



## The Clean Air and Urban Landscapes Hub Newsletter

The Clean Air and Urban Landscapes (CAUL) Hub is undertaking research that will provide real improvements to the environmental quality of Australian cities.

Research expertise covers air quality, urban ecology, urban planning, urban design, public health and green infrastructure.

The hub is a consortium of four universities; the University of Melbourne, RMIT University, the University of Wollongong and the University of Western Australia. It is funded under the Australian Government's National Environmental Science Program.

The CAUL Hub's planned projects for 2018 are:

-  Western Air-Shed and Particulate Study for Sydney (WASPSS)
-  Urban Greening for Liveability and Biodiversity
-  Urban Systems for Liveability
-  The Shared Urban Habitat
-  Network of Integrated Study Sites
-  Air Quality in Australia

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The Clean Air and Urban Landscapes Hub acknowledges Australia's Traditional Owners and pays respect to the past and present Elders of the nation's Indigenous communities.

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## HUB LEADER'S REPORT

# The View from the Middle

**Professor Peter Rayner, University of Melbourne  
Hub Leader, Clean Air and Urban Landscapes Hub**

This issue of Urban Beat marks the end of my time as CAUL's Hub Leader. This is a transition planned from the beginning and is one of many changes in the leadership as we reset for the second half of the project and, inevitably, begin to wonder about continuity.

Apart from thanking everyone for a marvellous journey, this is a good time to reflect on how we are travelling and what I have learnt.

Any judgment on how you're travelling presupposes you know where you're going. Like any such organisation we have our share of plans and strategies, and these can be boiled down to two informal goals.

First, we have to make ourselves useful to urban practitioners; the people who decide and implement how cities work. This may sound a little low-key but we eschewed phrases like 'the organisation of choice for providing advice on cities,' since any effort invested in competition was diverted from research.

Our progress towards this goal is easily measured by the number of people who want to work with us, either on collaborative research or in seeking our input. This has risen steadily from the end of our first year - the earliest time we could present a functional organisation to the community. So much so, our task now has switched from seeking partners, to managing workloads and interactions. But there are still gaps; our links with land developers should be stronger for example. Overall, though, the extent and depth of our interactions with the urban community is satisfying, especially so soon.

One caveat on this success would perhaps only worry an academic. Our goal was to be useful, not necessarily agreeable. An organisation whose legitimacy depends on the support of such diverse stakeholders has to worry about managing relationships. When does 'tailoring the message' become self-censorship? I don't have evidence we are 'pulling our punches' but the best defence against this is keen self-awareness.

The second goal was to build a multi-institution urban research community in Australia. Like most people in the CAUL Hub, I came to urban research from a specialised perspective. I was surprised indeed to find no Centres of Excellence or Cooperative

Research Centres dedicated to urbanism per se, though many aspects were included elsewhere. There was not a research organisation where social psychologists, atmospheric chemists, planners, ecologists, health experts and the rest were required to work on common problems. So we had to build one.

Previous experience had taught me the difference between building an organisation and a community. Building new organisations is not easy, but at least is well understood. Communities have to be encouraged to build themselves. It also takes time.

The ultimate test of whether the CAUL Hub has succeeded here is one I hope we won't have to pass: working together even if there is no money. I am encouraged by the increase in interactions among Hub partners on activities not part of the CAUL Hub, and on the goodwill of Hub researchers to balance its interests with all the other interests they must serve. But the real test here awaits us.

One other aspect that deserves its own essay; I think Australians will do better with their cities if we learn to love them not just live in them. It will make us think of the cities as entities. Europeans do this via their cities' histories. Australia has access to a deep, vibrant model for such a relationship. It has been with gratitude and wonder that I have learned from our Indigenous Advisory Group and several Indigenous practitioners how much care and wisdom has already been invested in this aspect. This knowledge cannot be taken, only given, but it offers Australia a path to an urban future both spirited and sustainable.



Outgoing Hub Leader Professor Peter Rayner

## RESEARCH OUTPUTS

# Creating Liveable Cities

Australian cities are proud of their reputation for high liveability, as measured by indices such as the Economist's Global Liveability Report. However, single figure scores like this are a crude way of measuring liveability and fail to consider inequities across cities.

Researchers from RMIT University have released the [Creating Liveable Cities in Australia](#) report, part-funded by the CAUL Hub, which provides the first comprehensive measurement of liveability in Australian cities.



This report is the first comprehensive measurement of liveability in Australian cities. Image credit: City of Melbourne

The Chief Investigator for the research was [Distinguished Professor Billie Giles-Corti](#), the CAUL Hub's liveability lead, while other contributors included CAUL Hub scientists Jonathan Arundel, Melanie Lowe, Paula Hooper.

The report includes a range of indicators for liveability in seven domains: walkability, public transport, public open space, housing affordability, employment, food environment, and alcohol environment. The work assessed how policy targets are being met in these domains for Sydney, Melbourne, Brisbane and Perth.

The key finding is that progress on many liveability indicators is slow. No Australian capital city performs well across all the liveability indicators, very few of the policy targets are being met, and in many cases those targets are not strong enough to secure liveable cities in the future.

The hope is that these findings will (re-)spark a national conversation about the need for policy-relevant evidence and development of evidence-informed policies across Australian cities, with the aim of maintaining the liveability of Australian cities – particularly as our population grows.

# Plant Life Balance App

Research from the CAUL Hub has been used to create an Australian-first virtual greening app called Plant Life Balance.



Australian-first virtual greening app called Plant Life Balance. Image credit: The Bravery is Here (The Bravery).

The app is designed to get Australians excited and confident about styling their homes with plants, while promoting the health and wellbeing benefits they bring.

It asks users to rate their space, then improve their health score by choosing a look for their room or outdoor area, grabbing a plant list, and hitting the nursery.

Researchers including CAUL Hub's Dominique Hes and Marco Amati, found that indoor plants improve air quality by filtering out particulate matter, or air pollution and other airborne toxins caused by organic chemicals in things like paints and furniture finishes.

They created a rule of thumb - simply adding one medium sized plant to a medium sized room increases air quality up to 25 per cent. And when it comes to improving wellbeing, five or more plants leads to people feeling healthier and happier. Direct benefits include improved mood and concentration and indirect benefits include productivity.

Different theories explain that this effect is reminiscent of our long history of close relationships with nature: we have an innate connection with it. Our brain evolved surrounded by natural environments and seeing these patterns and colour reminds our brain of that connection. Therefore, being able to see plants or be surrounded by them can be effective mechanisms of dealing with stress.

Find out more on the [PLant Life Balance website](#). Download the new app via the [App Store](#) and [Google Play](#).

## RESEARCH OUTPUTS

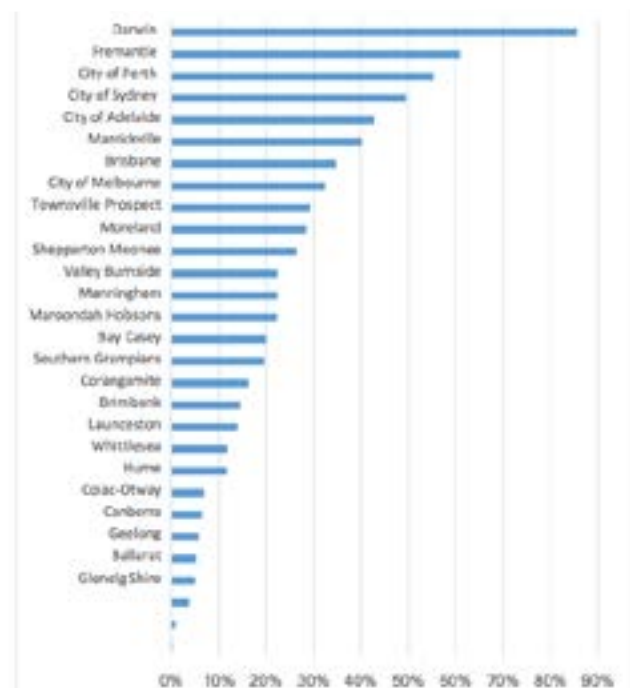
# Risks to Australia's Urban Forest

Australian cities contain millions of trees that provide amenity, important ecosystem services such as cooling and slowing stormwater, and habitat for birds and animals. But, there is growing recognition that increasing temperatures due to urban heat and climate change are a threat to some tree species.

In the [Risks to Australia's Urban Forest](#) report, CAUL Hub researchers including Dave Kendal, Caragh Threlfall and Judy Bush, analysed the risk of temperature increases to 1.9 million trees in 29 local government areas (LGAs) across Australia, from Launceston to Darwin, and Brisbane to Perth. Every tree was analysed to see how close it was to known temperature limits in current climates, an emissions-limited climate change scenario in 2040 assuming emissions stabilisation, and a business-as-usual emissions scenario in 2070.

It was found that 14% of all public trees (22% of species) in Australia's cities are at high risk (red flagged) from increased temperatures in the emissions-limited climate change scenario, and 24% of all public trees (35% of species) in the business-as-usual emissions scenario by 2070.

There was also great variation in the risk to urban trees of temperature increases from city to city, and across areas within each city.



The proportion of trees red-flagged in each LGA under the business-as-usual (RCP 8.5) climate change scenario.

The reported risks from increasing temperatures will present a major challenge to land managers across Australia, and a wide range of concerns must be addressed when planning our urban forests of the future. For example, particular care must be taken so the inequality in the distribution of urban trees is not reinforced, and that 'maladaptation,' leading to feedback loops with increasing temperatures (e.g. through reduced shade), does not occur.



14% of all public trees in Australia's cities are at high risk from increased temperatures in the emissions-limited climate change scenario. Image credit: City of Melbourne.

There are strategies that are available for urban forest managers to adapt to increasing temperatures. For important trees, a strategy of resistance can be used to improve the environmental conditions and prolong useful life (for example, by providing irrigation or improved pest and disease management). More generally, a strategy of promoting resilience can be used, through careful site selection for vulnerable species, and improved tree maintenance. Lastly, managers can respond to change by selecting trees that are better adapted to future climates.

While the report focussed on the risks of increasing temperatures, there are also many opportunities that will arise from it. New tree species will need to be introduced to our cities to maintain resilience and provide a wide range of benefits, and this renewal process is an opportunity to improve the sustainability of our cities.

Above all, meaningful engagement with the community and industry will help create successful urban forests of the future that provide a wide range of benefits for people and wildlife in cities.

[Read this and other reports on the CAUL website.](#)

## CONFERENCE REPORTS

### Green Surge

Over 300 researchers, decision-makers, planners, and practitioners, from 35 nationalities, came together for Green Surge Conference [Urban Green Infrastructure - Connecting People and Nature for Sustainable Cities](#) held 20-21 September, in Malmö, Sweden.

This was the final event of the European Commission funded project on urban-nature based solutions, which has important parallels to NESP and in particular the CAUL Hub vision.



A series of case studies was released and discussed – with much valuable and relevant material for CAUL’s Research Plan Version 4, in particular the work of Judy Bush, Dave Kendal and Cristina Ramalho.

University of Western Australia’s CAUL Hub researcher Cristina Ramalho presented ‘An attribute-function framework to support the generation of multiple benefits in urban green spaces’. This is a framework being developed by a multidisciplinary team of CAUL researchers and external collaborators, which aims to support the decision making process for the design and improvement of urban green spaces.

Cathy Oke, CAUL’s Knowledge Broker presented the opening keynote address on nature based solutions for a resilient city using material from the City of Melbourne, the recent Ecocity World Summit in Melbourne and CAUL’s approach to multidisciplinary, practitioner focused work.

Cathy also presented Dave Kendal’s paper ‘Global environmental change and the global urban forest’ - his CAUL Hub tree vulnerability to climate change research which can be found on the CAUL Hub website.

The conference insights from the four-year multi disciplinary and jurisdictional Green Surge project, and the tools developed to support urban planners to steer sustainable development at city level can be seen on the [website](#).

### ECOTAS17

Six scientists from the CAUL Hub presented at [ECOTAS17](#) - the sixth joint conference of the Ecological Society of Australia and the New Zealand Ecological Society, held 26 November - 1 December.

This year’s conference theme ‘Putting ecology to work’ was a call to focus on how ecological science can contribute to the economy, society, culture and public policy, as well as to the health of the environment and quality of life.

CAUL Hub talks included Caragh Threlfall on bats in urban areas, Luis Mata on bringing nature back into cities, Kirsten Parris on frogs in the city, Tanja Beer on arts-science experiences for connecting with nature and biodiversity knowledge, Alison Haynes on microhabitats in cities, and Leah Talbot from the Hub’s Steering Committee with her keynote presentation ‘How can Indigenous governance and the application of Indigenous knowledge – support ecology being put to work’.

CAUL’s research brought an urban perspective to discussions on maximising the impact of ecological research.

### State of Australian Cities Conference

CAUL Hub academics presented talks at the [State of Australian Cities](#) (SOAC) Conference in Adelaide, 28-30 November. This conference is the pre-eminent refereed conference on Australian urban research.

CAUL Hub talks included Leila Farahani on informal greenspaces, Cecily Maller on snakes in the city, Judy Bush on urban green spaces, and incoming Deputy Hub Leader Joe Hurley on implementing Ecologically Sustainable Development (ESD) through land use planning. Joe was also part of a panel discussion about research-practice collaboration and knowledge transfer, a key area of activity for the CAUL hub.

A stand out was the Public City Lecture by CAUL Hub’s Libby Porter, who spoke on the denial of Indigenous sovereignty in Australian urban studies. The presentation received a standing ovation and reinforced the importance of the Hub’s commitment to supporting Indigenous-led research.

## RESEARCH CENTRE PROFILE

# Centre for Atmospheric Chemistry

The University of Wollongong's [Centre for Atmospheric Chemistry \(CAC\)](#) is a major contributor to the research outputs of the CAUL Hub.

Over 20 years, the centre has established the most intensive atmospheric composition and chemistry research program in Australia.

The centre is led by CAUL Hub Project Leader Clare Murphy, and also includes Hub members Nicholas Deutscher, Jenny Fisher, Elise-Andree Guerette, Nicholas Jones, Travis Naylor, Frances Phillips and Stephen Wilson.

Together, they contribute significantly to Hub projects 1- Western Air-Shed and Particulate Study for Sydney (WASPSS), and 7- Air Quality in Australia.

WASPSS aims to provide the tools and evidence for policy makers to estimate the benefits of different mitigation strategies to the future air quality in Western Sydney.

As part of this project, members of CAC have been conducting targeted measurement campaigns, to address specific knowledge gaps from on-going air quality monitoring stations. They are also collating output from state-of-the-science air quality modelling to assess particle pollution in Western Sydney.

In 2018, their activities will include measuring the chemical emissions from trees to better understand how these combine with urban pollution and affect air quality in Sydney, and establishing a new monitoring facility and citizen science program at Liverpool Girls' High School.

The success of Project 1 has led to the CAUL Hub establishing Project 7. This project will 'nationalise' lessons from the Western Sydney air quality study.



MAQS sampling system measuring roadside pollution in Randwick. From left to right: Kate Sneesby, Lachlan Spicer, Clare Murphy, Alexander Kuhar, Jenny Xu and Stephanie Beaupark.

## STAKEHOLDER REPORT

# DoEE, NESP and CAUL

**Lee-Anne Shepherd, Director of the Science Partnerships Section in the Department of the Environment and Energy**

I was thrilled to join the team that manages the National Environmental Science Program (NESP) in the Department of the Environment and Energy (DoEE), in May 2017. I am enjoying the diversity of research, and appreciate that the research is targeted to influence environmental management action.



The DoEE team that supports NESP. Top row: Anthea Brecknell, Anna-Lisa Hayes, Naomie Johnson, Laura Gerstenberg, Kylie Kulper, Elisha Curran (2nd row) Lee-Anne Shepherd, Felicity Mclean, John McDougall. Not pictured: Maddison Watt, Allie Mokany, Scott Laidlaw.

NESP brings together a wonderful network of researchers, policy-makers, environmental managers, and the broader community. That interconnection is really interesting and powerful. It's the reason why NESP has real impact. As I learn more about the depth and diversity of work being done, I am constantly inspired by the stories I am hearing both from NESP researchers and policy-makers who have used the research findings to inform their work.

Developing a better shared understanding of research impact, communicating it and building on opportunities to make it greater will be one of our points of focus for the remaining three years of the program. Understanding both successes and failures in this area will help us learn lessons for the future on how to facilitate research that is as effective as possible in informing management interventions that improve environmental outcomes.

Research by the CAUL Hub engages many people, reflecting the high quality and relevance to the large percentage of the population living in urban areas. The impact of CAUL research is something that many of us can appreciate through the lens of our own day-to-day lives in cities and towns.

I look forward to being more involved in CAUL research and supporting connections with all NESP hubs.

## HUB UPDATES

# Indigenous Advisory Group Update

Maddi Miller and Jason Barrow, Co-Chairs



Jason Barrow, Kirstine Lee Wallis, Jade Kennedy and Maddi Miller.

2017 has been a busy year for the Indigenous Advisory Group (IAG) – in and out of our formal meeting sessions. We first want to thank the current IAG members for their guidance and critical feedback throughout the year to CAUL Project Leaders and Executive Team as part of our formal role in leading Indigenous research development, participation and engagement.

Some of us have also worked with project leaders such as Luis Mata at RMIT and Stephanie Beaupark, Elise-Andree Guerette and Clare Murphy at University of Wollongong as they incorporate Aboriginal knowledge into their understanding of biodiversity in the city and climate modelling respectively.

Most importantly we have helped shape CAUL's policy of prioritising Indigenous-led research. As such, our focus in 2017 was helping Lauren Arabena and Libby Porter at RMIT's Centre for Urban Research as they start to 'flip the tables' on urban research and view cities as Country. We look forward to the extension of this research into 2018 and we encourage you to look at Libby's recent Keynote presentation at the State of Australian Cities 2017, calling for city practitioners to acknowledge that urban places are on traditional land.

In closing I wanted to note the sentiments of my fellow IAG members at our last meeting for 2017. We are very happy to see CAUL's progress from a very low base of Indigenous engagement in 2015, to a research plan in 2018 that prioritises Indigenous-led projects and continues to increase cultural competency.

The IAG encourages CAUL to present a narrative of its journey to a variety of audiences in 2018 and we look forward to joining in these yarns.

# Roadshows and Research Plan Version 4 - 2018

Deputy Hub Leader Assoc Professor Kirsten Parris and Knowledge Broker Cathy Oke.

The development of Research Plan Version 4 (RPv4) for 2018 represented the half-way point for the CAUL Hub. As such our Steering Committee encouraged us to conduct an extensive stakeholder consultation process to test the relevance of existing, proposed, new and or extension research plans for the second half of the Hub.

Like the Stakeholder workshops we held at the inception of CAUL Hub in 2015, we delivered five full day meetings ('Roadshows') in Canberra, Melbourne, Sydney, Parramatta, Perth and also an exhibition booth at the Ecocity World Summit Melbourne – from July to September 2017.

Over 250 individuals participated in in-depth discussions on existing and proposed new research. Their feedback was collated and presented for discussion at the Strategic Leadership Group, Steering Committee and Indigenous Advisory Group meetings. The resulting agreed list of projects has been submitted to the Department of Environment and Energy in our Research Plan version 4.

The following is a brief overview of the plan including continuing projects, plus two new projects.

**Project 1: Western Air-Shed and Particulate Study for Sydney** is entering its final year, with a focus on air-quality measurements, modelling, evaluation of the human-health impacts of air pollution, and policy options for improving air quality in Western Sydney. *Continues over page.*



Urban greening is a focus of Project 3. Image credit: Photo by Oliver Wendel on Unsplash

**Project 3: Urban Greening for Liveability and Biodiversity** will continue in 2018 with a focus on the governance of urban green space including public participation in decision-making; improved management of green space in a changing environment; sophisticated methods for monitoring the multiple benefits of green space over time, and the suitability of different tree species for the urban forest of the Perth and Peel Metropolitan Regions.

**Project 4: Urban Systems for Liveability** is a multi-faceted project focusing on transport futures, commuting patterns and urban productivity; green-mapping tools and techniques; assessment of liveability of Victorian regional cities; and continued work on an Indigenous-led research agenda in cities.

**Project 5: The Shared Urban Habitat** is addressing the broad question of how humans can share cities with other species more effectively. This project will continue work on bringing nature back into cities; engaging urban-dwellers with biodiversity using our new citizen-science app; and the conservation of native biodiversity in cities. It will also include two new sub-projects; Indigenous-led research on biodiversity in the city, and practical actions for conservation in Australian cities.

New for 2018 are **Project 6: Network of Integrated Study Sites**, which will measure the multiple benefits of urban greening, using multidisciplinary methods and across multiple sites; and **Project 7 Air Quality in Australia**, which will apply lessons from the Western Sydney air-quality study at the national scale.

Please see future issues of Urban Beat for more information on these new projects.



Image credit: City of Melbourne

## GRAFFITI

Below is a selection of other reports, awards, research and media outputs by the CAUL Hub. More information can be found on the website.

- *Case Study Report released - [Greening the West: Assessment of the functioning and implications of collaborative efforts to achieve urban greening in Melbourne's West](#). By Jago Dodson and team.*
- *Article published in 'The Conversation' - [How Melbourne's west was greened](#). By Jago Dodson and team.*
- *Interview with Kirsten Parris featured in podcast '[My Marvelous Melbourne](#).'*
- *Indigenous Advisory Group Co-Chair Maddi Miller selected to participate in the inaugural Victorian Government's Joan Kirner Young and Emerging Leadership program.*
- *Article published in 'The Conversation' - [Can virtual nature and poo transplants solve city dwellers' health problems?](#) By Dave Kendal and team.*
- *Kylie Soanes gave expert advice in the making of new children's book [Urban Jungle](#).*
- *CAUL Hub researchers led by Distinguished Professor Billie Giles-Corti, contributed to the [Australian Government's National Cities Performance Framework](#).*

## Stay up to date

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Urban Beat is published three times a year.

Correspondence is welcome. Please provide comments, feedback or suggestions to [urbanbeat@nespurban.edu.au](mailto:urbanbeat@nespurban.edu.au).

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Contact details for individual CAUL Hub researchers can be found through their individual webpages on the [CAUL website](#).