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Supporting Sustainability in the Urban Context

The Wallumattagal Living Lab

This case study demonstrates how universities can function as anchor institutions for sustainable urban development by integrating nature-based solutions, digital platforms, and workforce capacity building within a functioning urban campus. The Wallumattagal Living Lab shows how place-based, interdisciplinary learning, Indigenous knowledge integration, and cross-sector partnerships can translate climate and biodiversity policy into delivery. It offers a scalable and transferable Living Lab model for Commonwealth cities seeking nature-positive, climate-resilient, and inclusive urban transformation.

Wallumattagal Living Lab, Macquarie University

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1. Overview

The Wallumattagal Living Lab at Macquarie University demonstrates how universities can act as catalysts for sustainable urban development by integrating research, education, and real-world implementation. Delivered through the Smart Green Cities Research Centre, the Living Lab provides a scalable model for advancing nature-based solutions, urban biodiversity, and workforce capability.

Located in Sydney and connected to Lane Cove National Park, the Living Lab operates as a campus-based demonstration site where students, researchers, government, and industry partners co-develop and test solutions to urban environmental challenges. A central feature is an interactive digital platform integrating ecological, environmental, and cultural data to support decision-making and public engagement.

The initiative contributes directly to Commonwealth priorities by building skills for sustainable cities, strengthening cross-sector partnerships, and embedding Indigenous knowledge systems in urban land management. It provides a transferable model for cities across the Commonwealth seeking to deliver nature-positive, climate-resilient, and inclusive urban development at scale.

2. Urban Context and Structural Challenge

Cities across the Commonwealth are experiencing rapid urbanisation, placing increasing pressure on ecosystems, infrastructure, and communities. Urban areas face converging challenges, including biodiversity loss, urban heat, water insecurity, pollution, and exposure to climate-related risks such as flooding, storms, and wildfires.

These challenges are particularly acute in rapidly growing cities, where planning systems and institutional capacity may struggle to keep pace with environmental change. At the same time, there is strong policy momentum toward nature-based solutions as cost-effective approaches that deliver co-benefits for climate adaptation, mitigation, biodiversity, and human well-being.

However, implementation gaps persist. Many cities face barriers including limited access to integrated data, insufficient interdisciplinary training, and a lack of practical demonstration sites to test and refine solutions. There is a critical need for models that connect policy, practice, and skills development, enabling cities to move from ambition to delivery.

The Wallumattagal Living Lab addresses this gap by transforming the campus of Macquarie University into a living demonstration of sustainable urban systems. It provides a platform for applied learning, collaborative research, and stakeholder engagement, generating insights and capacity that can inform urban sustainability transitions across diverse Commonwealth contexts.

3. Project Approach and Delivery Model

The Wallumattagal Living Lab is an interdisciplinary, place-based initiative embedded within the campus of Macquarie University. Developed through the Smart Green Cities Research Centre, it integrates ecological restoration, environmental monitoring, cultural knowledge, and community engagement into a cohesive framework for sustainable urban development.

A defining feature of the Living Lab is its focus on skills development and capacity building. Students and early career researchers engage in hands-on, problem-based learning, working with real datasets and real stakeholders. Through activities such as biodiversity monitoring, soil and water assessment, spatial analysis, and evaluation of nature-based interventions, participants develop key competencies in systems thinking, data literacy, interdisciplinary collaboration, and stakeholder engagement. These skills are directly aligned with workforce needs in sustainable cities across the Commonwealth.

The Living Lab is supported by an interactive digital platform, which integrates diverse datasets and visualises the campus as a dynamic social–ecological system. The platform enables users to explore:

- Ecological communities: Restoration of native vegetation and connectivity with Lane Cove National Park
- Flora and fauna: Comprehensive biodiversity mapping and monitoring using field and sensor-based methods
- Environmental monitoring: Real-time air and water quality data supporting applied research and teaching
- Community engagement: Walking trails and initiatives that promote health, wellbeing, and nature connection
- Indigenous knowledge: Recognition of the Wallumattagal people of the Dharug Nation and the integration of Caring for Country principles into land management

The Living Lab also facilitates partnerships with local government, industry, and community organisations, including those within the Macquarie Park innovation precinct. These collaborations provide opportunities for co-design and co-delivery of solutions, exposing students to governance, policy, and implementation challenges.

By embedding learning within a functioning urban ecosystem, the Living Lab bridges the gap between theory and practice, providing a replicable model for interdisciplinary training and innovation.

4. Insights and Lessons

The Wallumattagal Living Lab highlights the importance of integrated, place-based approaches to sustainable urban development. By combining research, education, and operations within a single platform, it enables more effective translation of knowledge into practice.

A key lesson is the value of experiential and interdisciplinary learning in developing the skills required for complex urban challenges. Students benefit from working across disciplinary boundaries and engaging directly with stakeholders, enhancing both technical and professional capabilities.

The initiative also demonstrates the importance of inclusive knowledge systems, particularly the integration of Indigenous perspectives. Engagement with Dharug knowledge and Caring for Country principles provides deeper insights into long-term landscape management and resilience.

Challenges include the integration and management of diverse datasets, the need for sustained investment in monitoring infrastructure, and the coordination required to maintain cross-sector partnerships. These challenges are common across many urban contexts, reinforcing the relevance of the Living Lab as a testbed for addressing them.

Overall, the Living Lab provides a strong foundation for capacity building, innovation, and policy translation, with lessons that are directly applicable to cities across the Commonwealth.

5. Key Takeaways

The Wallumattagal Living Lab:

- Aligns with global sustainability agendas, including United Nations frameworks such as the Sustainable Development Goals (SDGs 11, 13, 15), enabling cities to benchmark progress and attract international support, while supporting scaling and replication across Commonwealth cities.
- Supports national and local urban policy frameworks across Commonwealth countries, including climate resilience, biodiversity, and urban greening strategies, enabling the Living Lab to act as a demonstration model for policy implementation and delivery at city scale.
- Advances Commonwealth skills and capacity-building priorities by embedding interdisciplinary, work-integrated learning, enabling the development of a future-ready workforce and supporting institutional embedding of sustainability skills in higher education systems.
- Respects Indigenous and local knowledge systems, including Dharug Caring for Country principles, supporting inclusive and culturally grounded urban development and enabling context-specific adaptation across diverse Commonwealth settings.
- Strengthens cross-sector partnerships (university–government–industry–community), aligning with innovation and urban development strategies, and enabling co-investment, knowledge exchange, and scaling beyond pilot sites.
- Provides a replicable Living Lab model that integrates research, education, and practice, enabling mainstreaming of nature-based solutions, supporting long-term institutional adoption, and offering a blueprint for cities seeking to embed sustainability beyond proof-of-concept.

6. Implications for the Commonwealth Sustainable Cities Coalition

The Wallumattagal Living Lab offers a practical model for advancing the objectives of the Commonwealth Sustainable Cities Coalition by demonstrating how integrated, place-based approaches can accelerate sustainable urban development.

Its emphasis on skills development, partnership building, and applied innovation directly supports the Coalition's focus on strengthening capacity across member cities. The model shows how universities can function as anchor institutions, providing infrastructure, expertise, and convening power to support urban transformation.

Importantly, the Living Lab approach is highly adaptable. While grounded in the context of Sydney, its core elements—interdisciplinary training, digital integration, stakeholder co-creation, and embedding of Indigenous knowledge—can be tailored to different social, environmental, and governance contexts across the Commonwealth.

By supporting replication of similar models, the Coalition can help cities move from pilot projects to systemic change, enabling more rapid and coordinated progress toward resilient, inclusive, and nature-positive urban futures.

This Case Study was prepared by Prof. Michelle Leishman, Distinguished Professor of Biology, Macquarie University, by way of contribution to the work of the CSCC Sustainable Urbanisation Expert Group, March 2026

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