



LIVING LABORATORY EDUCATION AND RESEARCH PROGRESS UPDATE 2024/5

**Dr Keith R. Skene
Lead of the Living Laboratory University of
Dundee Botanic Garden**

- I have now been in post for 14 months
- I was set a series of agreed targets in terms of education, research and community involvement as part of my role as lead of the living laboratory at the Gardens
- This report summarizes the progress to date.



My initial challenges:

- **To try to increase school visits to the Garden;**
- **To develop local, regional and international links;**
- **To develop a relevant research programme that would serve the Garden;**
- **To develop stronger links across the University;**
- **To develop relationships with Dundee City Council and the Tay Cities Region Deal;**
- **To contribute to the financial sustainability of the Garden by generating income.**

Core areas

RESEARCH

CONNECTIVITY

EDUCATION

CONCORDAT

RESEARCH

Regener8-I PhD studentship with co-supervised with Dr Micheal Crabb, Computing Science HoD

RENEW-AR: Regenerative Narratives and Education with Augmented Reality.

**Successful: Rosie Young began in October 2025
Ends August 2029.**

RENEW-AR: Regenerative Narratives and Education with Augmented Reality.

- **A key project, creating state-of-the-art visitor attraction and attracting huge interest from the Tay Cities Councils**
- **No other botanical garden has this technology**
- **Knits together traditional knowledge, liminality and augmented reality.**

RESEARCH

**PREPARATION OF HORIZON EU GRANT
WITH CONSORTIUM INCLUDING
ANDREEA OARGA-MULEC**

**Climate Resilience and
Traditional Forestry
Management Practice**

Andreea visited May, 2025

RESEARCH

Living Lab papers published since October, 2024

Oarga-Mulec, A., Luin, U., Skene, K. and Valant, M. (2024). Environmental priorities in the circular economy: examples from iron-based technologies. Proceedings of the 9th International Conference on the Development of Industrial Engineering 21. November 2024 Novo mesto, Slovenia. Pp. 53-57.

Skene, K.R. and Oarga-Mulec, A. (2024). Systems theory, thermodynamics and life: integrated thinking across ecology, organization and biological evolution. *Biosystems* 236: p. 105123.

Zhang, J., Ji, Q., Skene, K.R., Wu, X., Zhou, C., Wang, S. and Fu, B. (2025). Bridging resilience and sustainability: a reconciled framework for navigating social-ecological systems. *Regional Environmental Change* 25: 106.

Zhang, J., Sun, W., Pradhan, P., Gao, S., Su, C., Skene, K.R. and Fu, B. (2025). Nonlinear and weak interactions among sustainable development goals (SDGs) drive China's SDGs growth rate below expectations. *Environmental Impact Assessment Review*, 115, p.107990.

Zhang, J, Skene, K.R., Wang, S., Ji, Q., Zheng H., Zhou, C., Pradhan, P., Meadows, M.E. and Fu, B. (2025). Beyond borders: assessing global sustainability through interconnected systems. *Sustainable Development* 33: 1909-1920.

RESEARCH

Living Lab papers published since October, 2024, cont.

Oarga-Mulec, A and Skene, K.R. (2026). A dynamic biome-specific governance approach that integrates indigenous knowledge and pluriversal thinking. *Humanities and Social Sciences Communications*. In press.

Skene, K.R. (2026). What is the unit of intelligence? Artificial intelligence, relational ethics and the Earth system. Special Issue, *Topoi* (Springer): Rethinking Human-Centeredness: Toward Collaboration Between Environmental Studies and Ethics of AI. In press.

Skene, K.R. and Oarga-Mulec, A. (2026). Sustainable economics: uniting the environmental, social and economic pluriverse. *Green International Business*. In press.

RESEARCH

Living Lab papers currently under review:

Seják, J. Skene, K.R. Pokorný, J., Ellison, D (2026). On Integrating the Cost of Ecosystem Service Loss into the Valuation of Ecosystem Benefits. *Applied Science*.

Skene, K.R. (2026). Sustainable Economics: Pluriversal thinking and the more-than-global. *Ecological Civilization*.

Skene, K.R. (2026). The Thermodynamics of Complex Systems: Implications for extra-terrestrial life. In: *Astrobiology Perspectives on Life in the Universe* (Mikhailovsky, M and Igamberdiev, A, Eds), Wiley-Scrivener.

EDUCATION

SCHOOLS

UNIVERSITY

**WALES CENTRE FOR
ALTERNATIVE
TECHNOLOGY**

SCHOOLS

- Developed new brochure for primary schools, detailing visit options, Curriculum for Excellence learning objectives and follow-up activities – well received;
- Developed 20 electronic activities for schools to use across the curriculum;
- Introduced alternatives if transport too expensive: School visits.
- Developed brochure for secondary schools for distribution in Dundee, Perthshire, Fife and Angus.

New partnerships with Primary and Secondary Council leaders

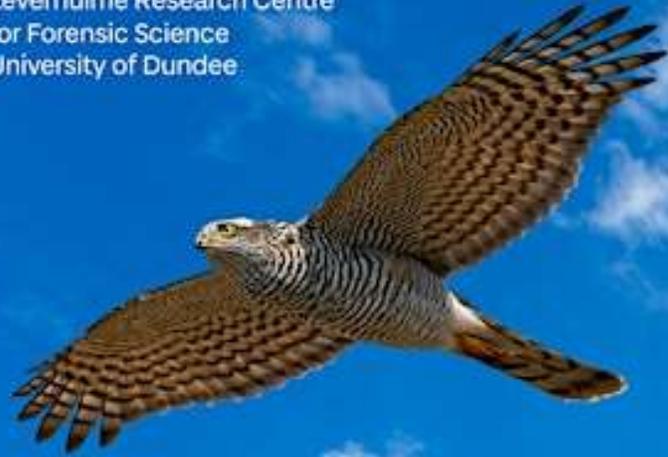
- **Jennifer Hunter: STEM Improvement Officer for Angus Council**
- **The Garden was part of the winning team for Royal Society STEM award – will lead to Primary Schools across Angus visiting**
- **Provides schools with £3000 to cover trips, funding trips to the Garden**
- **Invited to education marketing event where teachers from across Angus will attend (29th September).**

New partnerships with primary and Secondary Council leaders (cont.)

- **Held meeting with Tay Cities Council leaders at Garden**
- **250 high school students attended a major school event for Maths Week on 24th September (Operation Raptor), organized by the Living Lab and the Leverhulme Research Centre for Forensic Science, funded by Leverhulme Trust.**
- **Totalling £1000 for the Garden**
- **We work closely with Tay Cities officers based in every high school in the Tay Cities and they circulate our programmes to the schools**
- **They also are interested in the new research we are doing with Base groups for children with conditions such as Autism, Alcohol Fetal Syndrome and ADHD and are keen to develop a programme across Tay Cities.**



Leverhulme Research Centre
for Forensic Science
University of Dundee



OPERATION: RAPTOR RESCUE

Wednesday, 24 September 2025

**University of Dundee Botanic Garden,
DD2 1QH**



Base Group Programme

- We work closely with Tay Cities officers based in every high school in the Tay Cities and they circulate our programmes to the schools
- They also are interested in the new research we are doing with Base groups for children with on spectrums including Autism and ADHD, and they are keen to develop a programme across Tay Cities.
- From September 2025, we have weekly workshops for a base group from a Dundee primary school, observing and trying a range of approaches from sound to art. A report will be sent to the Scottish Government and the Tay Cities group, with the intention of using the findings to develop a nationwide programme for all base groups
- We now have base groups from Perth and Glasgow planning to visit.

Excerpts from the new ebrochure

Primary School Visits to the University of Dundee Botanic Gardens



Your visit

- **True experiential learning**
 - - **Allows more of the curriculum to be covered**
 - - **Expert, experienced educational staff**
 - - **Combines indoor (weatherproof) and outdoor**
 - - **Key areas of the curriculum rely on living ecosystems**
 - - **3D is better than 2D**
 - - **Immersive experience.**

Temperature and Biomes

- Contrast between desert and rainforest
- Senses: smell, feel, morphology, humidity, heat
- What does each biome feel like?
- How does it make me feel?
- Why do the plants look like they do?



Key economic plants at the Garden

- RICE
- LEMON
- ORANGE
- TEA
- COFFEE
- BREADFRUIT
- BANANA
- SPICES (Turmeric, Cardamon, Ginger)
- COCOA



Bookings

- **Huge increase in bookings from Angus, Dundee and Fife schools, and UHI**
- **Eight hundred and ninety children visited between March and June, with over 1000 children in 2025**
- **New outreach programme combined with garden visits**

- **17th March: St Josephs 93 children**
- **20th March: St Josephs visit glasshouse 57 children. 10-12.30pm**
- **26/27th March: Craigiebarns all day, both days, at school. 250 children**
- **29th April: Blackness Primary School Visit: 2 sessions of the P7 students (46 children)**
- **2nd May Pitteuchar East, PS Fife P2/3 class. 53 children**
- **13th May Blackness Primary morning and afternoon (10.45 – 12pm; 1.30-2.45 pm) 46 children**
- **22nd May Letham Primary School P1/2. 29 children + 4 adults**
- **28th May Andover Primary School P1 20 children + 3 Adults**
- **2nd June: Inchtute 22 children**
- **10th June: Letham Primary School 10-12.30pm P3 30 Children.**
- **10th June Letham Primary School 18 children**
- **17th June Lonhaugh Primary 33 children**
- **24 June Warrdykes Primary 44 children**
- **26 June St Columbas Primary 49 children**

UNIVERSITY

- **Teaching on EV22002 Earth System Function and Measurement module**
- **Exploring Sustainability compulsory training course for staff**
- **Developing sustainability web page with Elisa Garcia-Wilson and Lorraine van Blerk**
- **Lectures to students at University of Nova Gorica, Slovenia**

WALES CENTRE FOR ALTERNATIVE TECHNOLOGY

- Developed links with WCAT, Powys, Mid Wales.
- Taught on Masters course
- Potential for further collaboration



CONNECTIVITY

**RAISING THE PROFILE OF THE LIVING
LABORATORY**

Committees joined

Research (REF) Committee, Education and Social Work (Chair: Kumara Ward)
Environmental Futures Research Group (Chair: Simon Cook)
Collections Advisory Committee (Chair: Matthew Jarron)
DaffDNA Group (Chair: Liz Lakin)
Campus Wellbeing Committee (Chair: Jonathan Staal)
Sustainability Events Group (Chair: Elisa Garcia-Wilson)
The Environmental Association of Colleges and Universities
Organizing Committee: Wild Maths Day 28th September

Sustainability Concordat

Presented a paper on the Concordat for Environmental Sustainability of Research and Innovative Practice to Lorraine van Blerk, highlighting Living Lab and Botanic Gardens as a sustainability centre, able to contribute across the campus

Community Outreach

- **Roundhouse Community Kitchen**
- **Barnardos, Dundee**
- **Spoke at Science Café, Rep Theatre**
- **University of Aberdeen Science Cafe**
- **Collaboration with Falkland Palace (Ninian Stuart)**
- **Working with Changemakers Hub, Dundee.**

Challenges

- **Shortage of volunteers to help run larger school groups**
- **Extremely unpredictable situation in the University**
- **Increasing stress among staff due to this uncertainty.**