Barangaroo Reserve, Sydney Harbour (with permission from Noel Corkery, July 2019).

LANDSCAPE REVIEW

Connecting research with practice: Assessing landscape performance in the Australian context

LINDA CORKERY

Landscape architecture professionals are often required to provide 'evidence' of how their completed projects perform over time. However, few practitioners have the time or funds to carry out formal post-construction evaluations of their projects. Using a case study approach to methodically describe and assess landscape architecture projects is a way to systematically record project information and build a knowledge base about the design, construction and performance of the project. The work of Francis (2001) was foundational to the development of the Landscape Architecture Foundation's Case Study Investigation (CSI) Program, launched in 2010 with the aim of assessing landscape performance through the lens of sustainability. The recently established Landscape Foundation of Australia is adapting the CSI Program for the Australian context. This paper briefly traces the development of the case study method for documenting and assessing landscape performance, and how the Australian version is extending the original research-practice CSI model.

Linda Corkery is a Founding Director of the Landscape Foundation of Australia and Emeritus Professor, University of New South Wales, Sydney NSW, Australia.
Telephone: +61 414-525-124
Email: linda@landscapefoundation.org.au

Introduction

In current practice, landscape professionals are often required to provide 'evidence' of how their constructed projects perform over time. However, few practices can allocate the time and funds, or have the in-house expertise of data collection methods, to carry out formal post-construction evaluations of their projects. It is rare for a client to include project fees for post-occupancy evaluations (POEs), although this kind of research is useful to generate valid, defensible assessments. The benefits of evaluating landscape architecture projects lie in the prospect of achieving better outcomes for future projects and promoting the leading work of landscape architects who are designing sustainable solutions.

Over the past 25 years, the Landscape Architecture Foundation (LAF) in the United States has facilitated the development of a programme that funds research teams in which academics join with practitioners to assess the landscape performance of constructed projects. The goal of LAF's Landscape Performance Series (LPS) and the Case Study Investigation (CSI) Program is to generate quantitative evidence, using a variety of research methods and metrics, on how landscape architecture projects are contributing to more sustainable outcomes. The results are shared in Case Study Briefs that are catalogued on the LPS database. A similar research programme, modelled on LAF's CSI Program, has been initiated in 2024 with Australian academics and practitioners and is supported by the Landscape Foundation of Australia (LFA).

This paper briefly traces the development of the case study method for documenting landscape architecture projects and addresses POE as an effective methodology for assessing landscape performance. Finally, in view of the introduction of the CSI Program to Australia, the discussion turns to how this LAF model is being adapted to the Australian context.

Case studies for landscape architecture

The interest in creating a case study method for landscape architecture was initiated by the LAF in the United States. In 1997, LAF commissioned Professor Mark Francis to develop a methodology to 'improve the level of practice and scholarship in landscape architecture' (Francis, 2001, p 15). His work drew on the extensive scholarship of case study knowledge, particularly in the social sciences, to design a methodology that could be applied specifically to landscape architectural projects (Francis, 2019, p 5).

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At the outset of his work, Francis (2001) offered this definition for a landscape architecture case study:

> A case study is a well-documented and systematic examination of the process, decision-making and outcomes of a project which is undertaken for the purpose of informing future practice, policy, theory, and/or education. (p 16)

Francis saw the case study approach as a relevant scholarly endeavour for academic researchers, as well as a process that would benefit professionals by building a knowledge base to underpin the design and construction of projects, and inform their ongoing management. Shortly after the publication of his final report, LAF engaged him to demonstrate the application of the case study approach through a series of monographs, titled the Land and Community Design Case Study book series.

Canadian academics Brown and Corry, writing in 2011 without reference to either Francis' original work or the LAF book series, commented that a 'culture of non-reporting' seemed to exist in the discipline and profession of landscape architecture:

> There are very few articles in scholarly literature that evaluate the effectiveness of completed projects. Built landscapes are seldom tested or monitored to see if they achieved their stated objectives, and thus are repeated with remarkable and embarrassing efficiency. (Brown and Corry, 2011, p 327)

In their view, there had been too many 'missed opportunities to further the documented evidence that could support better-informed design' (ibid). Brown and Corry thought landscape architectural practice needed to be based on facts rather than on design theories or beliefs, and that little factual information was available for design decision-making. They advocated for 'evidence-based landscape architecture', defining that as 'the deliberate and explicit use of scholarly evidence in making decisions about the use and shaping of land'. They further called on landscape architecture academics to generate more research and peer-reviewed publications to 'inform decision making and communicate it to practitioners in a way that can be readily applied' (ibid, pp 327–328).

What Brown and Corry were promoting, and what Deming and Swaffield also encouraged in their work, was the use of case studies as a research method. In their co-authored book, *Landscape Architectural Research*: *Inquiry, Strategy, Design*, Deming and Swaffield (2011) include a chapter on 'Research and practice' in which they note 'Professional practice constitutes a (mostly) untapped research capacity of enormous potential value for the discipline' (p 237). They encourage academics 'to more systematically connect the research activity of universities with professional practice, and to better connect scholarly practitioners with a wider research community and enterprise' (ibid). They echo Brown and Corry's call for evidence-based practice grounded in empirical data, and would have been aware of LAF's emerging CSI Program for research, as Deming worked closely with LAF in its development (Landscape Architecture Foundation, 2024, p 2).

Case studies continue to be considered an effective research method for analysing the complexity of designed and constructed landscapes. For example, Swaffield's (2017) later writing on case studies supports their use as research tools rather than primarily for education purposes or as project exemplars. He specifically points to the growing record of case studies compiled in LAF's LPS database. He contends that for academic researchers, this archive could 'open up rich lines of case-based research involving research through design, cases as possibilities, learning from mistakes, and identifying the most effective design strategies' (Swaffield, 2017, p 117).

Post-occupancy evaluation and landscape performance

The POE research methodology originated in the 1970s, when it focused on the assessment of completed buildings and interior spaces to determine how well they were meeting the needs of their occupants after a period of use (Chen, Bowring and Davis, 2023a). In

subsequent years, POE methods were adapted to enable evaluations of landscape architecture projects, particularly those designed for human use such as public plazas, parks, playgrounds and residential developments. POEs were considered appropriate for generating case studies of completed landscape and planning projects that should be more frequently used (Deming and Swaffield, 2011). Many of the early POEs on landscape architecture projects, however, were not conducted by landscape architects, as this approach was based in the social sciences, more familiar to researchers in areas such as human geography, environmental psychology, and sociology (Lenzholzer, van den Brink and Duchhart, 2017, p 55).

In their investigation of definitions and forms of POEs for landscape architecture projects, Chen and colleagues (2023a) expose ambiguities inherent in a broad research methodology that evolved from the assessment of building design. They examined 46 case studies to identify and compare definitions of POEs from different disciplinary perspectives and found that POEs had both a wide range of definitions and varied methods for carrying them out. It is important, they concluded, that academics and practitioners acknowledge POE as a dynamic and evolving concept, which means they need to keep up to date with changes to POE research methods (ibid, p 20).

An associated issue that Chen, Bowring and Davis (2021) investigated is what the barriers and enablers are to carrying out 'performance evaluation'. From their examination of 41 cases related to landscape architecture projects in New Zealand, they confirmed that positive reasons for doing landscape performance evaluations, particularly in relation to ascertaining how projects are meeting sustainability goals, are that these evaluations:

- generate verified knowledge and help expand the body of knowledge for the profession
- help practitioners understand how their project designs perform and function for their intended use, which can influence future design approaches
- can uncover problems that need to be addressed, such as site management regimes, repairs, or fine-tuning of the site design so that it is safe to use and has improved function
- provide rigorous information to help practitioners communicate more effectively about the value of their work to decision-makers and the general public (ibid, pp 140–141).

However, Chen and colleagues (2021) found two main issues make it more difficult for practices to carry out POEs to assess landscape performance: the possibility of receiving a negative review and the lack of funds to underwrite the process. In reporting on this study, the authors discuss how the LAF, as a not-for-profit organisation, presents a programme model to address both of these issues in two ways. First, it focuses on the 'benefits' to be revealed from assessing high-performing landscape architecture projects. Second, it provides funding to teams of experienced academic researchers who can work with practices in undertaking POEs (ibid, p 151). With LAF's CSI Program now well established, the LFA is introducing an adaptation of it in Australia. The following sections briefly outline some of the operational aspects of the two programmes.

LAF: Landscape Performance Series and Case Study Investigation Program

The US-based LAF, a not-for-profit organisation founded in 1966, works to expand the influence of landscape architects through its scholarship and fellowship awards programmes that promote and support landscape architects during their studies and in their professional careers (Landscape Architecture Foundation, nd-b). In 2010, at about the same time as the publications described above were being written, LAF was testing its new CSI Program. A team of LAF staff members worked with PWP Landscape Architects to assess the landscape performance of one of PWP's recent award-winning projects: the Sydney Olympic Millenium Parklands in Australia. The resulting case study brief and methods report were created using the new programme structure and processes to assemble the baseline project information, conduct the research, and apply the metrics

and calculations to produce a performance assessment. (For the results of that pilot, see Landscape Architecture Foundation, 2010.) In 2011, the CSI Program was again piloted in a summer programme with 10 academic–student research teams. The 2012 CSI Program paired academic teams with design practices and their projects, which is the structure that continues currently.

LAF defines the term 'landscape performance' as 'a measure of the effectiveness with which landscape solutions fulfil their intended purpose and contribute toward achieving sustainability' (Canfield, Yang and Whitlow, 2018, p 1). One focus is on presenting the research findings and metrics so they are accessible and can be understood by a wide range of decision-makers. In this way, the CSI Program seeks to 'bridge the knowledge gap in the design, development, and policy realms about the importance of landscape solutions' (Landscape Architecture Foundation, 2020, p 1).

The CSI research model is unique in that it pairs academic research teams with practitioners in a design practice to assess one of the practice's completed projects that is considered to be 'high performing'. The assessment is structured to identify and quantify the environmental, social and economic benefits of this project and to document it in a case study brief and a methods report. The academic team comprises a research fellow, who is a full-time academic, and a student research assistant, often a master's-level student. The research fellow receives a stipend to allocate to their research assistant who, in turn, receives research training throughout the process. The academic team coordinates with a representative from the design practice, who is often someone who has been a lead designer on the project.

In a CSI project, the initial deliverables provide the baseline for the analysis of the project. Together, the academic team and design practitioner identify the key physical aspects of the project's design and confirm the goals the project is intended to achieve. The practitioner provides detailed information and documentation on the project, such as site analysis, design drawings, reports, and 'before' and 'after' photos. They also outline the client's goals for the project, including specific benefits the project intended to deliver and the features included to realise those benefits. The designer articulates the project 'narrative' or story, and explains to the research team how their site design and specific features have evolved to convey the narrative.

With this comprehensive understanding of the project, the academic team determines which benefits to assess and what methods they will use to measure and validate the project's performance (figure 1). The selection of metrics and research methods to use in assessing a project's landscape performance is a significant decision point in the assessment process. The team also outlines the client's goals for the project, including specific benefits the project intended to deliver and the features included to realise those benefits. The designer articulates the project 'narrative' or story, and explains to the research team how their site design and specific features have evolved to convey that narrative. As Bowring (2020) notes:

> being critically aware of how the values have bene established and how they might be recognized is important. Treating a set of requirements as boxes to be ticked can overlook more holistic aspects of design quality, and even have unintended consequences. (p 128)

LAF's *Evaluating Landscape Performance* (Canfield et al, 2018) is a key reference at this point in the process. This guidebook was compiled to be a primer that readers from a range of backgrounds could use to assess the performance of constructed landscape projects. It presents a total of 33 benefit categories organised under one of the three sustainability areas: environmental, social or economic. Since its publication, 32 additional tools and calculators have been added to the LPS website in a benefits toolkit (figure 1). Examples of these tools are Pathfinder: Landscape Carbon Calculator, iNaturalist, i-Tree Streets and i-Tree Eco, the Gehl Institute's Public Life Diversity Toolkit. This resource will continue to expand over time as new tools are developed.

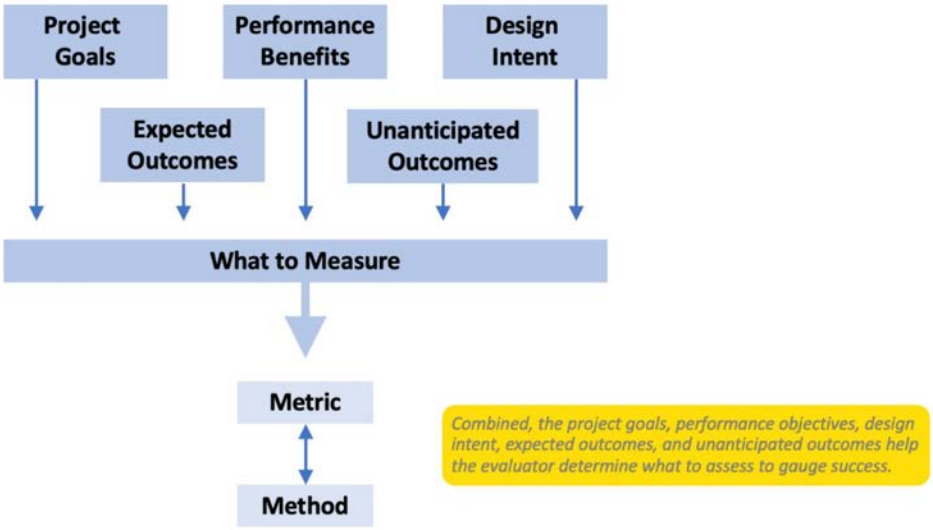

Figure 1. A number of factors contribute to a decision as to what aspects of the project to measure and which metrics and methods to use to calculate the benefits delivered by the project (with permission from Linden Crane).

Because this approach presents a series of key metrics for the sustainability outcomes of the project and documents how those metrics were arrived at, non-experts can replicate it on other projects with limited resources and short timeframes. The case study brief and methods report comprise a 'snapshot in time' in that they present the findings of two to three months of field research of the completed project – which, typically, happens two to five years post-construction. Before the documents are published on the LPS platform, experts in the field peer-review them to assess the validity and quality of work.

The CSI Program is now in its fourteenth year of operation. Close to 200 case study briefs and accompanying methods reports are catalogued on a fully searchable database of the LPS platform. This extensive resource is publicly accessible and is consulted by design practitioners, students, researchers and policy-makers to locate examples of sustainable landscape solutions that have been validated through the CSI process and provide evidence to support their claims of sustainability. Recognising its significance, the American Society of Landscape Architects (2015) presented LAF with an Award of Excellence in Communications for the LPS and an Honor Award in Research for the CSI Program. The jury's commendation for the LPS award states, 'It's a living document essential to our profession' (Landscape Architecture Foundation, 2015).

Between 2017 and 2022, five teams of Australian academics and student researchers participated in LAF's CSI Program, assessing eight projects. The 2021 cohort of CSI teams included an academic team from Lincoln University working with a New Zealand practice. University of New South Wales landscape architecture academics, including myself, undertook two of the 2020 CSI projects (table 1).

LFA: Landscape Performance Case Studies Program

Established in 2021, the Landscape Foundation of Australia is a not-for-profit organisation with the purpose of protecting, restoring and sustainably managing urban landscapes and natural environments of Australian cities and towns (Landscape Foundation of Australia, nd). Its three strategic priorities are:

- investing in knowledge-funding fellowships and research on landscape performance, and training to build capacities and skills
- enabling communities – working with community organisations and other not-for-profits, coordinating volunteer programmes and achieving local impact
- valuing nature – advocating for and influencing policy, such as in legislation and for instituting new accounting systems that incorporate natural asset management.

The first of these priorities is of particular relevance to this discussion.

Table 1. Australian projects undertaken in LAF's Case Studies Investigation Program

Year	Project	Research fellow(s)	Research assistant	Practice
2010	Sydney Olympic Millennium Parklands	LAF staff[1]	Not applicable	PWP Landscape Architecture and Bruce Mackenzie Design
2017	Barangaroo Reserve, Sydney	Simon Kilbane, Andrew Toland, UTS	Kane Pham, PhD candidate, UTS	PWP Landscape Architecture
2017	The Goods Line, Ultimo	Simon Kilbane, Andrew Toland, UTS	Kane Pham, PhD candidate, UTS	ASPECT Studios
2019	Ballast Point Park, Sydney	Simon Kilbane, Andrew Toland, UTS	Kane Pham, PhD candidate, UTS	McGregor Coxall Landscape Architects
2020	South Eveleigh Community Rooftop Garden	Linda Corkery, Sara Padgett Kjaersgaard, UNSW	Lisa Thomson, MPhil candidate, UNSW	Jiwah Design/Clarence Slockee
2020	Sydney Park Water Re-use Project	Catherine Evans, Linda Corkery, Sara Padgett Kjaersgaard, UNSW	Lei Zheng, MLArch student, UNSW	Turf Design Studio/ Environmental Partnership
2021	Bendigo Hospital	Bridget Keane, RMIT University	Peter Grant, MLArch student, RMIT University	Oculus Landscape Architects
2022	Summerland Peninsula Master Plan and Visitor Centre Precinct	Sidh Sintusingha, University of Melbourne	Jalida Salma, MLArch student, University of Melbourne	Tract Consultants

1 LAF staff carried out this initial case study in Sydney as a pilot project before the CSI Program was officially launched.
UNSW = University of New South Wales; UTS = University of Technology Sydney

The impetus for LFA to develop a CSI-type programme was similar to that for LAF. In Australia, as in the United States, there is demand for landscape performance to be verified and for evidence to be provided on how landscape projects perform over time. Equally, when projects do not perform as intended, many would like to have the information required to improve the design and implementation of later projects.

The Australian academics and practices who participated in LAF's CSI Program could see the value of producing credible metrics about project performance and were enthusiastic for a CSI model to be introduced in Australia. Having been through the CSI process of researching, assessing and preparing case studies, LFA had a group of experienced academics to draw on for support in creating the Landscape Performance Case Studies (LPCS) Program.

With the assistance of LAF, the LPCS Program was developed and has been launched in 2024. LFA and LAF have a memorandum of understanding through which LAF has provided advice on developing, implementing and managing the Australian LPCS Program. LAF's support includes providing access to its recorded training webinars and giving LFA permission to use the case study brief format to document the projects that are assessed in its programme. Both foundations see the advantage of this collaboration as a way of growing their individual capacities and organisational reach in sharing resources, experience and knowledge.

Similar to the CSI Program structure, the LPCS Program team has an academic research team leader, who receives a stipend to allocate to their research assistant(s). An additional amount is available to involve the Indigenous project consultant. The academic team coordinates with a person from the design practice, such as a lead designer on the project.

The training materials and resources currently available to LFA for conducting the LPCS Program include LAF's guidebook (Canfield et al, 2018), CSI Program Handbook, and pre-recorded training webinars that provide orientation and training for participants at the early stage of the Program. While LPCS teams are referred to this resource and the Benefits Toolkit, as the LPCS Program evolves LFA aims to collate similar Australia-specific resources, including regional project examples and assessment tools. LFA also intends to establish a database and knowledge portal comparable to the LPS platform.

Figure 2. The RMIT University team is assessing the benefits that have been realised in creating a new open space on structure when a below-grade carpark was added at Monash University (with permission from Drew Echberg, March 2021).

The first round of the LPCS Program is underway with two projects and teams.

- **Monash University** – Caulfield East, Victoria
  Project: Southern Precinct Landscape (figure 2)
  Academic lead: Professor Jock Gilbert, RMIT University
  Student assistants: Anna Durkin and Jasjit Banga, both PhD students
  Practice: ASPECT Studios
- **Curtin University** – Perth, Western Australia
  Project: Exchange Precinct Stage One Public Realm (figure 3)
  Academic Lead: Professor Peter Newman, Curtin University Sustainability Policy Institute (CUSP)
  Student assistant: Issana Burhan, PhD student
  Practice: REALMstudios

The developing LPCS Program

While the LPCS Program follows the CSI Program closely in structure, intent and outcomes, it has made a number of changes in response to the Australian context. These include changes to two operational aspects – project eligibility and programme length – and, more significantly, the addition of cultural sustainability as a fourth assessment category.

Project eligibility

In the LAF's CSI Program, projects are eligible to be evaluated if they have been completed and operating for at least one year. In the LPCS Program, proposed projects must have been completed and operating for at least two years post-construction by the time the Program assessment begins. The reason for this time lag is that, typically, projects have a 12-month period after practical completion when the landscape contractor continues to

maintain the soft landscape works. Once that contractual obligation has concluded, the ongoing management of the site is turned over to the owner/client.

LPCS Program length

The LPCS Program is scheduled to be undertaken over a nine-month timeframe, about two months longer than the CSI Program. LAF's 2025 Program, for example, will run from January through July. In contrast, the LPCS Program begins in February and runs through to October, which aligns with Australian university calendars and allows the teams more time for their field work and data analysis. Another implication of this schedule is that the project runs through the southern hemisphere's winter months, which in turn has an impact on which data collection methods will be most effective, particularly in terms of site use during the cooler months of the year.

Cultural sustainability as a fourth category

LAF's guidebook lists 'cultural preservation' as one of the 10 social benefits to consider. It defines this benefit as 'retaining or restoring culturally significant features, areas, practices, or views' (Canfield et al, 2018, p 51). Assessing cultural benefits requires a sensitive approach to gathering evidence of tangible benefits. In the early stages of developing the CSI Program, Deming produced three case studies to address this issue. Discussing these in a subsequent *Landscape Record* paper, Deming (2014) comments on the CSI Program's focus on measuring performance benefits of the projects and providing metrics: 'There are significant differences, however, between the work of measuring geo-physical factors and that of socio-cultural factors.' Further, she notes:

> Wherever intangibility is a factor in research, it can pose special intellectual and practical research challenges that demand creativity and subtlety in response … However, this should not be construed to mean intangible benefits are not critically important to … the values of sustainability. (ibid, p 105)

It follows that the LPCS Program has added cultural sustainability as a fourth category to assess. This specifically relates to the 'Connecting with Country' protocols (Government Architects New South Wales, 2023) that are integral to landscape architecture projects in Australia. All case studies generated in the LPCS Program will document how 'Connecting with Country' protocols have been incorporated into the project's processes from its inception, into site design and/or into design of specific features, through to its implementation and ongoing management. The involvement of Indigenous knowledge holders and communities throughout the project will be documented, as will their engagement with the site after project realisation, and their perceptions of the benefits that have arisen and can be extended forward.

The development of a 'method' for assessing this particular dimension of cultural sustainability for Australian projects will necessarily be specific to each site and project. LFA is collaborating with Indigenous consultants and landscape architecture academics with expertise in working with traditional knowledge holders and community, to identify effective and respectful ways of carrying out post-construction evaluation and generating meaningful reflections.

Figure 3. The forecourt to the Curtin University School of Design and Built Environment shows how the landscape design interprets the 'Living Knowledge Stream', a central feature of the Exchange Precinct's project narrative.

Evaluating the LPCS Program

At the conclusion of each iteration of the LPCS Program, LFA will evaluate how it ran during that year. The annual review will primarily focus on the operations of the Program and get feedback from the academics, student research assistants, design practice partners, Indigenous cultural advisors, and project clients directly involved with assessing a specific project. It will also seek feedback from LAF colleagues on the outcomes of the LPCS team's work.

The aim of the annual reviews is to verify that the LPCS Program is being well administered, that teams are receiving adequate support and guidance, and that the research methods, data collected and findings of the research are well documented and accurately assessed. The deliverables generated through the LPCS Program have the potential to be included as a case study brief in the LPS database.

Once the LPCS Program has assembled a body of case studies, a larger and more formal review will be conducted to ascertain if and/or how it is having an impact. External reviewers for a broader evaluation would include colleagues from academia and practice in related built environment disciplines; project clients; and relevant policy-makers from state and/or local government. Future scholarly investigation of the collection of LPCS case studies could be undertaken, building on the structures and research questions of the studies conducted by Chen and colleagues (2021, 2023a, 2023b). The results would provide a valuable comparison between the Australian and New Zealand contexts, as well as case studies produced in the CSI Program.

Conclusions

This paper has briefly traced the development of the case study methodology for documenting and assessing landscape performance over the past 25 years. The early work of Mark Francis underpinned the initial development and ongoing refinement of the LAF's CSI Program, which extended the case study approach by evaluating the outcomes of landscape performance to assess if and how the benefits delivered by constructed projects contribute to environmental, social and economic sustainability goals. The LFA is in its first year of adapting the CSI research–practice model to assess landscape performance in the Australian context and introduce it to academic researchers and professional practices.

It is becoming apparent that one of the strengths of the LPCS Program is that mutual learning can develop between the academic team and the design practice through the course of the project. The ability to report measurable and verified data about the sustainability benefits delivered by landscape projects will strengthen landscape architects' advocacy for applying proven design approaches and trialling innovative design features. For the student research assistants, this is a unique opportunity to learn and apply research methods in analysing and measuring the sustainability benefits delivered in completed landscape projects.

In addition, opportunities for mutual learning will emerge between LAF and LFA as the LPCS Program evolves in Australia. In the spirit of continual improvement and sharing knowledge, the collaboration between the two foundations has the potential to widely extend the benefits of the landscape performance assessment model to practitioners and academics in new locations.

About the author

Linda Corkery is Professor Emeritus, University of New South Wales, Sydney, Australia. She has master's qualifications in regional planning and landscape architecture from Cornell University. In her academic career, Linda's teaching and scholarship focused on public landscapes, while her research and publications addressed the critical importance of greenspace and healthy urban environments for the health and wellbeing of all species. With over 25 years of experience in professional practice, she is a registered landscape architect, Fellow of the Australian Institute of Landscape Architects (AILA) and past AILA National President (2016–2018). Linda is a co-founding Director of the Landscape Foundation of Australia.

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