kadmiel.maseyk@open.ac.uk">kadmiel.maseyk@open.ac.uk</a>)</td>
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<td>Sarah Davies (The Open University; <a href="mailto:sarah.davies@open.ac.uk">sarah.davies@open.ac.uk</a>)</td>
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<tr>
<td>Is the project co-designed by a student?</td>
<td>Yes ☐</td>
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<tr>
<td>Is the PhD suitable for part time study?</td>
<td>Yes ☒</td>
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Project Highlights:

- Work on a threatened and highly biodiverse habitat in the UK in a multi-disciplinary project.
- Investigate one of the most challenging environmental problems in developed societies: how to accommodate a growing urban population while protecting our environmental heritage.
- Learn key skills in community ecology, ecophysiology and biogeochemistry.

Overview:

Ancient woodlands are those woodlands which have been continuously forested for several centuries. In the UK they have declined dramatically as farmland and urban development have increased. With an increasing urban population and a major demand for housebuilding, remaining ancient woodlands are coming under additional pressure from urban expansion. Milton Keynes is a ‘new town’ constructed in the open countryside in the 1960s. As the city has grown, three patches of ancient woodland have become surrounded by urban development, potentially isolating them and exposing them to environmental impacts from local warming, drought and increased nutrient deposition. This project aims to use these sites as experimental areas for the study of impacts of urbanisation on ancient woodlands that will have relevance to these important habitats across the UK and further afield. It will combine a range of techniques from ecology to landscape history and biogeochemistry to assess the consequences for ancient woodlands of being incorporated into the urban landscape. An important element of the project is establishing fixed monitoring sites as the foundation for long-term monitoring of environmental change in these urban woodlands. Ultimately it will seek to understand whether and how ancient woodlands can survive in the face of urban expansion and
inform the emerging debate about land sparing and land sharing approaches to conservation in urbanising landscapes.

**Figure 1:** A hornbeam in Howe Park Wood, one of three ancient woodlands within the urban area of Milton Keynes that will be the focus of this project.

**Methodology:**

This highly interdisciplinary project will use a combination of approaches to assess the effects of urbanisation on ancient woodlands. Working with our project partners who have extensive local knowledge, we will take advantage of the three ‘urban’ ancient woodlands in Milton Keynes and pair them with a set of similar ‘control’ sites in the wider countryside. A review of the history of the six sites using historic maps and other local sources will set the context for more detailed environmental assessments. Ecological impacts will be assessed through ground flora surveys, comparing these to earlier studies in the urban sites and to our paired non-urban sites. The physical and chemical environments will be assessed by analysing soil properties and chemistry. The project will also use analysis of tree cores to analyse how tree growth (from ring-width) and physiology (water-use efficiency from $^{13}$C stable isotope composition) has changed pre and post urbanisation.

**Training and skills:**

Students will be awarded CENTA2 Training Credits (CTCs) for participation in CENTA2-provided and ‘free choice’ external training. One CTC equates to 1/2 day session and students must accrue 100 CTCs across the three years of their PhD.

While experience in ecological field methods, multivariate statistical analysis, soil analysis dendrochronology or stable isotope analysis would be helpful, students will be given full training in all relevant methods as part of the initial stages of the PhD. Students will receive full training in field data collection, statistical methods for the analysis of ecological data and laboratory methods for soil nutrient and stable isotope analysis at the Open University.
Partners and collaboration (including CASE):

The project is a CASE award in partnership with The Parks Trust in Milton Keynes, a charity, which is responsible for much of the green space in the city, including its three ancient woodlands. As a CASE award the student will take up a work placement with The Parks Trust, working with their biodiversity team.

Possible timeline:

Year 1: Site characterisation using mapping, archival studies and field evidence; training in statistical and laboratory analysis; establishing woodland monitoring plots; carrying out baseline ecological surveys.

Year 2: Repeat ecological and environmental surveys; tree-coring and ring width analysis, ringwood separation and initial stable isotope analysis. Prepare initial results for publication.

Year 3: Complete tree growth analysis; final data analysis; presentation at international conference; preparation of second publication; write up.

Year 4: Finalise writing up.

Further reading:


Further details:

Please contact Dr Phil Wheeler, (philip.wheeler@open.ac.uk) for further information.

The successful student will join a well-established team researching environmental and ecosystem processes and a vibrant postgraduate community at the Open University.

Applications should include:

- a cover letter outlining why the project is of interest and how their skills match those required,
- an academic CV containing contact details of three academic references
- a CENTA application form, downloadable from: http://www.centa.org.uk/apply/
- and an Open University application form, downloadable from: http://www.open.ac.uk/students/research/system/files/documents/Application%20form%20-%20uk-eu_0.docx

Applications should be sent to STEM-EEES-PHD@open.ac.uk by 12pm (noon) on Friday 10th January 2020.