



The Living Lab

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EDITORIAL

Liz Lakin^{1&2}; Kevin Frediani^{2&3}; Marie Beresford-Dey¹

¹. Education and Society, School of Humanities, Social Sciences and Law, University of Dundee, Dundee, Scotland, UK

². University of Dundee Botanic Garden, Dundee, Scotland, UK

³. Centre for Water Law, Policy and Science, University of Dundee, Dundee, Scotland, UK

Correspondence

Kevin Frediani, Curator of Plants and Garden, University of Dundee Botanic Garden, Dundee, DD2 1QH, Scotland, UK

Email: kfrediani001@dundee.ac.uk

ORCID

Liz Lakin <https://orcid.org/0000-0003-0874-3610>

Marie Beresford-Dey <https://orcid.org/0000-0002-8586-294X>

Kevin Frediani <https://orcid.org/0000-0003-2847-5983>

INTRODUCTION

Creating a new journal can be a substantial endeavour with numerous potential benefits, but there are also reasons why you might reconsider or think twice about launching one. The Living Lab journal exists to give researchers and practitioners a voice and to bring the work they do in furthering their objectives to a worldwide audience. It is for educationalists, scientists, artists, philosophers and poets who associate with the University of Dundee Botanic Garden Living Laboratory, and its key areas of ecological leadership; outdoor learning; education for sustainability, environmental art, philosophy and human ecology.

The journal is for specialists and students who are inspired by, and want to engage in, addressing the balance between the social and the ecosystem. The editors particularly welcome articles in these key areas of research, while encouraging PhD students associated with the Living Lab to contribute and explore their formative work within allied fields of curation, ecological science, health and wellbeing,

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community engagement and education for sustainability. The editorial board of this journal believe that the benefits outweigh the disbenefits for a number of reasons, which include filling a gap in the existing literature and addressing the lack of dedicated platforms for early career researchers and their mentors, while allowing a sense of community to develop among researchers, educators and practitioners interested in this field. It is hoped that the new journal can serve as a focal point for collaboration and discussion, shaping the discourse and influencing the direction of research and practices within this new domain; botanic garden and university campus as a living laboratory, potentially making a substantial impact in that field.

A living laboratory is essentially a real-world environment where research, experiments and innovations are conducted to explore and implement new ideas, technologies or practices. It's a setting where researchers, scientists, engineers and other experts work in collaboration with communities, businesses or institutions to test hypotheses, analyse data and develop solutions in a practical and tangible way. These laboratories often involve actual communities or spaces where various experiments or studies are carried out, allowing researchers to observe, collect data, and analyse the results in a real-world context. In this instance, a garden and university campus are aligned to a city that serve as a scalable living laboratory for testing sustainable technologies, urban planning initiatives, or behavioural studies. The concept promotes hands-on learning, interdisciplinary collaboration, and the application of theoretical knowledge in real-world scenarios. It's a way to bridge the gap between theory and practice, fostering innovation and sustainable solutions for diverse fields such as urban planning, environmental science, healthcare and more.

In this first journal, the papers present formative work taking place in the period of 2020-2023; a transitional period marking a rite of passage as the University of Dundee Botanic Garden came of age, 50 years after its opening and development along ecological lines. It is a relatively new garden and yet one already imbued with emotion and intimately connected to the development of the university and city of Dundee. A place imbued with emotion and yet existing in the interstitial space between the town and gown. A place of education, entertainment, outreach and since 2020, research. A place where art, science and a good day out can co-exist. A place that explores the human and more than human relationship with the world.

This inaugural edition of the Botanic Garden Living Lab journal itself epitomises the principles of a living laboratory; a co-creative initiative, integrating research and innovation, presenting an opportunity for students and academic staff to jointly contribute to a collaborative project—the

journal—exploring sustainability and associated issues. The Living Lab, however, is a virtual entity that also reaches out to professional staff and external bodies, tackling a broad reach of projects and collaborations. Not only is the Botanic Garden Living Lab timely but so too is this journal. We live in a fast-changing world where the need for a clear insight into our impact on the planet and its balance of physical components and biological systems, is ever more prevalent. With this, is the increased importance of our understanding of how the planet functions through ecological balance and sustainability. To gain an appreciation of the principles underpinning ecological and environmental balance and the interdisciplinary nature of that knowledge demands objectivity, accountability, integrity on the part of the knowledge providers and selfless leadership; all in a quest to meet current challenges of food security, improved air, water and soil quality, and sustained biodiversity, fundamental to any functioning ecosystem. To achieve this we need to acknowledge, develop and enable quality educational support in sustainability at all levels, from professionals and research academics to amateur enthusiasts and the young child innocently exploring the urban green environment.

Throughout this journal and indeed as manifests through the Living Lab, interdisciplinary networking and collaboration sits firmly within our remit. There is a resounding emphasis on evidence-based science whilst reaching out to all sectors of the populous, focusing our aim to engage and enthuse future generations. The goalposts, however, continue to move as we find ourselves in an increasingly ‘alien’ world where remote learning and teaching has become the ‘new norm’, and emphasis on nature connectivity and outdoor learning has become increasingly more important.

This first edition of the journal sees the Living Lab well into its second year with several original PhD students nearing completion. Included in this edition are articles from representatives across the Living Lab: PhD students actively researching education for sustainability and biodiversity through a diverse set of projects, academic supervisors reporting on their own related research, the Living Lab Director, and the Botanic Garden Curator. All have key roles to play in illustrating and enacting the various aspirations of the Living Lab.

As Liz Lakin reports in the first article of this inaugural issue of the journal, the inception of the Living Lab can be traced back to a recently established doctoral program that emphasises fostering cross-disciplinary collaboration among seasoned researchers and post-doctoral/doctoral students and local, national and international partners. Liz begins by exploring the concept of a Living Lab, before

providing a reflective review of the past two years, chronicling the Living Lab's evolution. The narrative then shifts towards the future to capture the aspirations for the upcoming phase.

Given the Living Lab's integral role within the University of Dundee Botanic Garden, it is imperative to grasp the history and work of a contemporary botanic garden regarding its curatorial practices and its interconnection with the social environment, aiming to advance sustainable development. Using a systematic approach, Botanic Garden Curator Kevin Frediani reviews the evolution of Western botanic gardens by investigating the external factors that have shaped their collection acquisitions. Kevin then utilises his findings to explore the epistemic role of the curator. The discussion then moves to evaluating the sustainable development framework before recognising the potential of nature-based solutions alongside a Just Transition as ways to inform policy and guide practices.

The next article is the first of three from PhD students at the University. Commencing with John Hale's paper, we learn about the Daffodil DNA project taking place in post-16 biology education across the UK in partnership with STEM partners, the James Hutton Institute and the University of Dundee. Drawing from citizen science and merging this with classroom practices, John provides us with an overview of the laboratory procedures undertaken by the students involved—with teacher support. A crucial component of this study is the 'life-changing' feedback offered by the students after their participation, not only in the project itself but also through presenting their findings at the Royal Society Summer Science Exhibition. John proposes that the Daffodil DNA Project presents a potential model for inquiry-based learning in biology education, highlighting the significance of genuine scientific exploration and collaboration.

Remaining with plant biology and education, Kara McHugh reports on her three-month professional internship working within a university botanic garden where she explored science communication with various audiences, including school pupils and teachers along with the general public. After defining the meaning of science communication and reviewing its importance, Kara sets out to inform how she leveraged her expertise in molecular biology and protein biochemistry to create a novel educational and recreational resource that showcases plants that possess medicinal properties. The purpose of this new resource was to enhance the sense of nature connectedness for visitors to the botanic garden by providing information and entertainment. The resource is due to be launched in 2024 when Kara will investigate the impact of the resource.

The third paper from the University's doctoral students is from Carmela Garcia Manas who provides us with a literature review focusing on education for social sustainability in the early years. Carmela commences by delving into the literature that underscores the imperative for integrating sustainable education into early childhood education. It subsequently provides a brief overview of previously published research initiatives centred on the three dimensions of sustainability—environmental, social and economic. Throughout the paper, Carmela challenges some core assumptions of what it means to be sustainable and argues that this understanding needs to be integral to early years education.

The final article in this first issue considers education for sustainable development through computer-mediated communication (CMC). Through the lens of social leadership, Marie Beresford-Dey, Andrea Cooper, Mike Crabb, Kristi Herd and Lorraine Syme-Smith report on a mixed methods study investigating one botanic garden's use of CMC tools such as social media and their webpages. The results underscore the staff and volunteers' eagerness to boost the utilisation of CMC tools for improved community engagement and information dissemination. Additionally, the findings suggest a requirement for increased autonomy and an intrapreneurial mindset to heighten knowledge and reinforce collaborative efforts within networks that are not predetermined or dictated by organisational structures.