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Empowering women in Zimbabwe

↗ **MUSICAL MEMORIES**  
Novel therapy for dementia care

# FUTURE-MAKERS

## A FORCE OF LIFE

Alexis Wright's  
award-winning  
collective memoir



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of people who have passed away.

**ABOUT**

Western Sydney University is a large, student-  
centred, research-led university. Established  
in 1989, the University proudly traces its  
history to 1891 through the Hawkesbury  
Agricultural College. Today the University has  
more than 200,000 alumni, 47,000 students  
and 2,600 staff.

The University is now ranked in all major  
global university ranking systems, and is  
in the top 2% of universities worldwide.  
Through investment in its academic  
strengths and facilities, the University  
continues to build its profile as a research  
leader in Australia and is nurturing  
the next generation of researchers. Western  
Sydney University graduates go on to  
take up rewarding careers that make real  
contributions to societal change, lifting the  
pride of students, staff and the community.

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- 3** EDITORIAL
- 4** INFOGRAPHIC



- 13** FEATURE: SERVING QUEER INDIG-  
ENOUS YOUNG PEOPLE BETTER



- 19** CONCRETE RECYCLING OFFERS  
HOPE FOR GREENER FUTURE



- 35** PUTTING A PRICE ON ECOSYSTEMS  
FOR COMMUNITY VALUE



- 5** TUNING INTO THE SOUNDTRACK  
OF A LIFE



COVER STORY

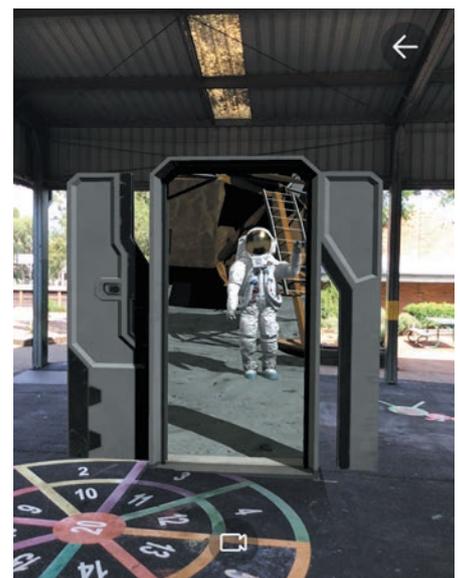
- 15** EAST MEETS WEST FOR  
BETTER HEALTH



- 21** FEATURE: A TALE OF  
TWO GROCERY STORES



- 27** BRINGING WORDS TO LIFE



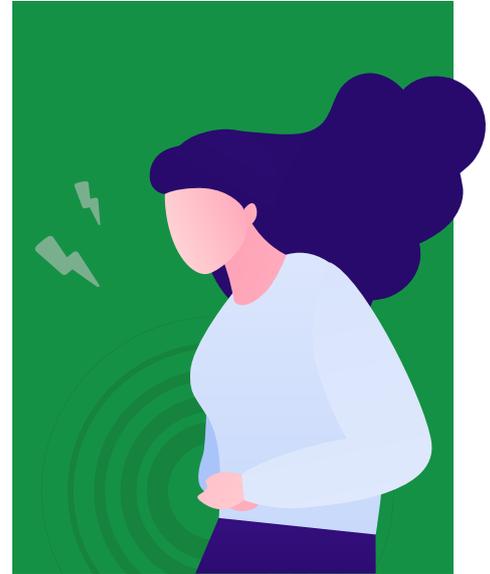
**8** SMART DRONES OFFER SAFETY SOLUTIONS



**9** HOW ECOSYSTEMS ON LAND CAN SLOW CLIMATE CHANGE



**11** IMPROVING WORKLIFE FOR SUFFERERS OF ENDOMETRIOSIS



**17** PROTECTING THREATENED FOREST ASSETS



**18** MIDWIFERY ORAL HEALTH PROGRAMME GOES GLOBAL



**23** DIGITAL CROP CONNECTIONS FOR A SUSTAINABLE FOOD FUTURE



**25** GUARDIANS OF THEIR OWN SAFETY



**29** BRINGING FOOD WASTE FULL CIRCLE



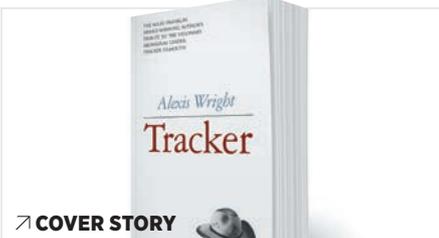
**30** LEARNING THE VALUE OF A DOLLAR



**31** **FEATURE:** A GREEN MOVE TO INDEPENDENCE



**37** AN INTIMATE PORTRAIT OF A TRAILBLAZING ACTIVIST



COVER STORY

**39** **FEATURE:** PRESERVING TREE-SCAPES AS CITIES GET HOTTER



COVER STORY

COVER STORY

ON THE COVER



➤ Alexis Wright, award-winning author and professor of creative writing. **page 37**

Cover image: Photo by Vincent L. Long, courtesy of Giramondo Publishing.

# CHANGING LIVES THROUGH RESEARCH

Welcome to the seventh edition of *Future-Makers* — a magazine dedicated to highlighting the impactful research being conducted at Western Sydney University.

At Western, we pursue global impact through a commitment to excellence, outward focus, and strategic alliances. We seek to address complex societal, environmental, health and economic global challenges, including those involving inequality and social exclusion. Accordingly, a significant portion of our research addresses real world challenges whilst displaying sensitivity and respect for local voices.

The success of this focus is reflected by the fact that Western has been ranked overall first — for the third year in a row — in the Times Higher Education Impact Rankings, which assesses the achievements of 1,700 global universities against the United Nations Sustainable Development Goals.

In this issue, we present stories about ways

in which Western research has changed lives — from providing transportation solutions for women in rural Zimbabwe to creating a digital agrifood ecosystem for farmers in Sri Lanka.

We also present stories of more local significance. For example, we celebrate Alexis Wright’s award-winning collective memoir *Tracker*, take a deep look into the needs of queer Indigenous young people, learn about the links between China and Australia through a story of two grocery stores, and discover how Australian students can make better financial decisions.

This is just a taste of the stories of global and local impact in these pages. We hope you enjoy this issue and encourage you to connect and collaborate with our researchers. ♥

**Professor Deborah Sweeney**  
Deputy Vice-Chancellor and Vice-President (Research, Enterprise and International)



The UN Sustainable Development Goals (SDGs) are a blueprint towards a better, more sustainable future (see: [sustainabledevelopment.un.org](https://sustainabledevelopment.un.org)). Western Sydney University has many research projects aligned with these goals. We have indicated the most relevant SDG above each article in this issue of Future-Makers where applicable.



# THE SDGS AT WESTERN

Since Western Sydney University signed the UN Sustainable Development Solutions Network Higher Education Commitment in March 2017, we have worked hard to not only support and promote the principles of the SDGs but to help provide solutions to the challenges they describe.

Our ranking of 1st overall out of more than 1,700 institutions in the 2023 Times Higher Education (THE) Impact Rankings — which are based on teaching, research, outreach and stewardship, and are the only ranking system in the world to assess higher education’s sustainability impact — reflects how we have followed through on our commitment and have become a leader in the sustainability space.

In this infographic we have included some of our 2023 THE Impact Ranking highlights and key strategies and initiatives in these areas.



out of 1,700 universities in the global Times Higher Education (THE) University Impact Rankings for our work and progress on the SDGs.



➤ **SDG5**  
Gender equality



**45%** of our senior academic staff, and more than half of our current commencing students and graduates, are women.

➤ **SDG12**  
Responsible consumption and production



**91%** of total waste produced on campus was recycled over the past decade and there is a ban on single-use plastics in all our campus retailers.



➤ **SDG6**  
Clean water and sanitation



**252 publications** on local and global research that is relevant to clean water and sanitation — well above the world median (33 publications).

➤ **SDG15**  
Life on land



**117 hectares** Biodiversity Stewardship site on the Hawkesbury campus championing action towards Western’s ambitious path of a climate-positive organisation.



➤ **SDG10**  
Reduced inequalities



**5,955 students** are the first in their family to start a degree, which is higher than the sector average. In 2022 we had 829 Aboriginal and Torres Strait Islander students enrolled. More than 10% of total students are from developing countries.

(top) peterschreiber.media/Stock/Getty; lemmono/Stock/Getty; (bottom) spiralmedia/Stock/Getty



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“I PLAYED  
SOME OPERA  
AND HER FACE  
JUST CAME  
ALIVE.”

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# TUNING INTO THE SOUNDTRACK OF A LIFE

Tailored playlists can ease emotional anxiety or withdrawal in people with dementia.

## 3 GOOD HEALTH AND WELL-BEING



**“I don’t think I have ever worked with a person with dementia that hasn’t connected with music,”** says Dr Sandra

Garrido, Senior Research Fellow in Brain Sciences at the MARCS Institute for Brain, Behaviour, and Development at Western Sydney University. “Sometimes the family will say, ‘oh, Dad has never really liked music that much’, and then we play some music and Dad’s the one dancing down the hallway.”

Garrido has a background in music and psychology, and her research brings the two fields together to study the use of music for mood regulation, improved mental health and wellbeing. Her research includes

young people with depression and older people with dementia.

“With younger people we find the lyrics are the most important factor in whether a song will make them feel better or not, because it’s about the message they’re taking from the music,” she says. In people living with dementia, as that cognitive response is lost, the innate physical response to music comes to the fore. “We know that our physiological systems, our heartbeat and our breathing rate, will synchronize to an external beat,” Garrido says. “Our key finding with people with dementia was that lyrics don’t matter so much, but tempo is very important.”

### MUSICAL MEMORIES

There is a strategy used in music therapy that first matches the music to the person’s current mental state before gradually shifting them to a calmer state, says Garrido. On the other hand, in different situations she has observed that music can help people to reach an optimal state of emotional arousal or calm. “If they are anxious and agitated, you can calm them by playing the music that helps reduce their heart rate and slow their breathing,” she says. Alternately, if a person with dementia is withdrawn and not engaging with the world, more up-tempo tunes can be used to bring them out.

### NEED TO KNOW

- Music can be used as a tool for mood regulation.
- Western’s Sandra Garrido has developed guidelines for aged care providers to use music as part of caring for a person with dementia.

Jawit/istock/Getty

“When people get to a certain stage in dementia, and their inhibition is gone, you see just the natural response to music,” she says. “It is quite beautiful to watch.”

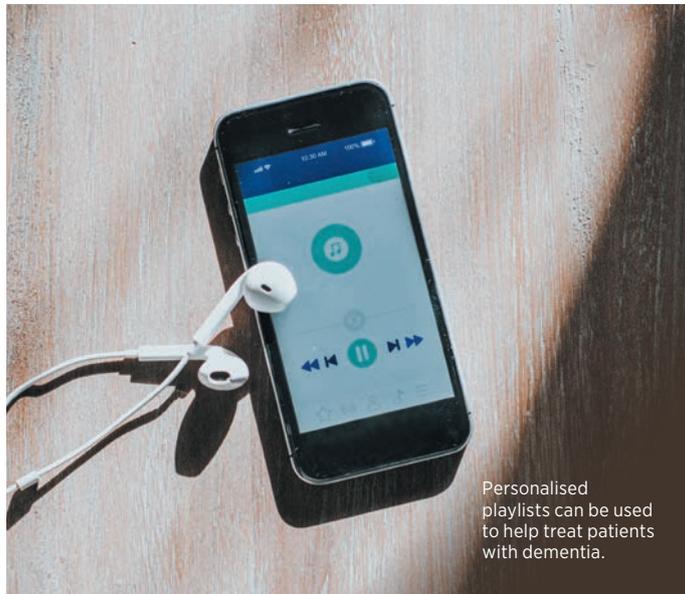
The response to music by people with dementia changes over time, Garrido has shown. “In the early stages of dementia people seem to be able to enjoy all sorts of music, including music they’ve never heard before,” she says. As the condition progresses, the range of effective music narrows to a handful of songs. “For each person, there are maybe three or four songs connected with really strong emotional memories during their life — perhaps a song that they loved in their teens, or their wedding song, or something they sang to their children.”

Connection to music can be deeply embedded. “Working with one lady, I played some opera and her face just came alive, and suddenly she remembered all these stories about how singing had been a big part of her life,” Garrido says. “She had such a connection to opera, and she didn’t remember that about herself until she heard it.” Given the powerful emotional connections — positive and negative — we make with music during our lives, it is also essential to identify and avoid music that could trigger traumatic memories, Garrido adds.

### PLAYLISTS WITH A PURPOSE

Based on her findings, Garrido has worked with collaborators at The Dementia Centre, HammondCare, in Sydney, to develop training to assist aged care workers incorporate music into dementia-patient care.

“The guidelines take caregivers through a six-step process for



Personalised playlists can be used to help treat patients with dementia.

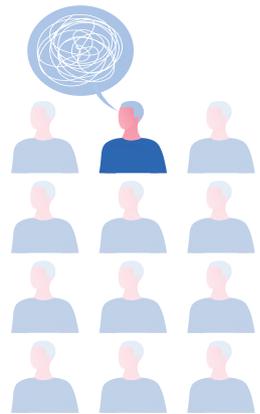
setting up a personalised music listening programme for a person with dementia,” she says. A key point of the training is that the music is not just being used as entertainment, but as a targeted intervention to help with their specific needs, Garrido explains.

“If they’re having sleep problems, there’ll be a playlist for that. Or if they have agitation around certain situations during the day, such as mealtimes in the noisy dining room, there’ll be a playlist and a strategy around when and how to use it,” she says.

As aged care staff are often time poor, the team recently distilled the training into a freely accessible one-hour online course. “We have also developed a 15-hour credentialled course,” Garrido says. “There are modules designed for either aged care staff, or volunteers, or family members who are caring for someone with dementia.”

“Sandra’s work has been significant in the effective translation of knowledge into practice,” says Holly Markwell,

National Programme Manager at The Dementia Centre, whose Dementia Support Australia service is led by the not-for-profit organisation HammondCare. “I have been working with Sandra since 2019 on the topic of personalised playlists, and it is a great example of how industry expertise and research-based evidence combines to create real world impacts, supporting quality of life for people living with dementia.”



**1 IN 12**  
**PEOPLE**  
**AGED 65 AND OVER**  
are living with  
dementia  
in Australia

Garrido is now exploring the role of technology in enabling a wider rollout of individual music programmes in dementia care. “I don’t think the ideal technology exists yet for aged care staff to implement personalised playlists programmes en masse,” she says. “The potential exists to explore how artificial intelligence could be used to streamline processes to help staff implement and monitor music programmes they’ve put in place for multiple people.”



Music can be used to help regulate mood.

(top) Catherine Falls Commercial/Moment/Getty; Anastasia Usenko/Stock/Getty; (bottom) Westend61/Getty

# SMART DRONES OFFER SAFETY SOLUTIONS

Drones equipped with high-tech sensors are learning to automatically identify signs of damage on bridges.



AI-equipped drones are used to detect defects in bridges.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



**It would be almost impossible to keep a country moving without bridges.** Most of Australia's

thousands of bridges go unnoticed while they suffer daily wear and tear from the stress of carrying people and vehicles. Inspecting for damage is hazardous, expensive and time-consuming.

Engineers at Western Sydney University are taking notice. Dr Maria Rashidi, a senior research fellow at the Urban Transformations Research Centre and leader of the Structural Engineering and Health Monitoring team, employs state-of-the-art drones to fly over, under and even inside bridges. They collect unprecedented volumes of data about the health of these structures.

Rashidi and her team fly drones of various shapes and sizes. Some are small, tough drones with bright lighting designed to enter confined spaces and withstand collisions. Drones with cameras that can swivel upwards are particularly useful for surveying the undersides of bridges. The observations are not restricted to visible light — infrared cameras can pick up

subtle changes in temperature related to structural damage.

"Infrared vision helps us identify defects such as delamination of concrete surfaces, corrosion or water entrapment," explains Rashidi. "These change the level of absorption of heat, and therefore produce different colours in the infrared images."

By combining drone images taken from multiple angles, along with ground-based data from penetrating radar, accelerometers and laser scanning, the team create 3D models of the bridges, known as 'digital twins'. These models can be used to simulate how bridges might respond to challenging physical conditions over time.

## PRESERVE AND PROTECT

"Drones are useful not only for damage inspection, but also in helping us to digitise and conserve heritage assets," says Rashidi.

## NEED TO KNOW

- Western's Maria Rashidi has been researching the use of drones for identifying damage on bridges.
- She has also used them to construct digital twins of heritage assets.

"In Australia, around 82% of bridges were built before 1976, so the original exact geometry and specifications may have been lost. We are working with Transport for NSW to digitise our historic timber truss bridges, and have digitised 27 so far."

A particular success was studying and modelling the Cedar Point Bridge, near Kyogle, in northern New South Wales. "This was an old bridge that had no structural drawing, and no architectural plans available. So we had to do everything from scratch with drones," says Rashidi.

The geometrical model, and the team's simulations on the digital twin, showed that the superstructure — the part of the bridge above the ground — had deteriorated severely. The superstructure was then replaced by a modular bridge imported from China, which was a good match with the substructure below the ground.

Most excitingly, the team are pioneering drones equipped with artificial intelligence, which can be trained to identify defects. "This type of drone can fly by itself, and if it automatically detects delamination (lifting), corrosion, or a crack, then it will go and investigate," says Rashidi.

Diana Zagora, Director of Civil Engineering Infrastructure

at Transport for NSW, is working in collaboration with Western to utilise AI-enabled drones for asset inspections, particularly of bridges.

"Using drones for asset inspections is an emerging and exciting space," says Zagora. "During the COVID lockdown it was more difficult to travel to undertake bridge inspections, particularly in regional NSW." The team was able to draw upon the knowledge from Western to develop digital models from drone footage and analyse bridge structures from the models remotely. "Since then, we have continued working with Maria and her team to develop machine learning for the detection of bridge defects in the images taken by the drone," she says.

Transport for NSW is now training and certifying 12 drone pilots. They plan to extend the use of drones to enhance safety during inspections of bridges, tunnels, natural disaster recovery and the monitoring of transport networks.

Rashidi is excited about trying different types of sensors in future, particularly LIDAR, which could improve the resolution of digital models from around 20 millimetres to less than a millimetre. This could be especially suited to monitoring the health of tailings dams for the mining industry. ♥

# WHY ECOSYSTEMS ON LAND ARE VITAL FOR SLOWING CLIMATE CHANGE

Ecosystem modeller Ben Smith is weighing the importance of terrestrial carbon sinks to meeting decarbonisation goals.



A whole tree chamber, at the Hawkesbury Institute for the Environment.

13 CLIMATE ACTION



## The Earth's land-based ecosystems

clearly play a huge role in mopping up some of the waste carbon dioxide (CO<sub>2</sub>) humans and their activities emit, but exactly how these ecosystems are responding to climate change and how much CO<sub>2</sub> they will continue to absorb remains an open question, one to which Western Sydney University ecologist, Professor Ben Smith, is seeking an answer.

Smith, who is the Research Director of Western's Hawkesbury Institute for the Environment, uses computer modelling to understand how ecosystems respond to climate change. He is particularly interested in the role that terrestrial ecosystems play within the carbon cycle, and how changes to these ecosystems impact the exchange of energy between the land surface and atmosphere.

The land-based ecosystems that absorb the most CO<sub>2</sub>

are called terrestrial carbon sinks and are a major research focus for Smith.

## TERRESTRIAL SINKS

Terrestrial carbon sinks currently absorb more than 25% of the 10 billion tonnes of CO<sub>2</sub> emitted into the atmosphere by human activities each year, he explains. The oceans soak up another 25%, meaning that only around half of the CO<sub>2</sub> emissions remain in the atmosphere.

To accurately model terrestrial carbon sinks "our first goal is to capture the balance between photosynthesis in plants, and respiration from vegetation and soils" says Smith.

Photosynthesis takes up CO<sub>2</sub> from the atmosphere and turns it into sugars for plants to use as an energy source. Conversely, during respiration, plants release CO<sub>2</sub> back into the atmosphere. Further respiration arises from the decomposition of plant litter and organic matter by bacteria and fungi. For the past several decades, the global biosphere has been exhibiting slightly more photosynthesis than respiration, meaning it is actively soaking up carbon — but there is no guarantee this will go on forever.

"The sink is strongest in the tropical forests, which have the highest levels of photosynthesis in the world. But increasingly, our focus is turning to the drylands, particularly savannas, because the sink is also strong there," says Smith. "Protecting and enhancing the terrestrial carbon sink is vital as the climate continues to warm, rainfall patterns change, and human appropriation of land ecosystem resources continues."

Smith is now leading the development of regional models,

## NEED TO KNOW

- Terrestrial carbon sinks absorb 25% of the world's CO<sub>2</sub> emissions.
- Western's Ben Smith is leading a team developing regional models for these sinks.
- The effort forms part of the NSW Decarbonisation Innovation Hub.



Regional models are critical in gaining an accurate picture of terrestrial carbon sinks.

which enable the carbon feedback processes of specific climate systems, such as the Arctic, to be studied at high resolution. His main motivation is the rising momentum across society to ensure sustainable use of the planet's resources and the transition to a decarbonised economy.

### SUPPORTING SUSTAINABILITY

“Scientific evidence to inform sustainable practices and decarbonisation is needed more than ever,” he says. “In New South Wales, our government believes that decarbonisation presents a significant opportunity for our state. They are actively supporting innovation in industry, land and energy resource management.”

To support this initiative, the Hawkesbury Institute is part of a new programme called the New South Wales Decarbonisation Innovation Hub, and Smith and his team are focusing on the terrestrial sinks.

Smith aims to harness the power of clever predictive models (see ‘A milestone for climate research’) for end-users such as carbon market developers and corporate landholders to guide their land use planning and management. For example, tools to analyse carbon stocks in relation to soil, climate and vegetation conditions across NSW could determine the potential for nature-based solutions to secure carbon storage. Recent meetings with representatives from local industry, agriculture and government have highlighted the gaps in current datasets and analyses, and demonstrate what is needed for these modelling tools to be used to their full potential.

“We are focused on refining our regional models and gathering dependable data specific to our NSW landscapes,” says Smith. “There is a real demand now for models to be packaged in a user-friendly form and tailored to specific groups and purposes. I am passionate about achieving this.”



### A MILESTONE FOR CLIMATE RESEARCH

In the early 2000s, while working at Lund University in Sweden, Ben Smith developed the ecosystem modelling framework LPJ-GUESS (the Lund-Potsdam-Jena General Ecosystem Simulator) — part of a major advance within Earth Systems Science at that time.

“These models allowed us to do forward simulations of the global land carbon balance for the first time, a key controller of greenhouse gas concentrations and therefore a leading influence on climate change,” says Smith.

LPJ-GUESS was the first global model to incorporate plant demography: a detailed representation of vegetation that adequately accounted for key biophysical processes, such as dieback of vegetation in response to extreme events such as droughts or wildfires. It also enabled further extensions to the model that allow researchers to ask questions about how human land management practices such as forest clearing or, conversely, planting forests, might interact with rising CO<sub>2</sub> concentrations and a warming climate.

LPJ-GUESS and other models that Smith has helped develop have since been widely used in research across the globe, and the model outputs provide integral underpinning data to the Intergovernmental Panel on Climate Change (IPCC) climate assessments.

“The development of LPJ-GUESS in the early 2000s was a milestone for climate impact research. The model revealed the relevance of vegetation dynamics for the global carbon cycle in a changing climate,” says Anja Rammig, a professor in land surface-atmosphere interactions at Technical University of Munich School of Life Sciences, in Munich, Germany.

“It also led to novel insights into how land-use change, nitrogen cycling, permafrost, fire and other processes interact with global carbon cycling and vegetation dynamics and functioning,” she says.

# IMPROVING WORKLIFE FOR SUFFERERS OF ENDOMETRIOSIS

As lockdowns threw the world into turmoil, many women gained the work flexibility they needed.

3 GOOD HEALTH AND WELL-BEING



For many people with endometriosis, their lives complicated by recurrent and debilitating pain, the COVID-19 pandemic requirement that they work from home was a relief. It was the first time they had the chance to manage the condition in ways they couldn't in the workplace, and still be productive in their jobs.

Endometriosis is a condition in which tissue similar to that which is found in the uterus grows elsewhere in the body, causing extreme pain. There are an estimated 830,000 Australians living with the disease.

But it shouldn't have taken

## NEED TO KNOW

- Endometriosis is costing the Australian economy \$9.7 billion each year.
- Modest changes in working conditions would lead to a significant improvement for people living with endometriosis.
- Endo@Work is a set of guidelines by NICM and Endometriosis Australia to support those in the workplace.



a global pandemic to bring such relief. Even small workplace changes and flexibility can make a world of difference to people with this chronic disease, says Associate Professor Mike Armour, from Western Sydney University's NICM Health Research Institute.

The Endo@Work initiative is a partnership between charity organisation Endometriosis Australia and researchers from NICM. The project also involves experts from the University of Technology Sydney, Southern Cross University, and the University of St Andrews, Scotland. Equipped with evidence gathered from reviews, surveys and focus groups, Endo@Work is developing recommendations for workplaces about how to better support people with endometriosis.

The inspiration for Endo@Work came from a 2019 study led by Armour into the economic cost of endometriosis and chronic pelvic pain in Australian women. The authors estimated that endometriosis was costing the Australian economy around

Cost of endometriosis to the Australian economy is

**\$9.7 BILLION**

**MORE THAN 80% OF THAT IS LOST PRODUCTIVITY**

\$9.7 billion each year, more than 80% of which was due to lost productivity. "It's also enormously costly for people with the disease", says Monica Forlano, chair of the board at Endometriosis Australia.

### A UNIQUE OPPORTUNITY

"The average person living with endometriosis is spending about \$30,000 a year managing the condition, so it's huge," she says, pointing to the need for surgery and pain management medications and treatments.

When the pandemic struck, the associated lockdowns provided a unique research opportunity that Donna Ciccía — director and co-founder of Endometriosis Australia, and a masters student at NICM Health Research Institute — was determined to seize. "I was sitting here thinking, 'everyone's working from home, what a great time to do this research into whether working from home is making it easier for patients with endometriosis,'" says Ciccía.

The team ran an online survey of the workplace experiences of 389 people with endometriosis

during the pandemic. This revealed that most found it much easier to manage their symptoms and were more productive because of the flexibility in work hours. "The things that they wanted were so minor," Ciccía says, "It wasn't like we were reaching for the moon." Something as small as access to a heat pack, a quiet room, or an ergonomic chair could make the difference between productivity and presenteeism.

This lit the spark of an idea: simple, practical recommendations for workplaces, to help them support staff with endometriosis to achieve their full working potential.

After a scoping review, and a series of focus groups, the Endo@Work guidelines have now reached the draft stage, and the characteristics of an endometriosis-friendly workplace are starting to become clear.

"It would be an organisation that does that dual work of reducing the stigma — providing education around endometriosis — as well as offering flexible working arrangements," says Dani Howe, a PhD candidate at NICM Health Research Institute, who is working on developing and testing the guidelines as part of her PhD, under the supervision of Armour, Dr Michelle O'Shea, and Dr Sarah Duffy.

### REDUCING STIGMA

Reducing stigma is a huge issue for people with endometriosis, who often shoulder the considerable burden of repeatedly explaining their disease to colleagues and who experience discrimination from people who view them as malingerers or not tough enough.

“So much of it was the emotional labour of the person trying to be believed by their managers, and then gaining that trust to take the flexible working time, to take a split shift or figure out a time that works for them,” Howe says.

Armour sees an important role for workplaces to appoint endometriosis ‘ambassadors’ to help people with the disease manage their requests for flexibility. “They’re already fatigued, they’re in pain, and asking them to also educate their workplace is another burden on them,” he says. Another change that could lighten the load is to reduce the requirements for medical certificates. “We know people with endometriosis often have about four days of sick leave each month,” he says. An alternative might be to have a more flexible, standing doctor’s certificate arrangement, so people with endometriosis aren’t trying to get a GP appointment every month.

The draft guidelines are now being reviewed across a variety of industries and workplaces in Australia, recognising that there can’t be a one-size-fits-all approach. “One of the biggest challenges is understanding how this applies across different industries,” Howe says, pointing out that someone working in an emergency department will need different accommodations to someone working in an office environment.

The hope is these guidelines will be available to the public and employers by 2025, and Forlano says they will be ‘world-leading’. “There are so few researchers in endometriosis because of the lack of funding, and we’re fortunate that people like Mike are working on this.”

“IT WASN’T  
LIKE WE WERE  
REACHING  
FOR  
THE MOON”



# SERVING QUEER INDIGENOUS YOUNG PEOPLE BETTER

A project seeks to understand the experiences of young Aboriginal and Torres Strait Islander LGBTQI+ people with the aim of improving services to support cultural, social and emotional well-being.

**Being a young person is hard:** you're trying to fit in, and at the same time figure out who you are and where you fit in the world. For Aboriginal and Torres Strait Islander LGBTQI+ young people, the additional challenges of homophobia, transphobia, and racism within settler colonial Australia, place significant pressure on their social, emotional and cultural wellbeing.

As one young person from New South Wales told Professor Karen Soldatić at Western's Institute for Culture and

Society: "I find being Aboriginal within Australia is its own issue, and being gay within Australia its own issue. But then to be Aboriginal and gay within Australia is like a whole other ball game."\*

When Soldatić and the team first began the project in 2018, they quickly realised there really wasn't much out there in relation to safe and culturally appropriate service design to support the social, emotional and cultural needs of Aboriginal and Torres Strait Islander LGBTQI+ young people.



The striking cover image from the Dalarinji project's 'Your Story' report\*.

Few services across NSW offered comprehensive support for Aboriginal and Torres Strait Islander LGBTQI+ young people. When the project started, the dominant model of service provision tended to focus on Indigenous health and cultural needs or LGBTQI+ psycho-social and health needs, but none that really combined those two important elements, "that is, Indigenous young people who were seeking social, emotional and cultural supports that also understood and would celebrate them being both Queer

and Indigenous," explains Soldatić's colleague and project collaborator, Professor Corrinne Sullivan, who is also the Associate Dean of Indigenous Education at the School of Social Sciences at Western.

There were many reasons for this, says Soldatić, but one stood out among the others: "There was limited research available nationally and internationally that explicitly responded to the diverse and nuanced wellbeing needs of Indigenous Queer Young People, so there simply wasn't a substantial knowledge

Art by Worimi/ Biripi, Gay man Jake Simon INYADOT ART

base to inform service practice when the project first began.”

The researchers set about building this knowledge base, working in partnership with NSW Aboriginal community organisations where available, and supporting the development of local initiatives in the area as they emerged across the timescale of the project. For example, in 2019, they partnered with the non-profit, BlaQ Aboriginal Corporation, and the AIDS Council of NSW (ACON) to launch the Dalarinji project.

### BATTLE ON BOTH FRONTS

“The project couldn’t have been more timely”, says BlaQ’s founding director and chair, John Leha. “Without services targeted to their specific, unique needs, Aboriginal and Torres Strait Islander Queer young people don’t necessarily know where to turn to for trusted medical help, such as advice on positive and safe sex. This, in turn, can manifest in issues such as high instances of self-harm, drug, and alcohol abuse, as well as higher rates of HIV”, says Leha. “There’s literature to say those types of statistics were the result of sexual racism or service systems’ inability to cater to the needs of First Nations LGBTIQ+ people.”

But Dalarinji was a game-changer because it “really highlighted the need for culturally tailored and bespoke responses,” he says.

For the project, the team focussed their efforts on New South Wales, partly due to the state having the highest urban density of Indigenous young people in the country. Additionally, NSW has “quite significant localised dynamics

that impact the health and well-being of these young people that might not necessarily be in other jurisdictions across Australia,” says Soldatić.

Over the course of three years, the team conducted a range of activities, including in-depth interviews, a small community survey, and a series of workshops. These were done hand-in-hand with community researchers from ACON and BlaQ, including Leha, who praised the team’s “understanding of cultural nuances and respect for Aboriginal ways at every stage of the project” and for “really valuing our contributions to the report.” This, he says, “really enabled the participants to have confidence in the process.”

The guiding principle behind this inclusive approach

is Indigenous data sovereignty, which is about “respecting the boundaries between research and community knowledge, and recognising how we can work together in respectful ways to co-produce knowledge that is grounded in community values and delivers the outcomes our community partners, including the young people who were collaborators, are seeking,” says Soldatić. “Otherwise, it just becomes research for research.”

When analysing the findings, she says it was astounding to learn just how much racism Indigenous Queer young people faced on a daily basis. Of those surveyed, 87.5% reported experiencing racism and/or discrimination, with abuse most commonly experienced online and in the communities they grew up in.

Consequently, young people are afraid to “put their hands up to say ‘I’m queer’ because of the possibility of bullying and violence” says Soldatić. This means they’re “not getting access to education, health and psychosocial supports and services around sexuality and gender that can keep them safe.”

### CHANGE IS AFOOT

Reflecting on the outcomes of the Dalarinji project, Sullivan says the work has been “quite fruitful.” In addition to the numerous and multi-disciplinary journal articles that have been published, the team has produced a state-wide roadmap to inform future service delivery in the area, two reports for the community, and hosted an international symposium to present the findings.

“I think it was the first time we had worked so closely with

community members asking such personal questions. For them to have been so vulnerable really enabled us to have a true understanding of their experiences and what we need to do to help them better,” says Leha. Additionally, it was important for young people “to have seen the results of those surveys and how their own experiences contributed to such a document,” says Leha.

The reports and roadmaps have also been recognised at a higher level. “We’ve had meetings with the NSW Health Department and a range of different departments about the need to include Indigenous Queer sexuality and gender health and support into their frameworks,” says Soldatić.

The NSW Government has now begun to draft their own strategic plan that highlights the importance of taking Indigenous LGBTIQ+ needs into consideration, says Leha, who is an advisor on the project. “It’s clear to us that the work of Dalarinji has been a catalyst.”

“We haven’t seen the outcome of policy yet but at least we’ve ensured that we have a seat at the table,” says Sullivan. She’s now leading a new project that aims to build on the foundation of what was learnt during Dalarinji, this time seeking to understand the lived experiences of Indigenous LGBTIQ+ people and their social, economic, and cultural needs and aspirations in both the short- and long-term.

The path to greater understanding may be long, she says, but “we’re starting to make inroads.” ♥

\*Sullivan, C. et al. Dalarinji - ‘Your Story’: Community Roadmaps (2022) <https://doi.org/10.26183/nv49-0x86>

### NEED TO KNOW

- Young Indigenous LGBTIQ+ people in New South Wales, and elsewhere in Australia, face unique social, emotional, cultural and sexual health needs.
- Service providers are not offering specific, holistic care and support to meet these needs because there is a lack of knowledge and know-how.
- Western research has started to address this knowledge gap, resulting in changes to build a more comprehensive and supportive support system.

# EAST MEETS WEST FOR BETTER HEALTH

Patients benefit from an evidence-driven integrative approach to healthcare.

**3** GOOD HEALTH AND WELL-BEING



## Traditional Chinese Medicine and Western medical practice

can be complementary approaches to healing. That's the philosophy of Western Sydney University Associate Professor Carolyn Ee, a practicing GP and academic lead at NICM Health Research Institute's joint initiative and partnership of Next Practice — Western Sydney Integrative Health (WSIH), Australia's first university-based integrative healthcare centre.

Launched in February 2022, the centre integrates general practice with complementary therapies, including yoga therapy, acupuncture and the use of dietary supplements. The

integrative medical centre hopes to help alleviate symptoms of illness, and the side effects of prescribed drugs, experienced by people with chronic conditions or cancer. "Western medicine can save your life, but integrative medicine can make your life worth living," Ee says.

### COMPLEMENTARY MEDICINE

Ee has a long history in healthcare. "I joined medical school straight out of high school, and then jumped directly into being a junior doctor," she says. For Ee, the long hours were not the biggest challenge. "It was the sense that I wasn't always able to help people," she says. "Often patients came in because they were having a severe side effect to a prescribed medication, and at times it felt like I was in sickness care rather than healthcare."

In her third year as a junior doctor, Ee — who has a Chinese background and a long-held interest in the culture's traditional medicine — took time out to consider other healthcare approaches.

She spent the next three years gaining a degree in Chinese medicine at RMIT University, before completing her specialist training as a GP to become one of the first practising medical doctors in Australia to also carry traditional Chinese medicine qualifications. "Then I started looking at how I might combine the two," she says.

Each system has distinct strengths, believes Ee. "Western medicine is very good at resuscitating you when you're very sick. If you're about to have a heart attack, I'm not going to prescribe yoga, I'm going to get you into an ambulance," she says.

In combination with Western medicine, complementary medicine can assist with treatment of symptoms and side effects, and recovery. "If you have cancer you need the chemotherapy and radiotherapy, but you can certainly do other things to help reduce the side effects, so acupuncture can help with the pins and needles that you might get from chemotherapy, or yoga might help with the fatigue from radiotherapy."

While working as a clinician, Ee became interested in integrative medicine research after using acupuncture to help women who were experiencing menopausal hot flashes. "The acupuncture seemed to work, and I wanted to know why," she says.

Ee's team conducted two clinical trials, comparing acupuncture with a type of placebo acupuncture that uses



blunt false needles that retract before they puncture the skin. The studies showed that, in both groups, around 40% of treated women experienced a reduction in hot flashes. "So we concluded that acupuncture seemed to work, but it's nothing to do with the actual needle going through the skin," Ee says.

"There may be a kind of beneficial effect that comes from the therapeutic interaction of attending the clinic and talking about the symptoms", she adds. In a secondary analysis of her trial data, Ee also showed that the patient's odds of getting better had no correlation with their expectations of recovery before the treatment began, proving that women didn't just get better because they expected to get better.



Traditional Chinese medicines often involve plants.

Western Sydney  
Integrative Health  
brings general practice  
and complementary  
medicine together.



## INTEGRATIVE HEALTHCARE

In 2016, Ee joined Western Sydney University's NICM Health Research Institute, which specialises in research on traditional, complementary and integrative therapies, to continue her work. Her recent work has investigated the benefits of integrating complementary medicine with typical treatments for women's health issues, for cancer survivorship, and for patients who have metabolic conditions such as diabetes and obesity. Cancer is currently her main focus, alongside heading up Next Practice WSIH.

"The idea for the integrative health centre emerged because NICM Health Research Institute wanted to explore how we could translate our research into practice," Ee says. University-

## NEED TO KNOW

- Complementary medicine can be used in combination with Western medicine to improve patient wellbeing.
- NICM Health Research Institute has partnered with Next Practice to open the first university-based integrative healthcare centre in Australia.

based, evidence-led integrative health centres combining general and complementary practice are already common at universities, research clinics and cancer centres in the United States. So Ee led a series of studies

examining the potential value of establishing the first such centre in Australia.

"Our first consumer survey highlighted how much the centre was needed," Ee says, pointing to the trust and credibility brought by a university-based initiative. In subsequent studies, the team established that local GPs and medical specialists would strongly support an integrative health centre that was evidence-based and focused on patient safety.

The centre has been embraced by local healthcare practitioners. "It's a great resource for our patients," says Elisabeth Elder, a breast surgeon at the Westmead Breast Cancer Institute and clinical professor at the University of Sydney. "Carolyn and her team are also wonderful

collaborators on a number of research projects with the aim to improve long-term well-being for people with cancer from different backgrounds," she says.

Strengthening the evidence base of integrative healthcare through research remains the focus of Ee's work. The team is developing summaries to guide centre practitioners on the latest research findings about different therapies for specific patient needs. The emphasis on evidence also extends to the outcomes of the centre's own patients, Ee adds. "We're starting to collect patient outcome data including measures of quality of life, pain, depression, and patient satisfaction, so that we can see the real-world impact our integrative medical centre is having." ■

# PROTECTING THREATENED FOREST ASSETS

We have lessons to learn from the Kayapo people of the south-eastern Brazilian Amazon who have successfully shielded their rainforest lands from mining and logging.

15

LIFE ON LAND



“What happens in the Amazon rainforest has consequences across the globe,” says Dr Beatriz Garcia, an academic in the School of Law at Western Sydney University, who specialises in international environmental law.

Human activities such as logging, mining, and agriculture threaten the Amazon — an ecosystem which is spread across eight South American countries — but there is little multi-lateral legislation between the countries to protect this vital biome. While international rivers, fisheries, and air unequivocally transcend borders, other natural resources such as forests fall within well-defined national borders. This is one of the reasons why countries have usually been averse to global rules on forests, based on the principle of national sovereignty over natural resources. However, “forests don’t stop at borders,” says Garcia, citing

the Amazon as a key example.

Garcia recently completed a research project working with the Kayapo people, an Indigenous community living in the Amazon basin in Brazil, to understand how they have successfully protected their territory from threats including gold mining and logging. The research project is a collaboration between Garcia and researchers involved in the Climate Action Beacon, Griffith University in Queensland, led by Professor Brendan Mackey, and professionals working for the Kayapo Indigenous organisations.

“Kayapo territory covers around 10 million hectares, located in the highly threatened south-eastern Brazilian Amazon,” says Garcia. “Their land is currently surrounded by cattle ranches, roads, and towns. With little or no help from the Brazilian government, the Kayapo have protected their ancestral land from these impacts — we wanted to understand how they did this.”

Garcia conducted extensive interviews with the Kayapo and staff

## NEED TO KNOW

- Forests often extend across national borders.
- This complicates conservation efforts.
- Western’s Beatriz Garcia has been studying the successful conservation efforts of the Kayapo people in Brazil.

from the organisations who work closely with them. “Charting lived experiences and witnessing their flourishing community first hand was invaluable,” says Garcia.

Garcia and co-workers measured the success of the Kayapo’s strategies under the “three-pillar framework” developed by Ed Morgan and colleagues at Griffith University: ecosystem integrity, governance, and planning. They examined the Kayapo’s own community organisations, their structure and funding, and how decisions are made and implemented.

They found that the community’s strategies are multi-faceted and highly successful. The International Conservation Fund of Canada (ICFC), the principal outside partner and funder of the Kayapo organisations, and some Brazilian NGOs have been long-term supporters, working closely with the Kayapo over the past 20 years, explains Garcia.

“These external organisations truly understand the needs of the community, and there is a strong trust there,” she adds. “Long-term support is vital for protecting ecosystems and their communities — helping for a few years and then moving on is of limited use.”

Key to the Kayapo’s success in countering outside influences is that they carefully survey their land, establishing guard posts along vulnerable entry points. “This deters illegal activities and limits people entering their land, but it also provides employment for Kayapo people,” says Garcia. “Employment is also boosted by the sustainable trades that the community



The Mata Atlantica  
in Brazil.

has established, for example growing Brazil nuts, and selling traditional handicrafts.”

“The Kayapo protect the largest tract of tropical forest in the world under some form of official protection (an indigenous territory) and are a model for large scale forest conservation with an Indigenous people,” says Barbara Zimmerman, Director of the Kayapo Project at the International Conservation Fund of Canada, based in Chester, Nova Scotia.

She adds that Garcia “was able to tease apart and explain the various threads of action and principles that have led to Kayapo’s success at protecting most of their vast territory in the lawless south-eastern Amazon,” which has been an invaluable contribution to helping save the Amazon rainforest from further degradation.

Garcia hopes that documenting the Kayapo’s route to success could be useful for other Indigenous communities, including those in Australia. ♥

## MIDWIFERY ORAL HEALTH PROGRAMME GOES GLOBAL

An Australian initiative that trains midwives to provide advice about oral health to pregnant women is spreading across the world.

### 3 GOOD HEALTH AND WELL-BEING



### The Midwifery Initiated Oral Health (MIOH) programme

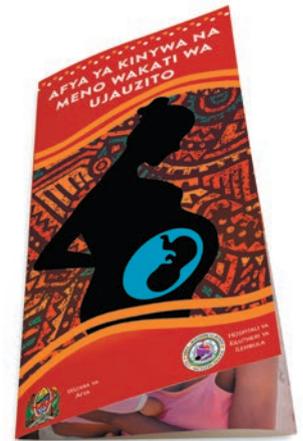
was started by Western Sydney University’s Professor Ajesh George in 2008, to increase awareness of the importance of good oral health during pregnancy, which benefits both mothers and babies. “Although poor maternal oral health is linked to adverse pregnancy outcomes and increases the risk of early dental decay in children, many don’t see it as a priority and very few women visit the dentist during pregnancy,” says George, a Professor of Interprofessional Oral Health in Western’s School of Nursing and Midwifery.

As a pregnant woman’s first point of contact within the Australian health system, midwives are well positioned to play a role in providing advice about oral health, says George, so the MIOH programme was designed to equip them with the training, resources, and referral pathways to do just that. In the years since the start of the programme it has been adopted by health systems across Australia as a cost-effective model and has contributed to a significant improvement in

the uptake of oral health advice and health outcomes in mothers and children.

Now MIOH is going global, with several other countries and jurisdictions adopting their own versions of the programme, including Iran, Saudi Arabia, Pakistan, and several U.S. states. Dr Juhani Brodtkin, a dentist in Finland, helped to bring the programme to Tanzania, where he was involved in oral health projects through the Rotary Club.

Brodtkin discovered MIOH in 2020 while searching for a model that integrates oral health into maternity clinics, which could be applied to Tanzania. While the pandemic and a lack of funding slowed things down, Brodtkin and his partners in Tanzania worked with George



to develop an informational brochure and short training seminar in the Swahili language for health workers, which ran in September and October 2022. Now they are seeking funding to develop more comprehensive training for midwives based on MIOH, about why oral health is important and how to advise pregnant women about it.

The participants in last year’s training seminars were very enthusiastic, says Brodtkin. The training was shown to significantly improve the oral health knowledge and confidence of participants, adds George. Brodtkin has since had discussions with the Ministry of Health, and the Dean of the Dar es Salaam School of Dentistry about expanding the programme. “Phase two will be much bigger,” he says.

Beyond Tanzania, the World Health Organization has also taken an interest in MIOH, says George, and is using it as a case study of an effective strategy to integrate oral health into primary health care. “MIOH is one of the only programmes to actually prove non-dental professionals can play an effective role in oral health care,” he says.

As the programme gains recognition around the world, it will help both mothers and children maintain healthy smiles for years to come. ♥

### NEED TO KNOW

- The Midwifery Initiated Oral Health Programme aims to increase knowledge about the importance of oral health during pregnancy.
- After an initial rollout in Australia, the programme has been introduced in several countries including the U.S. and Tanzania.

kyoshino/E+/Getty

# CONCRETE RECYCLING OFFERS HOPE FOR GREENER FUTURE

An innovative process for improved concrete recycling reaches a major milestone with its first full-scale commercial realisation.

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



Each year in Australia, about 30 million cubic metres of concrete is produced for construction. A third of this, and a large part of the cost, is the gravel aggregate that is added to bulk up and strengthen the final product.

At the same time, an estimated 5.5 million tonnes of waste concrete is produced each year as a result of demolitions. Researchers and engineers have been working for many years to re-use this concrete waste as recycled aggregate for new concrete, but the recycled product could never economically achieve the same

strength or performance of so-called 'virgin' concrete.

Distinguished Professor Vivian Tam and her team at the newly established Western Sydney University spinoff 'CO2 Concrete' have developed a scalable process that converts crushed recycled concrete into an aggregate that meets industrial strength standards, but at a cost that is about 10% cheaper than rock aggregate. They are the first company in Australia to demonstrate this commercially on a construction project

"Replacing rock with normal recycled concrete aggregate reduces concrete strength by about 30%," says Tam. "Our CO2 Concrete process improves the quality of the recycled

aggregate and the performance of the final concrete, and is simply added as a replacement aggregate in the normal concrete production process."

When concrete is poured, the fluid cement undergoes a chemical reaction to form calcium silicate — a stone-like material that gives concrete its amazing strength. However, some cement fails to form silicates and instead solidifies as calcium hydroxide, which is a weak powdery material. The amount of calcium hydroxide formed depends on the curing time and other factors, but its presence is what reduces the strength of crushed concrete for reuse as aggregate.

"In our process, we saturate the crushed recycled concrete with carbon dioxide to react with the calcium hydroxide and form calcium carbonate, which improves its strength and performance as an aggregate."

Tam and her team have spent the past eight years doing the experimental work and required testing to verify CO2 Concrete as an industry-ready product. However, despite strong interest

## NEED TO KNOW

- Concrete waste is a significant industrial and environmental issue.
- A Western spin-off company found a way to use demolished concrete waste as an aggregate for concrete production.
- Their aggregate meets industrial standards and is 10% cheaper than using a rock aggregate.

from industry, achieving broad uptake of the recycled aggregate is a challenge.

In May 2022, CO2 Concrete was a winner of the Holcim Accelerator Program — an intensive 6-month programme dedicated to speeding up low-carbon innovation along the construction value chain. This gave Tam's team the opportunity to work closely with major construction industry partners including Holcim, Mott MacDonald, AW Edwards, Sika and Bouygues Construction.

"Through this programme, our first commercial slab was poured in October 2022 for the new Blacktown Animal Rehoming Centre in Western Sydney," says Tam.

"CO2 Concrete was one of just nine start-ups to be selected for the programme from over 400 applications," says Evan Smith from Holcim. "It has been a pleasure working with Professor Tam over the past 12 months to bring the construction trial to a successful conclusion. The technology has the potential to be a win for reduced emissions and supporting a circular economy." ■



The concrete industry is a huge source of carbon dioxide emissions.



**THE QUANTITY OF NEW CO<sub>2</sub> EMISSIONS** that could be avoided annually at current levels of concrete production in Australia.

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“OUR FIRST  
COMMERCIAL  
SLAB WAS  
POURED  
IN OCTOBER  
2022.”

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SONGRHOL, THESAKIT/Moment/Getty

# A TALE OF TWO GROCERY STORES

Two shops on different continents tell one of many stories of how people, money and ideas have criss-crossed the space between Australia and China for more than a century.



**Separated by more than 7,400 kilometres stand two buildings:** 82 Harbour Street in Sydney, Australia, and 86 Yuelai Road in Zhongshan, China. Behind each of their modest facades lies a rich shared history, one that connects generations of Chinese Australians to both countries.

“While Australia has lots of buildings that date back more than 120 years or so, it also has a built heritage overseas. China’s heritage also transcends national boundaries,” says Professor Denis Byrne, who leads the China-Australia Heritage Corridor project with Distinguished Professor Ien Ang.

Supported by an Australian Research Council grant, Byrne and Ang have been investigating the post-1840s bidirectional flow of people between Australia and China, captured in both physical places and family histories. It is in this context that they have been documenting the history of the

two grocery stores. The findings of their wider research have been shared in a public database, which is helping many Chinese Australians trace their roots and deepen their sense of identity.

## FROM SYDNEY AND SHEKKI

Both Harbour Street and Yuelai Road were sites for grocery stores owned by Chee Win Lee. Born in Zhongshan, Lee immigrated to Australia in 1900 and soon opened a grocery shop at 82 Harbour Street which he named Yet Shing & Co. Ten years later, having saved enough money, Lee returned to Zhongshan and married. He

opened a second grocery shop at 86 Yuelai Road in Shekki, Zhongshan’s main commercial hub, and built a house nearby on Meiji Street for his wife and children. Lee himself, however, returned to Sydney and regularly sent money home.

“As so often happens with migrants, they often intend to go back to their home country but develop ties to the places they migrate to. This could be in the form of a business or a marriage,” says Byrne. “Essentially, they set down roots.”

Lee’s living arrangements were typical for many migrants to Australia at the turn of the century. Decades after a gold rush which brought many Chinese migrants into the country, Australia introduced the Immigration Restriction Act in 1901, designed to restrict non-European migration and make it difficult for the Chinese men working in Australia to bring their families with them.

Eventually, however, Lee was able to bring his family to Australia. The first to arrive was his son, Wah Hook, who arrived in 1923 aged 12-years. In 1938, as

the Japanese invaded China, Lee returned to Shekki to bring the rest of his family out of China.

## MARKET GARDENERS

Lee’s son, Wah Hook, later married Doris Gay, whose mother had a Chinese father and an English mother. The Gay family traces their time in Australia back to Louis Gay, who was born in Zhongshan and came to Australia at age 17. After a stint managing a banana plantation in Fiji, Gay struck out on his own as a market gardener in Sydney, first on leased land at Rose Bay and then on land he bought at Guildford.

Farming saw the Gay family through up to the 1950s, when the land was acquired by the government. The family grew lettuce, potatoes and other vegetables, taking their produce to a stall in Sydney’s Haymarket by horse and cart, and later by truck. During the Great Depression of the 1930s, the farm provided the family with a stable source of food, and when World War II broke out, the sons were spared military service since market gardening was seen as an essential industry.

Farmers like the Gays brought

## NEED TO KNOW

- The Chinese-Australia Heritage Corridor examines the bidirectional flow of people between the two countries.
- The research highlights the strong transnational connection between Australia and China.



Clockwise from left: Doris Lee and her son William at the family grocery store in Haymarket, 1951; Wah Hook Lee and Doris with their grandchildren; the building housing the grocery shop in Shekki in 2017; William Lee and his wife Nancy at their home in North Parramatta today.

Chinese agricultural techniques refined over hundreds of years to Australia, including methods of irrigating the often-dry soil. “In addition, there were plant seeds flowing in from China, as well as a whole range of commodities such as dried seafood and other preserved goods,” says Byrne.

“On the one hand you had remittances being sent back from Australia, so there’s a flow of money in that direction being used to build houses and so on,” Byrne continues. “Flowing in the opposite direction, you had knowledge and ideas about farming.”

### RETURN TO YUELAI

After their wedding in the early 1930s, Wah Hook and Doris lived in Shekki for a year, staying in the Meiji Street home built by Chee Win Lee. Upon their return to Sydney, they first stayed at the Gay market garden where their son William was born in 1934, subsequently moving to a house close to the grocery store on

Harbour Street in Haymarket.

Unlike his father and grandfathers before him, William grew up entirely in Australia, studying at Ultimo Primary School and Fort Street High School before attending medical school at Sydney University. He nonetheless remained interested in his heritage, and in 1985 made his first visit to China.

By then, his ancestral home had been destroyed. The grocery store at Yuelai Road, however, was still standing and is today a takeaway food store. Similarly, although the store at Harbour Street closed down in the 1960s, the building remains, and the unit is now a Korean restaurant.

Many members of the Chinese community in Sydney have been able to track down the villages from which their forebears came, visit the ancestral halls there and even have their own names added to the genealogy book, as well as locating the houses built with money sent from Australia. Hundreds of these houses have

been listed as heritage properties by the local authorities in China.

“During the 1940s up until the 1980s it wasn’t possible for many of them to go back. Once it became possible, hundreds of them returned to visit, many for the first time,” Byrne explains. “The number of houses and the scale of transnational connections between Australia and China had not received much attention before our research.”

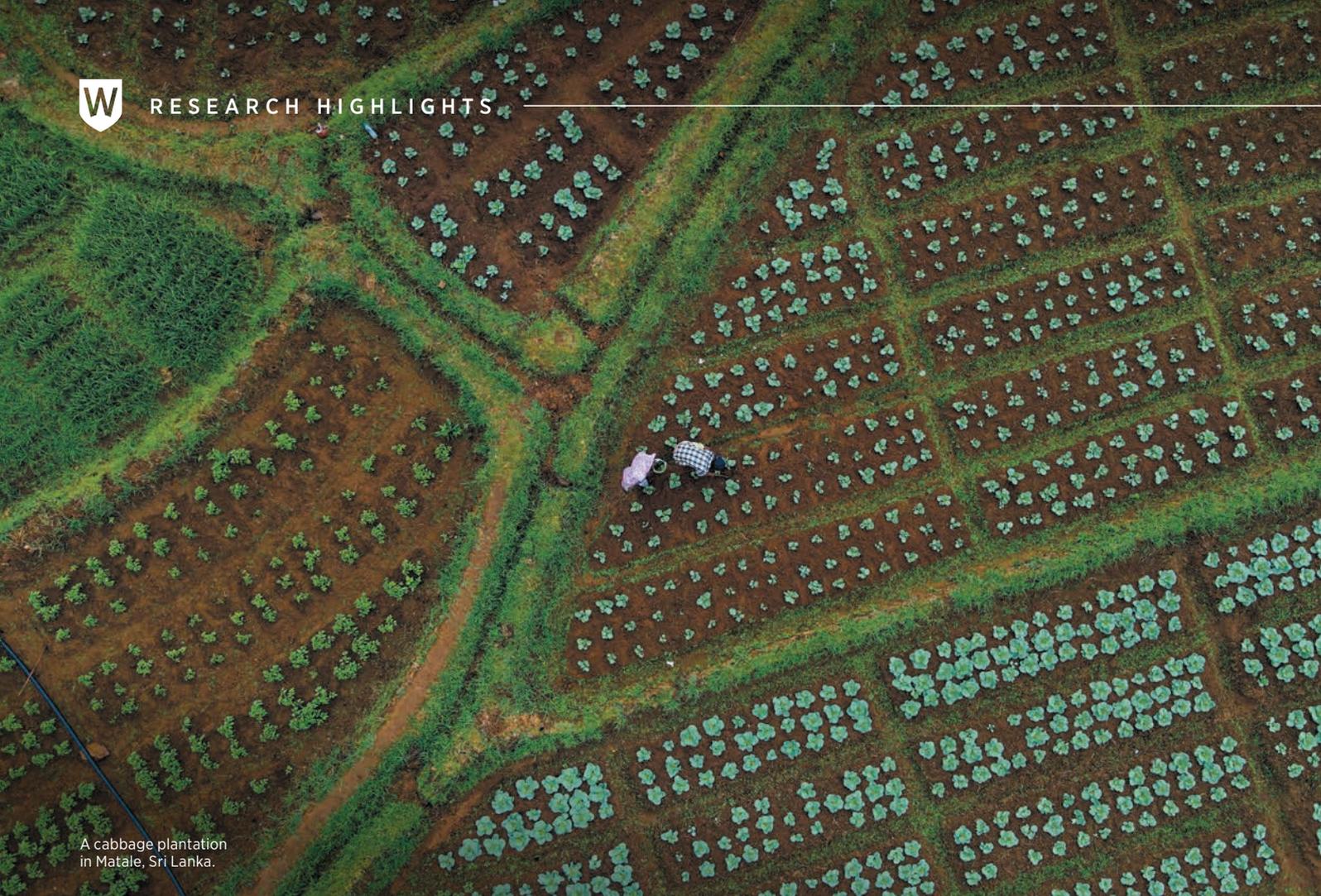
### THE NEW WAVE

Today, William lives in Parramatta with his wife, Nancy. Both were interviewed for the China-Australia Heritage Corridor project in 2017. With four generations of memories, the Lees are firmly woven into the fabric of the local community. Recent years have seen a new wave of immigration bringing large numbers of Chinese and Indian migrants into the area.

“In a related project, partly funded by the New South Wales Government’s Heritage

Office, we are looking at the way the new wave of immigrants are making their own heritage in the area,” says Byrne. “We are asking them how they relate to Indigenous heritage and old buildings in Parramatta, including heritage sites of the colonial era. It’s been really interesting to see how they’ve been building connections and developing their own perspective.”

By tracing the unusual connections between seemingly ordinary places and everyday people, this research has not only deepened the identities of individual participants, but also raised awareness of the Chinese Australian community’s shared history. “The research also highlights the continuing strong transnational connection between Australia and China which these migrants and their descendants have maintained. This is especially important today as a counter against challenges in the political relationship between the two countries,” adds Ang. ♥



A cabbage plantation in Matale, Sri Lanka.

# CROP CONNECTIONS FOR A SUSTAINABLE FOOD FUTURE

Building a digital technology platform improves the agro-economy for farming communities.



**From his childhood in Sri Lanka,** Athula Ginige understood the importance of helping farmers. “My father worked in protecting farmers’ rights,” he says. Now a professor at Western Sydney University’s School of Computer, Data and Mathematical Sciences, Ginige

is continuing a family tradition of empowering farmers by applying his computational expertise to the development of a digital agrifood ‘ecosystem’.

In 2011, spurred by a desire to find a project that contributed to helping people, Ginige visited villages in Sri Lanka and observed first-hand the challenges that farmers were struggling with.

Farmers were producing too much of specific crops, which led to oversupply,

low financial returns and wasted produce. Agricultural failures and associated poverty cause thousands of farmers to take their lives in Sri Lanka each year.

Ginige realised that farmers lacked information about which crops would be the most profitable in a particular growing season. He hoped to help build that knowledge through technology by creating a digital agrifood ‘ecosystem’.

## ECOSYSTEM EVOLUTION

Ginige describes such a system as “a digitally connected community of farmers,” based on information technology. This system would link suppliers, farmers, buyers and others together, to reduce wastage.

“The system provides farmers with information to make

optimum decisions — what to grow and when it will be in demand,” Ginige explains. “Consumers know where to buy the best quality crops, and suppliers will control their

## NEED TO KNOW

- Western’s Athula Ginige has developed a ‘digital agrifood ecosystem’ to help farmers in Sri Lanka manage their crops.
- The WIDYA platform provides farmers with up-to-date information on the supply and demand of certain crops.

NurPhoto/Contributor/NurPhoto/Getty

inventories based on knowing what will be in demand for the coming season.”

“It’s a win-win situation for everyone,” he adds.

But how do you develop such a system? In 2020, Ginige and his Western Sydney University colleagues launched a start-up company called WIDYA. “In Sanskrit this is the name for science or knowledge,” he says. “We are basically looking at the knowledge economy, and how this knowledge can be used to enhance agricultural activities.”

Ginige describes WIDYA as “a holistic technology platform with multiple apps to connect the different stakeholders.” This includes region-specific apps for farmers, consumers, and suppliers, which can be customized to solve specific problems and tailored to countries or even villages.

### CREATING SUCCESS

Historically, in many parts of the world, farmers lacked market information about what to grow. “They looked at what brought the highest prices this season, and they grew that the next season,” Ginige says. “Everyone then grew that crop, and other crops ended up in short supply.”

Now with the WIDYA system, a farmer can track the demand for a range of crops and avoid planting the crops that are likely to be oversupplied. This increases their odds of producing a crop that is in high demand and will fetch a high price.

However, those farmers also need information from suppliers and consumers. “There’s no point in giving farmers information about what to grow if they can’t get the seeds and the necessary water at the right time,” Ginige



WIDYA powers a digital agrifood ecosystem to help farmers in Sri Lanka manage their crops.

says. “That’s why we created a technology platform organised in layers — multiple technologies addressing multiple dimensions of the information.”

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## “THE SYSTEM PROVIDES FARMERS WITH INFORMATION TO MAKE OPTIMUM DECISIONS.”

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Based on this knowledge, WIDYA creates actionable insights for all the players in the agricultural economy. That insight even includes information about when to fertilise a particular crop and when pest management could be needed.

Achieving success, though, depends on a whole team. Part

of that team includes ecosystem coordinators in the areas where WIDYA is being used. One of WIDYA’s coordinators who is a research assistant at the University of Ruhuna in Sri Lanka, Tharanga Shanadi, explains the role as “acting as a bridge, fostering communication and collaboration among diverse stakeholders including farmers, educators, technologists, and local communities.”

In addition to working with experts at Western and WIDYA to identify growth opportunities, Shanadi notes that “the coordinator engages in data analysis and assessment to track performance and impact to refine strategies and improve outcomes.”

### EXPANDING THE REACH

The potential of WIDYA goes far beyond large commercial-scale farmers. At the height of the COVID-19 pandemic, even the smallest farmers reached out to

Ginige and his colleagues. “There was a strong demand to modify the application to help people to grow food in their backyards,” he says. So the team created a backyard-farming app.

One of these farmers ran into a backyard pest problem. “Recognising this recurring issue, we collaborated with agricultural experts to develop a comprehensive pest-management guide,” Shanadi says. “This resource was integrated into the app, providing users with practical solutions.”

Applications of WIDYA keep evolving; now the backyard-farming app is even being introduced in schools. “The home-garden app holds the aspiration to serve as a transformative educational tool for schoolchildren,” Shanadi says.

WIDYA is all about creating an agrifood community, adds Ginige. “Everything is connected to everything,” he says. ■

# HOW YOUNG PEOPLE BECAME GUARDIANS OF THEIR OWN SAFETY

Putting young people at the centre of research about themselves makes it relevant.



“Rapidly evolving computational technology is a juggernaut that brings many concerns about the safety of children and young people who are interacting with it,” says Professor Amanda Third, who is co-director of the Young and Resilient Research Centre (Y&R) at Western Sydney University. “Yet together with those risks, digital technology offers young people incredible opportunities. It’s a fine balancing act.”

The pace has further intensified since the arrival of generative AI. “It’s hard to get ahead of the curve and put mechanisms in place to protect children and young people,” she explains. “But there is one thing we know that works.”

Y&R researchers have taken an inclusive approach to reimagining online safety education — involving children and young people as co-researchers and rebuilding current protocols together, from the ground up.

## EMPOWERING YOUTH

Third explains that this approach balances risk management with the encouragement to make full use of the functionality that technology puts in the hands of young people. The challenge is finding experts who can navigate this rapidly changing landscape, but to the team at Y&R, it’s obvious who is best qualified.

“When we try to keep children and young people safe, we have a limited set of strategies to call on when we try to educate them,” Third says. “But they know much more than we give them credit for.”

So Y&R has enlisted young people to help explore the risks and opportunities present in digital environments, and to develop a framework for online safety education. Young people are playing an active role in keeping themselves and their peers safe — work that has attracted funding from the office of Australia’s e-Safety Commissioner.

“It’s not research about young people, it’s research with young people,” says Third.

Rather than sticking to traditional research methods, the team use a novel methodology. One thing that’s clear is that the process of seeking the opinions of children and young people can’t be hurried. “We create space for them to develop their opinions and find the language to articulate them. Often, we ask about something they know a lot about, but they may not have had to articulate those opinions before,” Third says.

Y&R also team up with partner organisations working in youth advocacy, to engage with children and young people from all walks of life, including those who are passionate about research, but also vulnerable and marginalised children whose opinions are often not heard. Their projects use artistic and play-based methods to get the creative juices flowing. These include drawing, building collages, answering quizzes and conducting interviews amongst themselves.

## NEED TO KNOW

- Western’s Young and Resilient Research Centre involves young people in research that concerns them.
- They have been involved in developing a framework for online safety.

Lucy Thomas is CEO of partner organisation PROJECT ROCKIT, based in Collingwood, Victoria, which was integral to the development of the online safety education framework.

“Young people tend to find the advice they receive paternalistic and patronising. They do have concerns about safety, but the conversations being had didn’t include them or weren’t relevant to them,” Thomas says. “But the way that Y&R centred the agenda on the youth voice, and listened to grassroots organisations like us, they’ve created novel, unique and compelling evidence to support the community.”

Third explains that engaging with children and young people, and centring their ideas and experiences in research, is an approach that should not be underestimated, “otherwise you risk missing important things, or imposing adult perspectives,” she says.

The result has prompted a shift in focus for education



Young people want to be included in research involving their needs and concerns.



Children and young people understand social media algorithms can be trained to suit them.



**44%**  
**OF YOUNG PEOPLE  
IN AUSTRALIA**  
reported a negative  
online experience  
in a 6-month period

Source: The digital lives of Aussie teens,  
eSafety Commissioner (2021).

around online safety. To date it has typically centred on extreme events — bullying, identity theft, extortion of intimate images — whereas children and young people are much more interested in everyday problems: the dynamics of their friendship groups, misunderstandings within them, and defining their boundaries.

Y&R's findings, *Reimagining*

*Online Safety Education through the Eyes of Young People*, informed the creation of a PROJECT ROCKIT video library, featuring young people, to help teachers design online safety lessons that are relevant in real life. The video library builds core competencies, such as critical judgement, resilience, and communication skills, rather than addressing specific situations.

### SAFEGUARDING THE FUTURE

Young people who are involved in developing the online safety framework explain that online spaces are a place they can hang out with friends freely. “I feel like the online world can actually help people be more outgoing,” says one young participant. “You can create like this safe positive place,” says another. Children and young people have a sense of safety and are protective of their friends and their community. Except for a very small minority, they are sensible around risks.

Importantly, children and young people have a sense of agency in the online world, says Third. For example, they feel a kind of partnership with a platform’s algorithm. Whereas

an adult might frame the habit of scrolling past unwanted content as ‘doom-scrolling’, children and young people feel they are training ‘their’ algorithm to deliver the content that they want and they feel will be good for them. As one participant puts it, “so many people forget that your phone works for you, you don’t work for your phone.”

“I’m frequently stunned by the depth of insight children and young people bring to some of the questions we’re solving. They blow my mind,” Third says.

“That makes me really optimistic about the future — even though I’m deeply aware of the huge challenges,” she adds. “We’re grappling with what it means to be growing up in today’s world.”

# BRINGING WORDS TO LIFE

Augmented reality apps help foster literacy skills through new multisensory experiences.

4 QUALITY EDUCATION



**The Gruffalo is a children's story of a mouse walking through the "deep dark wood",**

outwitting potential predators along the way. With augmented reality (AR) apps becoming increasingly common, children now have the chance to become active characters, navigating in their own way through the forest.

"It's an experience that's very distinct from reading the book or watching a video. They hear what's in the forest, they see the light or lack of light from the first-person perspective," says Dr Lynde Tan, a senior lecturer in primary education at Western Sydney University.

Tan is at the forefront of integrating emerging technologies such as AR into the teaching of primary literacy. In addition to reading, writing, speaking, and listening, Australia's English

curriculum recognises literacy as multiple ways of making meaning, such as using words, images, gestures and sounds. Teachers often use printed picture books, videos, and films to demonstrate the interplay between words and images.

With the capacity to engage children through multiple senses, AR has the potential to enhance multimodal literacy learning for children in innovative ways.

## AR IN EDUCATION

The educational benefits of using AR have been well explored for teaching science and mathematics. "It allows students to study things beyond what they can access in their everyday lives, like examining a planet as though you can hold it in your hands," says Tan.

This led Tan to examine whether these benefits could also be applied to literacy teaching, particularly in primary schools.

"While many associate AR primarily with recreational uses, such as the game Pokemon Go, its capability to interact

with text using multiple senses — sight, sound, and touch — makes it particularly relevant to literacy," she says. "To equip young students for their futures, emerging technologies such as AR need to be integrated into curricula from the early learning stages, so that we can explore how all the educational benefits can be leveraged for meaningful, educational use."

## CLASSROOM IMPACTS

Tan has started to co-design lessons with teachers so that the use of AR aligns with the Australian Curriculum for English and the intended learning outcomes.

"For us, it was important that there was evidence-based research behind the use of AR. I had reservations about how we could integrate newer technologies meaningfully and strategically at first," explains Nicole Tainsh, the principal of Vaucluse Public School in Sydney. Tainsh collaborated with Tan when she was a deputy principal of another school with a large population of students for whom English is an additional language.

"I was interested in using AR not as a small, fun activity on the side, but something that augments the learning," she adds. "At the same time, I thought AR could be an excellent way to foster children's understanding of

Augmented reality can make children feel like they are part of the story.



Entering outer space through a virtual door on an augmented reality moon.



(left) iikercelik/E+/Getty

© iRadix

## NEED TO KNOW

- Augmented reality can transform children's learning experiences.
- Western's Lynde Tan is examining how it can be best applied to teaching literacy in primary schools.

what a virtual world is, because there is overlay with the real world."

In the collaborating school's Year 2 class, students learned about space. Teachers showed students books on the solar system and galaxy, illustrating the vastness of the cosmos. Later, students used an AR app, teleporting to the Moon as astronauts, which represented space differently than the book. The teachers guided the students to pay attention to the pitch, volume and pace of sound on the AR app, for example, when the rocket was launching to the Moon. The qualities of sound suggest how far the Moon is from Earth. The spatial mode is also examined when the students explored the Moon as an astronaut.

The potential to accelerate vocabulary and reading comprehension also stood out for Tan. "Comprehension can be learned through actions, much like how a toddler acquires language through contextual cues. When students hear an instruction to 'get into the rover', they see an astronaut pointing to the rover. Nothing happens until they walk into it. They picked up new words through the tacit, AR-mediated experience," says

Tan, who adds that they were very engaged in the experience.

"When receiving instructions, the students were noticeably quiet. As soon as they began using the app outdoors, however, they became excited to be a character in the story," Tan says. "The teachers were also amazed. Using AR was like taking their students to a new world, and they forgot where they were. One teacher commented that being immersed in the half-real, half-virtual world facilitated deep conversations about the topic."

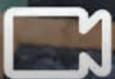
## FUTURE TECH USERS

The initiative impacted Tan's practice in the long term, helping craft units of work with AR that were practical, aligned with the syllabus, and based on best teaching principles. In addition, Tan devised a pedagogical framework and evaluation criteria for AR apps so that teachers can select those that are practical and know how to use them effectively to cater toward teaching goals.

"While apps evolve, I have the knowledge to determine if an app can be meaningfully integrated into lessons. The word is spreading among educators about its effectiveness and engagement potential," she says. "We want children to be creative and critical users of technology as they grow older; these lessons show children as active learners and how they use technology beyond passive consumption." ♥

## Acknowledgement

*The AR project entitled Language and Literacy Learning and Teaching with Augmented Reality was funded by Primary English Teaching Association Australia.*



# BRINGING FOOD WASTE FULL CIRCLE

A process to produce chicken feed and liquid fertiliser from unused food could solve a major waste problem.



Finding ways to upcycle food waste at scale has been challenging.



**Australians send more than 7 million tonnes of food waste to landfill annually,** where it produces

greenhouse gas emissions including methane, which is much more harmful than carbon dioxide. Every year, the methane generated from food waste is estimated to have a warming effect equivalent to more than 20 million tonnes of CO<sub>2</sub>. While there have been efforts to convert food waste to energy through composting, it has been challenging to find ways to reuse the waste at scale.

Dr Dharma Hagare, a senior lecturer in sustainability engineering who leads the Nutrient, Energy, Water and Materials Recycling Group at

Western Sydney University, has been investigating various ways that food waste could be ‘upcycled’ on a large scale.

“We have been working on the circular economy of water, food and nutrients by recycling the majority of food waste as animal feed,” explains Hagare. “This would not only eliminate the production of greenhouse gas emissions from waste, but also save the raw food material that would otherwise be used to produce animal feed.”

Over the past few years, Hagare’s team has carried out proof-of-concept studies that have demonstrated the feasibility of producing chicken feed from food waste collected predominantly from restaurants, grocers and fish markets at the Sydney Markets, in Flemington.

“The production of animal feed and liquid fertiliser from food waste has not been

## NEED TO KNOW

- Organic waste going to landfill is an avoidable source of greenhouse gas emission.
- Dharma Hagare from Western has demonstrated that food waste can be upcycled into chicken feed.
- The process has now been commercialised.

attempted before. We have developed a unique process where all the food waste is recycled with zero waste produced,” he says.

The upcycling process involves a series of steps including sorting, heating, mincing, drying, grinding, and pelletising to produce animal feed. Liquid extraction is also

required to make the fertiliser. The resultant chicken feed is of similar nutritional value to commercial products, and the liquid fertiliser has similar concentrations to that of commercial liquid fertiliser used in hydroponics.

Through a new start-up, Food Recycle International, the team is analysing the economic and life cycle considerations of this food waste recycling approach.

“The research is now at the commercialisation stage,” says Hagare. The industry partner, Food Recycle Ltd, has partnered with OzHarvest Ventures to raise \$18 million to start commercial production in Sydney. The research team is now testing diverse commercial food waste streams from across the country. “Research and development never ends,” says Norm Boyle, CEO-Founder of Food Recycle Ltd. “The

company is very grateful for the collaboration with WSU and expects it to continue for many years to come.”

Although there remain many aspects of the technology to work through, including the economies of scale and life cycle costing, as well as biosafety and nutrient content, its potential as an enabler of the circular economy is huge. The cost to the economy of food waste disposal in Australia alone amounts to more than \$30 billion dollars each year.

“Upcycling and energy generation from food and other organic waste will be a top priority for all advanced economies,” adds Hagare. “There will be significant investment in new methods and technologies for recycling these materials. Our work is peaking at the right time to harness these investments.”

His team is also looking at other organic waste streams. Food waste constitutes just half of the 15 million tonnes of organic waste generated in Australia each year. The team is working on processes to convert organic waste into raw material for brick production, and has partnered with Global Renewables, Austral Bricks, and Circular Australia to trial the technology. The possibility of producing bioleather and biofibre is also being explored with another industry partner.

“The projects we are working on will eventually reduce the organic waste going to landfill,” Hagare says. “If we can reach even a 50% reduction in the organic waste going into landfill, it will be a great achievement.”

## LEARNING THE VALUE OF A DOLLAR

A student-focused personal finance app improves knowledge and spending habits.



**When Associate Professor Michelle Cull began teaching a course** at Western Sydney University on financial planning, she noticed that although students had a strong interest in basic personal finance, they lacked knowledge.

“It was a surprise to see how little students understood basic personal finance, even when they were enrolled in an advanced business-related subject,” says Cull. “I’ve seen high-achieving students let their grades slip, or not submit assignments on time. Often it would come back to a financial situation affecting their sleep and mental well-being.”

To bridge the gap, she considered creating a tool

that offers students advice before they make financial decisions. Assisted by Professor Catherine Attard in the School of Education, she partnered with UniBank — a bank focused on serving the university sector — and a developer from Western’s Launch Pad startup incubator, to design a personal finance app specifically for university students in Australia, called Wallet\$mart.

The app includes features and resources covering seven crucial areas for student life: borrowing, budgeting, buying a car, education fees, employment, moving out of home, and saving. When they sign up, students are tested on their knowledge of personal finance. This generates a ‘Wallet\$mart score’ that students are encouraged to improve upon as they learn from in-app resources.

In a survey conducted after five months of app use, Cull found that 75% of the students using it felt it had positively influenced their financial knowledge and money management habits. Students who used all features of the app answered 81% more accurately on questions commonly used to test basic financial literacy than students who weren’t using the app.

Budgeting was one of the features that the students found to be most useful; this helped them save more money and plan expenditure. Several students



A screenshot from the Wallet\$mart app.

looking to buy a car made the decision to postpone the purchase after they used the app.

“It made them realize that it’s not just the upfront cost, but the ongoing costs of maintenance, petrol, tolls, parking and insurance that they need to consider. It’s great that students were able to make those informed decisions and understand that to purchase that car, they would have to budget for it,” says Cull.

Plans are underway to add more content that motivates students to learn further, for example a certification to recognise knowledge, as well as versions that target different cohorts, such as high-school students and teachers.

“Poor money management could affect these students for the rest of their lives,” Cull adds. “As students pay big tuition fees to universities to study, we have an obligation to ensure that we help them while they navigate through their finances.”

### NEED TO KNOW

- University students can lack knowledge in basic personal finance.
- Western’s Michelle Cull partnered with UniBank to create an app to address this.
- 75% of app users reported a positive impact on their financial knowledge.

Olesia Bekh/IStock/Getty



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“THE LACK OF  
TRANSPORTATION  
CAN MEAN  
THE DIFFERENCE  
BETWEEN  
LIFE AND DEATH.”

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A hamba driver in  
Wedza, Zimbabwe.

# A GREEN MOVE TO INDEPENDENCE

Access to affordable, reliable and sustainable transport has proved a life changer for rural women in Zimbabwe.

5 GENDER EQUALITY



The introduction of ‘hambas’ — solar-powered electric cargo tricycles — to a rural district of Zimbabwe has enhanced the lives of women and their families, bringing benefits for health, agricultural production and new opportunities for income generation.

For Edina Shayanewako, a nurse at the Igava Clinic in the Wedza district of the province of Mashonaland East, the introduction of the hamba (meaning ‘to move’ in Swahili), is improving her ability to implement the district’s polio vaccination programme.

“It’s not easy for us nurses to reach all of the children; many people are employed on farms and struggle to get time off to take their children for immunisations. Before hamba we were missing a lot of children,” explains Shayanewako.

“But, with the hamba it was easy because we could go to the farms. Thanks to the hamba, nurses vaccinated 1,023 children over four days.”

As with many other rural areas of Africa, subsistence farming is the main source of income in Wedza and it falls to women to carry out most of the day-to-day tasks.

But the lack of affordable transport is a significant issue.

Prohibitive distances to health facilities contribute to mother and child mortality, long walks to school force children to drop out, crops rot before they get to market, and women spend hours collecting water and fuel for cooking.

“The lack of transportation can mean the difference between death and survival, because of the long distances between health clinics,” says Western Sydney University’s Dr Tendai Chikweche.

## NEED TO KNOW

- Western’s Tendai Chikweche partnered with Mobility for Africa to address the issue of transport in Zimbabwe.
- This developed into a social enterprise that leases solar powered ‘hambas’ to women in rural areas.
- The programme has had a significant impact on the drivers’ lives.

## CO-CREATING SOLUTIONS

The hamba project started as a broad general conversation among people with an interest in female empowerment, led by Shantha Bloemen, about the challenge of transportation for women in Africa.

Chikweche is an ethnographer whose research focuses on people living in extreme poverty, and he is also the School of Business’ Academic Lead for Africa and contributes to the University’s working group on Africa

## ADDRESSING SUSTAINABLE DEVELOPMENT GOALS

The hambas have helped to address problems targeted by many of the UN Sustainable Development Goals, including poverty, hunger, gender equality, clean energy, and partnerships. Freed up from time-consuming tasks such as collecting water and fuel, the women now have more time to spend generating an income.

Communities have access to shared solar energy portals in three rural sites of 3,600 people and more than 2,900 batteries have been recharged using solar energy.

More than 24 communities have been empowered by the programme, both economically and socially. Many people have been employed to assemble and service the hambas. Some of the women have become entrepreneurs, starting their own ride-share services, or setting up small enterprises to sell their produce.

The partnerships with local government have also resulted in eight vehicles for police, health workers and agricultural support staff. This aspect of the programme was vital during the height of the COVID-19 pandemic when health staff used the hambas to travel around sharing information, and later police used them to help enforce COVID-19 restrictions.



strategy, while Bloemen is an entrepreneur with more than 20 years' experience in international development in Asia and Africa, who has seen first-hand the challenges caused by women's lack of mobility. They decided to see if they could do something about the problem themselves.

After selecting Wedza as a test case the Mobility for Africa team, including research assistants from local universities, embedded themselves with the local community, where they conducted interviews and focus groups. Over a period of two years, they stayed for weeks at a time, working with the local women to create and co-design the project.

"Living in the community and seeing the challenges the women

face to go to a clinic or their fields helped us understand their experience," says Chikweche.

The women saw an opportunity for a community outcome by providing vehicles to agencies such as health workers, maternity nurses, police and agricultural support workers.

"They demonstrated that as rural African women there is a collective vision of their livelihoods. They don't think about themselves as individuals, they are always asking: how can this help the broader community?", Chikweche recalls.

As well as being large enough to transport people and crops, the vehicle had to fit the social expectations and norms for women, for whom riding a bicycle was not socially acceptable.

### MOBILITY FOR AFRICA

The result was the hamba, a cargo tricycle, manufactured in Zimbabwe's capital Harare from parts made in China, including a solar-charged lithium-ion battery. The project became a social enterprise start-up, Mobility for Africa (MFA), with Bloemen as its founder and director, and with the goal of creating a renewable, community-based transport solution for Africa.

MFA introduced the hambas to three pilot sites in Wedza. The vehicles' rechargeable batteries are powered at community-based, off-grid solar charging ports, and MFA provides driving lessons, backup services and vehicle maintenance.

The women lease the hambas — which can travel up to 100 km

per charge — on either a short-term monthly basis or over a longer term. Toyota Mobility Foundation has been a major partner of MFA from the start, providing technical support to improve performance of the hambas' batteries and GPS.

In December 2022, Mobility for Africa was funded with US\$2 million from a private investor, InfraCo Africa (part of the Private Infrastructure Development Group) to scale-up the programme. Industry players are also partnering with the hamba drivers, for example, the country's biggest milk processor is subcontracting some of the women to deliver milk in their local areas.

The number of hambas has increased from the initial 48 to more than 600 since



Hambas have also helped the local community.



### THE VIEW FROM THE ROAD

Some of the women from the Wedza pilot sites share their experiences of life since the hamba.

“For us to get home, before we had to hire a car; now because of Mobility for Africa, things are better. When two members of my group go to buy chicken feed, one will be waiting with the hamba and then we go home” — Marry Taengwah.

“We never thought that women could drive, now women in this area are driving so much that our work becomes much easier” — Caroline Mafere.

“Most of them know by now that they wait under this tree — that is where the hamba taxi will be. Sometimes there are so many people waiting, so I will go past them with my passengers. Besides offering a taxi service, when I am home, I use the hamba to carry seeds and fertiliser to my field. After I finish my field work, I will carry firewood home” — Josephine Nyevhe, taxi driver.

### THE NUMBER OF HAMBAS

has increased since the launch of the programme in 2020.



the launch of the programme in 2020-21.

Chikweche says the next steps are to improve the efficiencies of the lithium battery technology, while also looking for opportunities to extend the hamba for other uses, and to track and monitor the project’s commercial impact. Mobility for Africa has also started feasibility studies for a new programme in Tanzania. The big aspiration is to see hambas

being introduced into rural areas in other African countries.

Another initiative he would like to see is entrepreneurship training for the women. “It has been my long-term desire to see Western Sydney University giving training to these women as part of our strategy for Africa,” says Chikweche.

The development of the hamba has achieved more than just giving people access

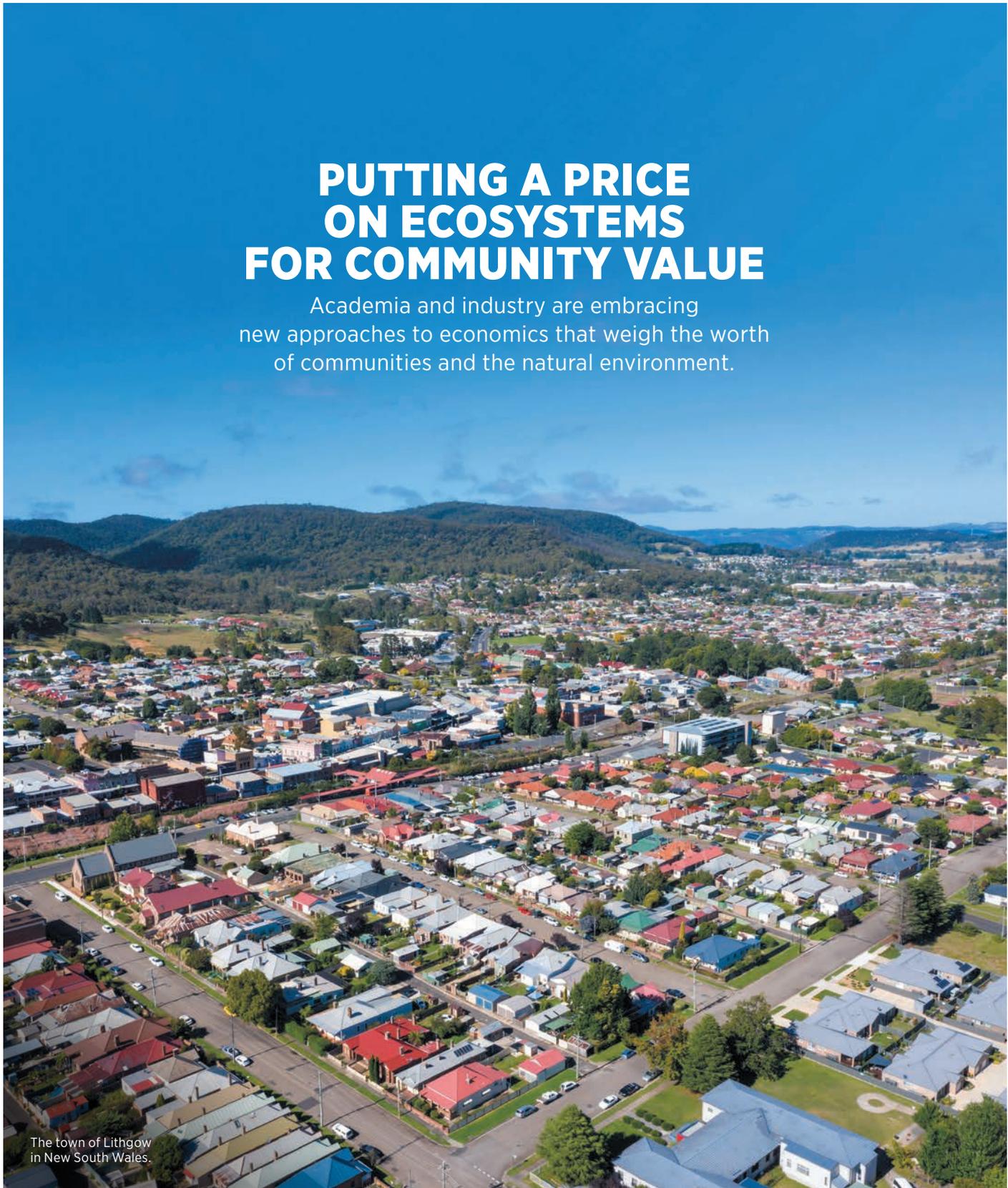
to transportation; it is having an impact across many aspects of their lives. Women are now able to take their children to school, visit clinics and maternity nurses, and earn a living from their agricultural produce.

“The change in women’s livelihoods and them being able to take control of their lives, for me is the biggest change — the fact that we have given people hope where there was no hope.”



# PUTTING A PRICE ON ECOSYSTEMS FOR COMMUNITY VALUE

Academia and industry are embracing new approaches to economics that weigh the worth of communities and the natural environment.



The town of Lithgow in New South Wales.

Phillip Wittke/Alamy Stock Photo

## 11 SUSTAINABLE CITIES AND COMMUNITIES



## How much would you pay to save a tree, or a spider?

To what extent does your local community enhance your wealth and wellbeing? These types of questions may seem abstract, but they are vital considerations for ecological economists like Neil Perry, an associate professor in corporate social responsibility and sustainability at Western Sydney University.

“In orthodox economics, the environment is simply a resource to be drawn from and to put waste into,” says Perry. “In ecological economics, we look at things in a more circular and holistic fashion, seeing the economy as part of a broader ecosystem. There are many things that are valuable, that are not currently recognised in financial markets.”

Perry, like many others, is averse to monetising everything in the natural world. However, he is well aware that governments make decisions through cost-benefit analyses. In a recent

book chapter he wrote on ‘The Economics of Ecological Restoration’, he noted that cost-benefit analysis is needed to justify the importance of government projects and to help them attract funds.

“If we can broaden the values that they include in their economic analysis, then perhaps we can get some outcomes that we ordinarily wouldn’t, like promoting sustainable communities, the environment and endangered species,” he says. “For example, we can assess the value of a national park including things such as the time and money people spend to visit it, or the value of nearby houses that enjoy good views.”

### TRANSFORMING TOWNS

In recent years, Perry has focused attention on the town of Lithgow, on the edge of the Blue Mountains, west of Sydney. Lithgow was once the centre of the coal industry in New South Wales, but one of the coal-fired power stations has now been closed. Through advisory roles with the NSW Government and the Maldhan Nurr Nurr – Lithgow Transformation Hub, Perry aims to help Lithgow to transition to a lower-carbon future, while also building wealth for the community.

“We’re trying to create the best conditions for the emergence of new industries. For example, we’re helping young people imagine different futures for themselves beyond the mines or the power station. We’d like the community to own the capital, rather than just have big companies come in there and employ them.”

Lithgow has a lot going for it. There is a large area of serviceable industrial land left by

the old power station, as well as very good train and road access, and plenty of water. Perry is working to promote the value of these factors, which bring competitive advantages and could attract different investors. Lithgow may become a centre for new manufacturing and logistics; other promising proposals include renewable energy schemes such as wind, biomass and a pumped hydropower plant.

“We’re learning a lot from Lithgow,” says Perry. “By publicising our experiences, we can hopefully help many other places like Lithgow around the world.”

## “THE ECONOMY IS PART OF A BROADER ECOSYSTEM.”

### LIVING AND WORKING

Perry’s research doesn’t just examine how people work, but also how and where they live. Through collaborations with Transport for NSW and Sydney Metro — a fully automated, rapid transit rail system — he has highlighted the wider economic benefits of transport for connecting communities. For example, his team’s research found evidence that northwest Sydney, which is well connected by the metro system, was less affected by COVID-19-induced business closures than other parts of the city.

Perry is also involved in a project led by his colleague, Professor Louise Crabtree-Hayes, examining housing

cooperatives — member-based organisations that provide home building, governance, management, maintenance and financial services.

“Cooperative housing represents less than 1% of housing, but the members are very vocal, and adamant that they enjoy great benefits over normal social housing, where people don’t contribute or communicate as much with each other,” says Perry. “We are analysing data to test the hypothesis that there are better outcomes for the members, because they’re not just residents, they’re participants in their own housing.”

Perry’s broad research interests could lead to several directions in the future. “I would like to get involved in biodiversity markets and carbon offsets, which I believe are deeply flawed. By improving these measures, we can help governments to increase the incentives for private land conservation.”

One of Perry’s close collaborators, Jennifer Jenkins, an Associate Director at Infrastructure Australia, based in Sydney, is responsible for independently assessing public infrastructure business cases that are seeking Australian Government funding.

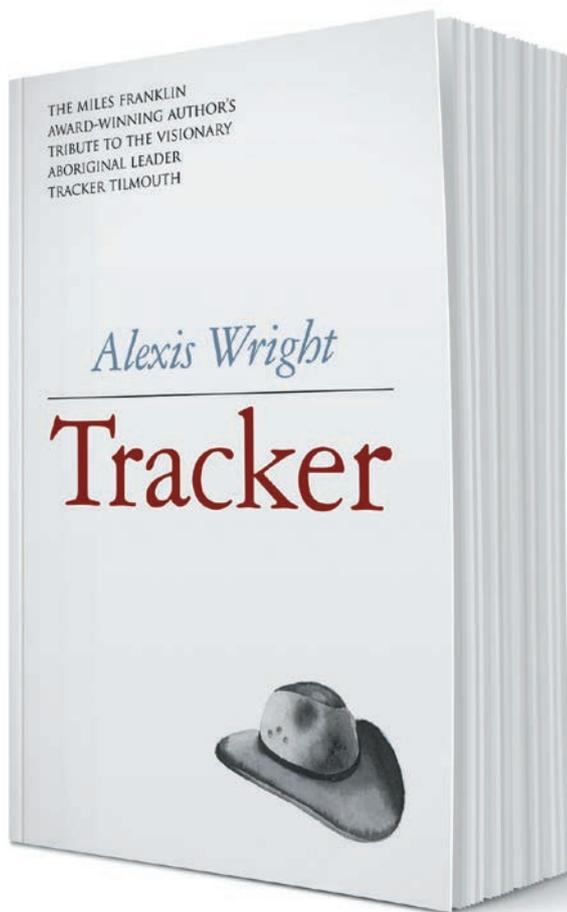
“We have drawn on Neil’s expertise to provide cost benefit analysis training, and to provide advice on new economic evaluation approaches to improve valuation of sustainability in economic appraisals,” she says. “He provides a unique and refreshing perspective to our work that is grounded in a practical understanding of the role of government and private sector in policy development.” ■

### NEED TO KNOW

- The benefits of sustainability can be difficult to quantify economically.
- Western’s Neil Perry has applied ecological economic approaches to projects such as the transformation of regional hubs and cooperative housing.

# AN INTIMATE PORTRAIT OF A TRAILBLAZING ACTIVIST

Charting adventures from the Northern Territory to the hallways of Parliament House, a ‘collective memoir’ of leader, political thinker and visionary, Tracker Tilmouth, has been highly acclaimed.



The cover of the 2017 edition of *Tracker*.

Aboriginal and Torres Strait Islander peoples should be aware that this story contains the images and names of people who have passed away.

“An absolute force of life,” is how Distinguished Professor Alexis Wright describes her longtime friend, Tracker Tilmouth, the visionary leader in building Aboriginal economies who is the subject of her 2018 book, *Tracker*, which won the Stella Prize.

An Eastern Arrernte man, Kwementyaye ‘Tracker’ Tilmouth was born in 1954 in Alice Springs. Part of the Stolen Generation, Tilmouth was taken from his family and raised at the Croker Island Mission. He later went from working as a stockman in central Australia to striding down the hallways of Parliament House to argue in favour of land rights, native title rights, and Aboriginal self determination.

In 2015, then aged 62, Tilmouth died from heart and cancer complications, leaving a chasm in the lives of his family and friends, including Wright, who was then busy writing the book the two had envisaged together.

Wright is a professor in creative writing at Western Sydney University, as well as a Miles Franklin award winning novelist, and was recently awarded the Creative Australia Inaugural Lifetime Achievement Award in Literature. When she started to consider how best to tell Tracker’s story, she quickly ruled out a traditional biographical approach.

Instead, she decided on a ‘collective memoir’ and spoke to and recorded the recollections of approximately 50 people who had been suggested by Tilmouth.

## CONSENSUS CULTURE

The idea of consensus — of everyone discussing issues to come to an agreement — is strongly rooted in the Aboriginal culture, explains Wright, a member of the Waanyi nation of the Gulf of Carpentaria. “It has been our way of doing things in our culture for forever and a day.”

*Tracker* takes this approach; “it’s a book of consensus of what people had to say about Tracker Tilmouth. About his work, his ideas, his vision, his humour, and his ability to astound you on a regular basis,” she explains.

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“ONE MAN’S STORY TOLD BY MANY VOICES, ALMOST OPERATIC IN SCALE.”

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“Tracker never wrote anything down,” says Wright. “But through writing this memoir, I realised that his filing cabinet, his archives, were in other people’s minds, in the work that he did with them.”

Following its release, *Tracker* was highly acclaimed in literary circles. The judges’ report for the Stella Prize, a major literary award celebrating Australian women’s writing, described it as “one man’s story told by many voices, almost operatic in scale.”

But perhaps more importantly, it was embraced by the Aboriginal community. “After this book came out, a lot of Aboriginal people said there should be a Tracker Tilmouth University built about his ideas and vision,” says Wright.

Tracker Tilmouth speaking at the Northern Territory Constitutional convention in 1993.



“In a way, I feel that this book is Tracker’s University.”

Wright’s work has had global impact, with her books translated into Chinese, French, Italian and Polish. She was even contacted by university students in China’s province of Inner Mongolia who were keen to translate *Tracker* into Mongolian.

#### EMBRACING CHALLENGE

Now, *Tracker* is set to find a new audience in the UK — alongside Wright’s novel, *Praiseworthy* (which won the 2024 Stella Prize), it is soon to be published by independent publisher: And Other Stories.

“*Tracker* is astounding and couldn’t be more relevant

in the UK. Britain is often disengaged from the long-term impacts of colonialism in its former colonies, and *Tracker* brings home the stakes in

#### NEED TO KNOW

- Western’s Alexis Wright wrote a collective memoir about Tracker Tilmouth, a celebrated Indigenous activist.
- She won the 2018 Stella Prize for it.
- *Tracker* is being published in the UK.

a moving and engaging way,” says Tara Tobler, senior fiction editor at And Other Stories. “It’s a testament to the wit, intelligence, boundless energy, survival drive and sheer strategic genius of a man who, according to the genocidal-colonial project, shouldn’t have been here at all. Yet here he is, in the centre of the old empire, winking and laughing at us from every page, oceans away from Country but standing up for it all the same. I also think *Tracker* has a lot to teach us about how collaborative authorship and collective storytelling can work on the page. Like everything by Alexis Wright, it’s an absolute marvel. I couldn’t be prouder to publish it.”

Wright believes the world is increasingly embracing Australian literature, and people are excited about it. However, she acknowledges there is a lot for Australian writers to deal with in this time of extreme climate change and global unrest. “They need to keep up with what’s happening in the world and look at the broader picture, and to be able to write the sort of stories that are required, at this time and into the future,” she says.

She also notes that readers have a significant role to play, by being open to feeling challenged by literature, adding: “We need people to love literature as much as they love sports in this country.” ♥



# PRESERVING TREESCAPES AS CITIES GET HOTTER

As the climate heats up, urban forests are becoming more vital but also more vulnerable. Western Sydney University researchers are working to help them survive.

Manuel Esperon-Rodríguez watering seedlings at the Hawkesbury Institute for the Environment.



Cybele Malinowski



**When did you last notice the trees in your neighbourhood?** Perhaps

it was on a scorching summer afternoon when you took advantage of the cooling shade they provided, or when you stopped to shelter beneath their leafy canopy during a downpour. Was it when you looked up to track the source of a burst of bird calls and realised the branches above you were alive with lorikeets? Or when you stopped to admire a town boulevard painted with living autumnal colours?

Trees are a vital feature of towns and cities, yet remarkably little is known or documented about how well they cope with the pressures of the urban environment, how that is changing with a warming climate, and how we can help urban trees survive and adapt to those challenging conditions.

This is where the work of Western Sydney University

**NEED TO KNOW**

- By including trees in urban environments, temperatures can be lowered.
- Researchers from Western’s HIE are helping city planners choose the best trees for their urban forests.
- They have also developed a new national standard for saplings.

researchers, Professor Mark Tjoelker and Dr Manuel Esperon-Rodriguez, comes in. At Western’s Hawkesbury Institute for the Environment, they have been developing datasets and guidelines that will help secure a greener, healthier and more sustainable urban treescape.

**SUPPORTING SAPLINGS**

“As a nature-based solution to the urban heat-island effect, trees have an outsized impact in urban environments compared to their role in natural environments”, Tjoelker says. Their ability to shade heat-absorbing surfaces can have a big effect on urban energy consumption by reducing air-conditioning needs. “Some studies have shown that trees in urban environments can directly reduce energy consumption by 10 or 15%,” he says. “That’s a huge potential contribution to getting to net zero carbon emissions.”

To help urban landscapers pick the healthiest, most viable saplings at a plant nursery, Tjoelker and colleagues have developed a new national standard, accredited by Standards Australia: AS 2303:2018 Tree Stock for Landscape Use. These national standards exist to ‘ensure the quality and consistency of products and services’, ranging from bushfire-resilient building to designing for access and mobility.

To develop this standard, the research team gathered biometric data on nearly 14,000 container-grown trees in plant nurseries — representing 159 tree species commonly used by urban landscapers across Australia.

“The standard has a checklist of different criteria that are used to help ensure quality,” Tjoelker says. “It will help ensure that the tree has every chance, if planted in the correct location and treated right,



Mark Tjoelker measuring seedlings.

to survive, grow and thrive.”

That checklist includes questions about whether the volume of the pot is suitable for the height and diameter of the tree, and whether the potted roots have the proper form and are free from defects. “It ensures the right balance between the roots that need to supply water and nutrients to the tree and the above ground portion of the tree,” Tjoelker says. “If that’s too small, the tree will really struggle to get a foothold in the landscape.”

“Purchasers now have a clear standard to quote when purchasing tree stock and the result of this is a high-quality product being supplied that will have a greater survival rate; this

means our cities and towns are going to be greener, safer and cooler,” says Hamish Mitchell, the managing director of Specialty Trees, one of the nurseries that uses the new standard.

**PICKING THE RIGHT PLANT**

Ensuring that young trees have the best possible chance to flourish is just one part of the challenge; equally important is deciding which tree species to plant in a particular location.

Esperon-Rodriguez has long been fascinated by trees. He began his research career in the mist-cloaked cloud forests of Mexico, studying how tree species in that unique setting are dealing with the changes in

Cybele Malinowski

climate that are threatening to dry out the lush environment. A post-doctoral opportunity brought him to Australia, and eventually to Western Sydney University and the *Which Plant Where* research programme: a joint initiative of Western Sydney University, Macquarie University, the NSW Department of Planning and Environment, and Hort Innovation.

The aim of that five-year project was to build a resource for all those involved in developing urban greenspaces to enable climate-ready decision making and to develop resilient green spaces of the future. To do that, the project team has gathered extensive information from around Australia about what factors are associated with urban tree success or failure, with a particular eye on how climate change is shaping these outcomes.

“I spent two years contacting people at the councils of more than 200 cities all across Australia, asking if they could give me any species lists or names that they were no longer planting because of climate change, because they knew they were failing,” Esperon-Rodriguez says. It turned out that very few city councils had that data recorded in any systematic fashion, which is perhaps unsurprising given the myriad reasons why any particular urban tree might fail: climate and weather, planting techniques, species vulnerability, damage, vandalism or poisoning.

Esperon-Rodriguez widened his search to a network of people in 14 countries around the world, and still came up empty handed. It showed there was a desperate lack of information, and at a time when it was badly needed. “I decided I wanted to do something about

climate change and urban trees and try to help councils to identify the vulnerable and resilient species,” Esperon-Rodriguez says.

That took the form of a comprehensive assessment of the distribution of more than 3,000 urban tree species in 164 cities globally, which expressed that distribution in terms of those species’ tolerance for climatic conditions such as temperature and rainfall.

It revealed some surprises, including non-native tree species whose original distribution might suggest they weren’t well suited to Australian temperatures but were in fact thriving, and native species that weren’t coping nearly as well as expected. “The models can say this species is vulnerable, but in reality, we can see that the trees are surviving quite well,” Esperon-Rodriguez says.

It’s valuable information for local governments trying to plan for urban treescapes, says Karen Sweeney, an urban forester with the City of Sydney Council. “We want to get 40 to 80 or even 100 years out of some trees, particularly in parks,” she says. “In our streets, it’s about making sure that we have good environments and the right adaptive trees to be able to thrive in those harsh environments for the long term.”

### LOOKING BACK TO GET AHEAD

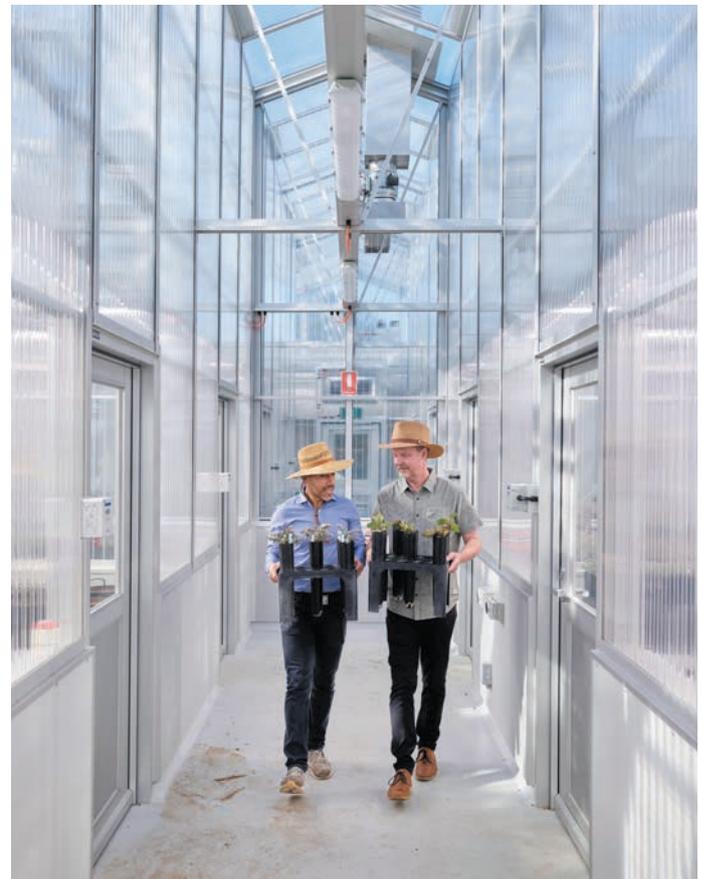
The research group is also looking into the past to see how existing trees have coped with previous climatic variation. Esperon-Rodriguez is studying tree cores taken from trees in Adelaide, Mandurah, Melbourne, Mildura, Parramatta, Penrith, and Sydney, to record how tree growth has changed over the life of that tree. Again, this has revealed some surprises.

“We thought that the trees in hotter, drier Mildura were going to have lower growth compared to Sydney or Melbourne, for example.” But it turns out they’re doing just as well, suggesting some trees are able to adapt to local climates. Esperon-Rodriguez is now looking more deeply into this, examining how some species of trees vary in their morphology across different climates, such as producing smaller leaves to reduce water loss.

The work being done at Western complements the existing expertise of urban foresters like Phillip Julian, who works with the City of Sydney Council. They have a tough job, because urban environments are becoming ever

more crowded. “Competition for space is increasingly becoming important, so we need to coordinate our tree planting activities with other activities in Council,” Julian says.

Tree species are selected for the space they will occupy above and below ground, the conditions of the location now, and how they look and behave through different seasons, “but the missing part of that puzzle was we don’t have a crystal ball to look to the future and see how that species is going to do in 20, 30, 50 years’ time,” Julian says. “Manuel has helped to fill that gap and give us some confidence and an evidence-based grounding about what we think might do well into the future.”



Manuel Esperon-Rodriguez (left) and Mark Tjoelker at the greenhouse facility at the Hawkesbury Institute for the Environment.

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