

Quantifying ecosystem co-benefits with Kew's Living Laboratory

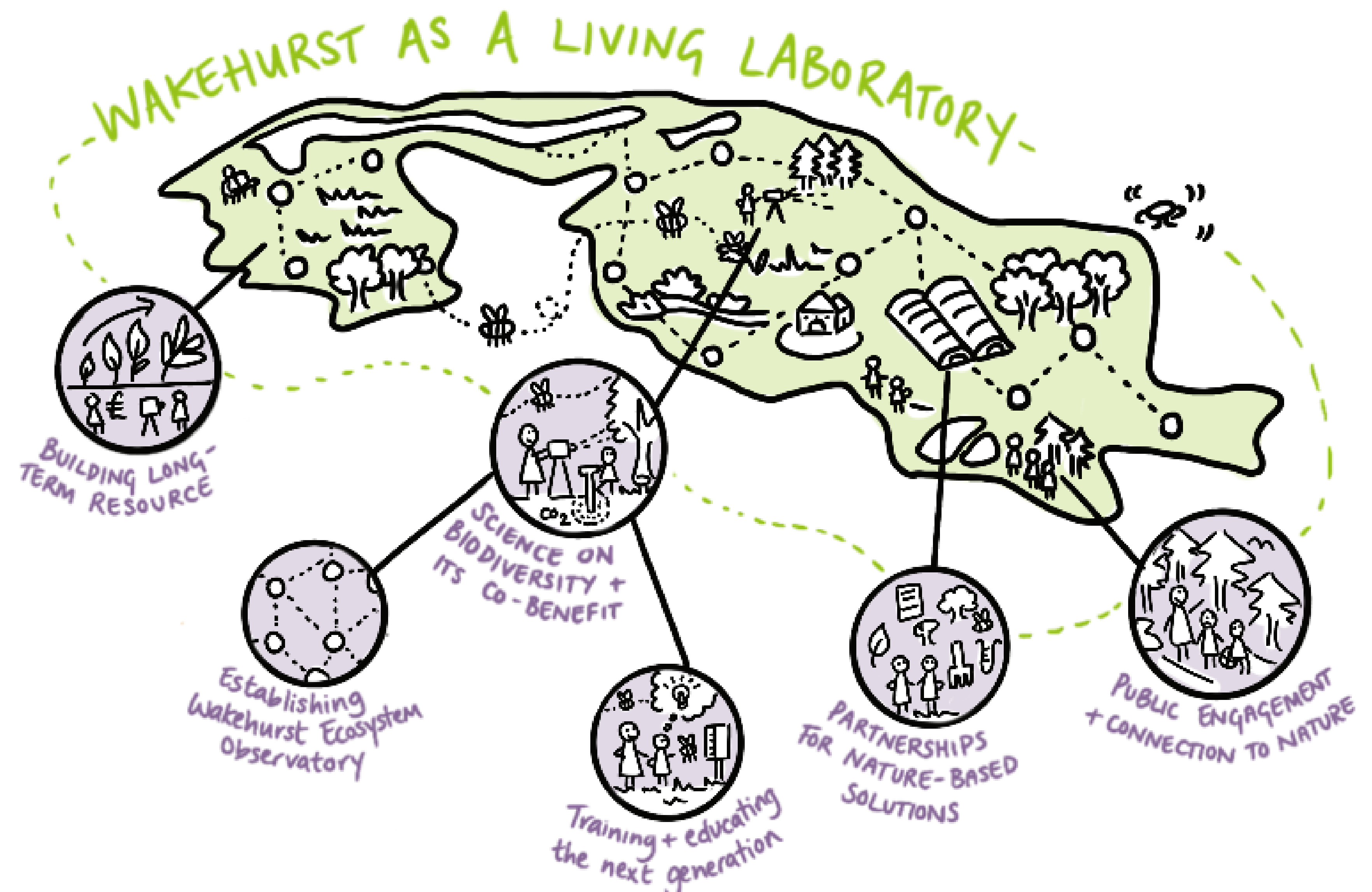
The Nature Unlocked (NU) programme launched in 2021 as Wakehurst's *living laboratory*.

The **Wakehurst Ecosystem Observatory (WEO)** will embed the living laboratory in the landscape underpinning long-term experiments on biodiversity and co-benefits of UK's multifunctional landscapes.

Results from the pilot phase

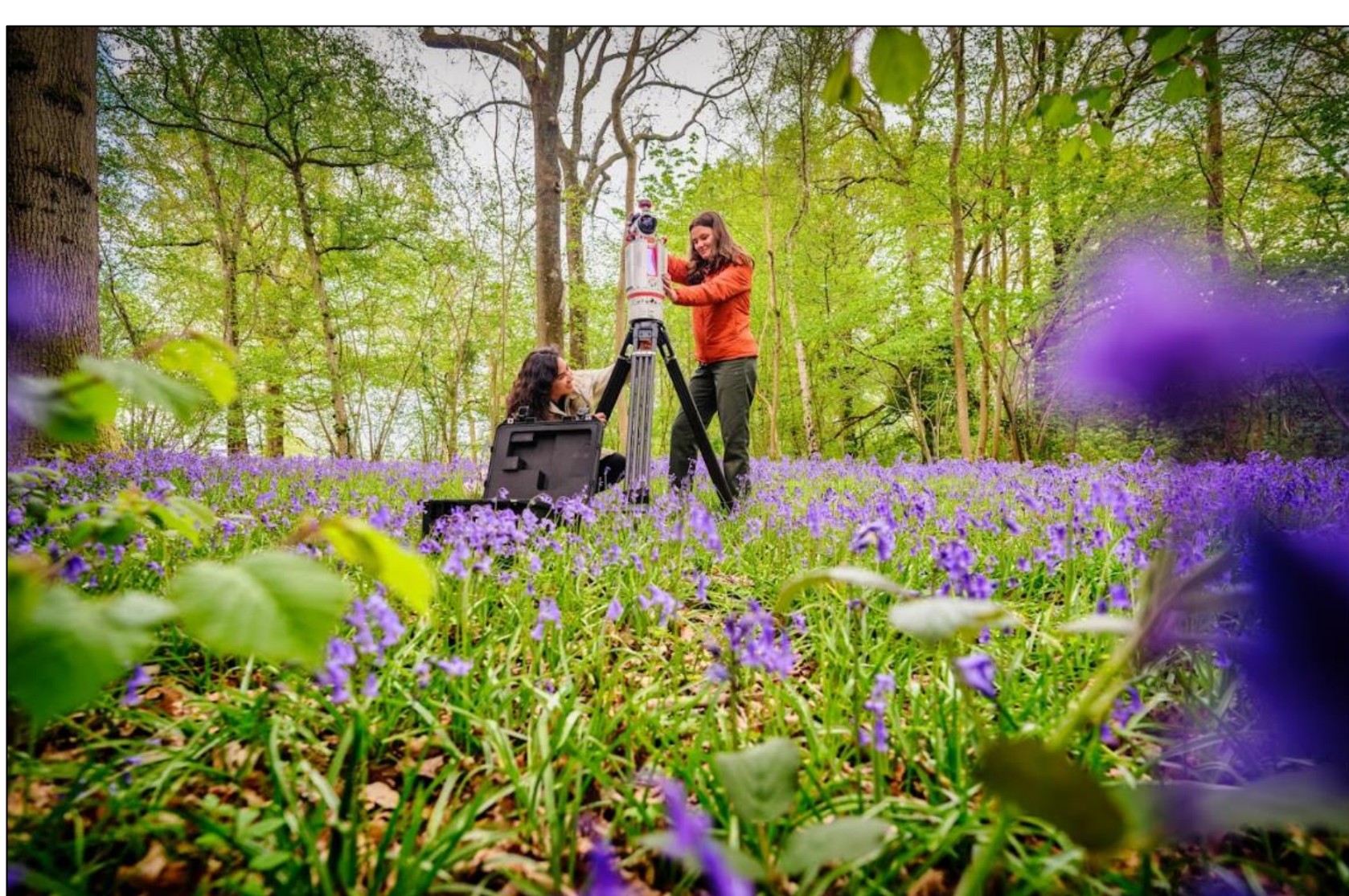
NU's pilot phase (2021 – 2024) delivered over 20 science projects. Insights from carbon, biodiversity, nature-connectedness, pollination, and seed viability research include:

- Terrestrial LiDAR reveals conventional methods may underestimate AGB in woodlands.
- New methods to quantify mycorrhizal diversity reveal high diversity in meadows and woodland, including new species.
- Biodiverse habitats provide varied wellbeing benefits: Children thrive in meadows, and men benefit most from nature connection.
- *Tree for Bees* citizen science project identifies important tree species for pollinator resource, using Wakehurst's 1,500 tree species.



WEO in numbers

- 8 habitats including broadleaf woodland, conifer plantation, hazel coppice, wet woodlands and meadows.
- 23 plots (0.5 ha plot size) and 2 experimental bee banks.
- Continuous monitoring equipment including UK's largest *in situ* gas flux network, micro-climate and soil moisture sensors (pollinator bioacoustics coming soon!)
- Annual soil and BioBlitz, bi-annual terrestrial LiDAR and drone surveys.
- Supporting 4 PhD students, 5 interns and MSc student projects.



What next? Embedding WEO in the landscape to quantify long-term co-benefits

- Expand **research** to quantify a broader range of ecosystem services, creating a 'stacked' database of social and ecological co-benefits across multifunctional landscapes.
- Creating data management **infrastructure** to allow open-access data discovery.
- Form **partnerships** and aligning **protocols** with other Long-Term Experiments sites for interoperability and a unified UK climate and biodiversity database.
- **Engaging** Kew Wakehurst's 450,000 annual visitors with science and nature through events, interpretation and citizen science.
- Create a **testbed** for new techniques, instrumentation and interventions. Comparison with low-cost, scalable solutions and evaluating 'what good looks like' for land use scenarios.
- Building **capacity to scale** beyond Wakehurst to other UK land use types, including agricultural and urban ecosystems.

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