VOL.55, SUMMER 2025

Uniview

THE MAGAZINE OF THE UNIVERSITY OF WESTERN AUSTRALIA

Shaping our environments

THE UNIVERSITY OF WESTERN AUSTRALIA

SEEK WISDOM

Message from **the Editor**

As climate change and its environmental impacts become ever-pressing realities, it is reassuring to know that our brightest scientific minds are focused on practical solutions.

This edition of *Uniview* highlights UWA research that is underpinning adaptive solutions from beneath the earth to our peatlands, oceans and outer space — and for the animals and plants that inhabit these environments.

Learn what higher temperatures mean for the food sources and habitats of our marine species, wetlands frogs and suburban magpies and why our native western pebble mouse must dig deeper to survive.

Be inspired to read about the pioneering technology and projects that are identifying conservation priorities and restoring environments — including critical underwater kelp forests and large tracts of native land denuded by mining.

We also share the UWA innovative agri-tech behind our newest commercial startup, Emergence Ecotech that is accelerating the revegetation of vast, degraded native environments to restore diversity and soil quality.

Alison Batcheler
Editor
Associate Director, Corporate Communications

Global energy transition research

Future-proofing life on land

Space for growth on Earth

CONTENTS

03	From the Vice-Chancellery	**28**	UWA Spotlight
04	In Focus	**30**	Future Thinker
06	Features	**31**	Convocation
22	Thought Leadership	**32**	Community Impact
25	Newsmaker	**36**	Tech Hub
26	Showcase	**38**	In the Frame

The University of Western Australia acknowledges that its campuses are situated on Noongar land, and that Noongar people remain the spiritual and cultural custodians of their land, and continue to practise their values, languages, beliefs and knowledge.

Editor: Alison Batcheler
Uniview Sub-editor: Milka Bukilic
Editorial: Corporate Communications, The University of Western Australia, Perth, WA 6009
Telephone: +61 8 6488 4206
Design and print: UniPrint, The University of Western Australia
Email: uniview@uwa.edu.au

The University of Western Australia – UWA
UWAnews
UWA website: *uwa.edu.au/news*

The Rowley Shoals in 2021. Image credit: Michael Cuttler


Professor Amit Chakma, Vice-Chancellor
The University of Western Australia

From the **Vice-Chancellery**

Our precious natural environment is under threat on many fronts, from climate change to biodiversity loss, pollution of our air and water, deforestation, water scarcity and food and water insecurity.

We are proud that our researchers are working on solutions to many of the world's biggest environmental challenges, such as managing marine heatwaves and marine biodiversity, large-scale land restoration through innovative agricultural technology and research-based solutions to food and nutritional security.

In this edition you can read about the ARC Industrial Transformation Training Centre in Critical Resources for the Future, which is leading the global energy transition. It brings together some of the nation's leading universities, resource industry stakeholders and government to drive research into critical minerals and sustainable mining.

We also acknowledge the extraordinary contribution of Professor Barry Marshall, who reflects on the 2005 Nobel Prize-winning discovery with the late Professor Robin Warren, which put Western Australia firmly on the map.

Millions of people worldwide have had their lives transformed by having their stomach ulcers successfully treated with antibiotics; thanks to a determined researcher who deliberately infected himself with bacteria to prove his theory in 1985.

It took another 20 years of successful treatment to convince the medical and scientific world that there was sufficient evidence and for the pair to be awarded Nobel Prize for Physiology or Medicine.

I would also like to take this opportunity to welcome our new Deputy Vice-Chancellor of Education and Student Experience Professor Guy Littlefair. Guy joined us earlier this year from Auckland University of Technology and brings a passion for student experience as well as a commitment to academic excellence.

He also brings a strong track record in global engagement and has already made several visits to India, helping strengthen higher education ties between our nations as we move forward with plans to establish branch campuses in Mumbai and Chennai. You can read more about Guy and our Indian campuses.

Professor Amit Chakma
Vice-Chancellor
The University of Western Australia

Coral bleached by marine heatwaves

Climate change **driving marine heatwaves and impacting biodiversity**

The long-term impacts of marine heatwaves on biodiversity and management strategies required to mitigate further damage were the focus of a review by researchers at UWA.

Professor Thomas Wernberg, Dr Karen Filbee-Dexter and Dr Shinae Montie, from UWA Oceans Institute and School of Biological Sciences, led the review published in *Nature Reviews Biodiversity*.

"The past two years – 2023 and 2024 – have been the most extreme years on record for marine heatwaves," Professor Wernberg said.

"Globally, marine heatwaves are a natural phenomenon, but they have become stronger, longer and more frequent since 1980 and are being driven by climate change."

The review found species and populations with narrow distributions, limited mobility and proximity to their warm distribution limits were most vulnerable to temperature stress.

Marine heatwaves also had a direct impact on species' productivity and distribution, and indirect impacts through altered species' interactions.

"We found a shift in species' abundance and distribution, decimation of seagrasses, corals and kelps and megafauna mortality," Dr Montie said.

"Impacts on species that play an important part in the ecosystem resulted in cascading changes to the biodiversity, through loss of food sources and habitats."

Rising temperatures resulted in a loss of fisheries, nutrient cycling, carbon storage, ecotourism and cultural values.

"Marine heatwaves have profoundly impacted how humans interact with the oceans," Dr Filbee-Dexter said.

"Marine ecosystem services – the benefits people derive from the oceans – really takes a hit every time the temperatures soar."

The review concluded increasing marine heatwaves were inevitable for the coming decades and reducing greenhouse gas emissions was the only long-term solution to reduce the impact.

"Marine heatwaves have been at the core of environmental, biological, ecological and socioeconomic change in marine ecosystems in virtually all oceans and seas and these impacts have increased exponentially," Professor Wernberg said.

"We need to create flexible fisheries management and swift conservation practices to protect vulnerable species. Future research should take into account the effects of rising temperature and the compounding stressors." ■

Funding boost to **expand South West peatland research collaboration**

Scientists studying Western Australia's endangered South West peatland ecosystems have received a $3.38 million boost from Lotterywest that will support a major collaboration to better understand and manage the peatlands.

The ancient and organic-rich wetlands, derived from Western Australian plants such as Empodisma, Reedia and Warren River cedar, are highly sensitive to disturbance, climate change and altered land use. They store significant carbon, regulate water flow, and support unique biodiversity – yet remain under-recognised and under-studied.

The PEAT Southwest project builds upon an existing project known as PEAT – Protecting Peatland Ecosystems and Addressing Threats in Southwestern Australia – through expanding work to include peatland systems across the State's South West and Great Southern regions.

Co-led by UWA and Edith Cowan University, and guided by Noongar Elders, the broader project will be delivered in partnership with South Coast NRM, South West NRM, the Walpole Nornalup National Parks Association, the Department of Biodiversity, Conservation and Attractions, the Western Australian Museum and Biologic Environmental.

Project leader UWA Professor Nicki Mitchell said peatlands were precious natural capital for Western Australia, as well as catalogues of past environments.

"Lotterywest's support means we can literally and figuratively put our peatlands on the global map. It will also enable us to comprehensively study some of our oldest and most distinctive species, such as sunset frogs, pitcher plants and a range of invertebrates, which have evolved in and around peatlands."

Co-leader Dr Dave Blake from ECU said peatland ecosystems were under increasing threat from climate change, particularly in temperate regions such as south-western Australia, where changing hydrological and fire regimes threaten their existence.

"The Lotterywest funding has enabled us to assemble a formidable collaboration, including Traditional Owners, academia, State Government and community groups, to undertake a transdisciplinary approach to the conservation of these complex systems and the species they support."

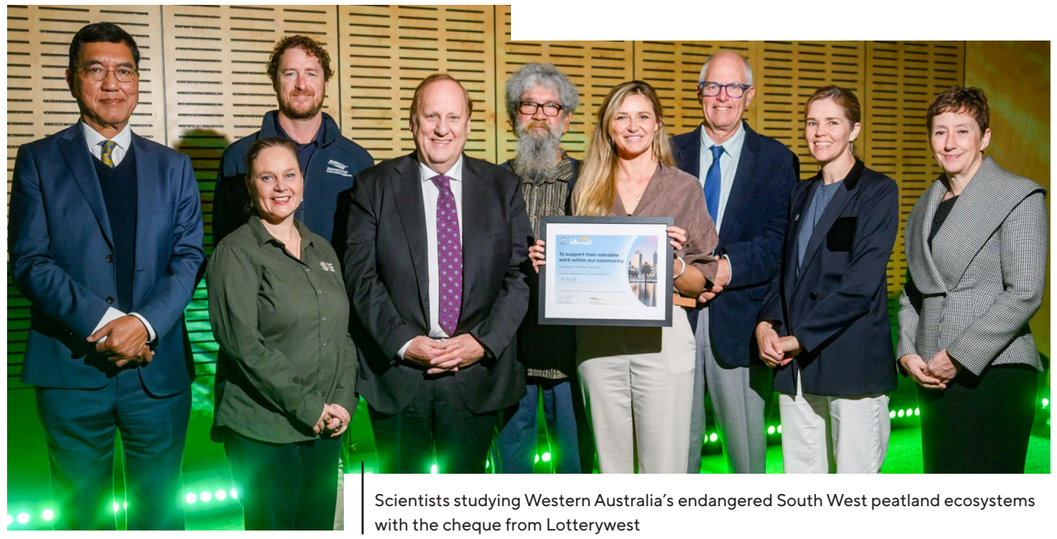
Dr Manda Page, CEO South West NRM, said her organisation was seeking to drive positive environmental outcomes beyond the local to a landscape scale, across all four million hectares of the region.

"The depth and breadth of this formal collaboration creates a unique opportunity for the rapid transfer of scientific knowledge to on-ground action at a large scale," Dr Page said.

Tom Nagle, Program Lead – Priority Landscapes, South Coast NRM, said the funding would enable his organisation to support conservation efforts from the Ramsar Wetlands of the Esperance area in the east to the Walpole wilderness area in the west.

"We welcome the opportunity to work alongside such a diverse consortium of First Nations, research and practitioner partners," Mr Nagle said.

The Lotterywest funding complements existing financial support from The Ian Potter Foundation, the two universities and other contributors. Empodisma peatlands across southwestern Australia were nationally listed as a Threatened Ecological Community in 2023 due to their loss and degradation associated with our drying climate, damaging fire regimes and feral pigs. ■



Scientists studying Western Australia's endangered South West peatland ecosystems with the cheque from Lotterywest

Professor Marco Fiorentini

New research that will lead GLOBAL ENERGY TRANSITION

By Thomas Smith

The University of Western Australia is leading pioneering research that will unlock the critical minerals needed to shape a global energy transition.

Our world is changing. The transition from fossil fuels to more sustainable, cleaner energy is under way.

This energy transition relies on new technology. The critical minerals that are essential for developing this new technology will require governments and industries to undergo their own transition.

Traditional exploration, extraction and processing methods no longer meet Australia's environmental, social and governance (ESG) standards.

The critical minerals sector is facing the challenge of not only increasing production to meet rising, global demand, but they must also develop new strategies to meet the latest sustainability targets.

A smarter, more agile approach is required.

The supply chain - exploration, extraction and processing - must evolve to meet this demand and deliver the critical minerals the world needs.

UWA's energy transition solution

Researchers at UWA have stepped up to meet this global energy transition challenge, with the launch of an innovative new research centre, the ARC Industrial Transformation Training Centre in Critical Resources for the Future (ITTC).

This Centre brings together some of Australia's leading universities, resource industry stakeholders and government institutions to drive research into critical minerals and sustainable mining.

The Centre's founder and Director is Professor Marco Fiorentini, from UWA's School of Earth and Oceans.

Professor Fiorentini said the new Centre was the first of its kind in Australia, uniting research leaders from UWA, Australian National University, The University of Queensland and The University of Adelaide.

"Critical minerals are so important because a lot of them are used to manufacture the technology needed to move away from fossil resources," Professor Fiorentini said.

"If we want to manufacture batteries, if we want to electrify the world, if we want to really develop a society that is non-carbon based, we need a lot of these metals.

"However, Australia's exploration and extraction strategies currently rely heavily on empirical knowledge of known mineral systems, limiting our ability to meet the rapidly increasing global demand for critical minerals."

FEATURE

'The critical minerals sector is facing the challenge of not only increasing production to meet rising, global demand, but they must also develop new strategies to meet the latest sustainability targets.'

Role of the new transformational Centre

Hosted by UWA, the Centre aims to bring together the skills and disruptive thinking required to advance the critical minerals sector. It's also focused on training the next generation of geoscientists to address the global challenges of climate change and energy security.

"The Centre will develop the science that is needed to find the ore deposits of the future that are key to the energy transition," Professor Fiorentini said.

"It will operate between and across different disciplines, so that we have geoscientists working with metallurgists, working with engineers, working with environmentalists.

Professor Fiorentini's vision for the new Centre includes the creation of a more agile approach to identifying new ore bodies, and developing the science to optimise extraction and processing.

"Through science, we can really become surgical in finding new deposits," Professor Fiorentini said.

"It's not only about finding more ore, it's about finding diverse sources of ore. That's why we're thinking about ways of repurposing existing mine waste, and looking at ways to explore for new types of ore deposits."

Professor Fiorentini said it was vital for exploration and mining operations to minimise the environmental impact associated with exploration, through more precise, predictive targeting, as well as efficient ore processing and metallurgical practices.

"Commodities such as lithium, cobalt, rare earths and platinum group elements require the sustainable development of new ore deposits," Professor Fiorentini said.

"Current exploration methods may not suffice, so future mines will need to leverage automation, digitalisation and decarbonised processes to meet ESG standards."

The critical minerals sector's traditional methods limit the discovery of new ore bodies.

‘We want to create the knowledge that is required and we want to translate that science into training models so that our future students, our future geoscientists, will be well equipped to address the challenges before us.’

“At the moment, we don’t have all the skills to find the resources we need,” Professor Fiorentini said.

“We want to create the knowledge that is required and we want to translate that science into training models so that our future students, our future geoscientists, will be well equipped to address the challenges before us.”

Key to the Centre’s success is collaboration.

“The link between industry, government and academia is already very good in Australia but we can make it better,” Professor Fiorentini said.

“Industry will play a key role, providing mentorships, internships, defining the challenges that have to be addressed, providing resources, providing opportunities to be trained at these different nodes at different universities.

“If we can start training students using that technology, and developing that technology to generate new, cutting-edge science, that will be transformational.

“Most importantly, the ITTC will focus on training future geoscientists - from discovering new, critical metal resources, all the way to characterising and processing them.

“I want the Centre to inspire young geoscientists. I want them to understand how important their work is, and that geoscientists can play an important role in global energy transition for future generations.”

The energy transition opportunity

Climate change and population growth are key factors behind the global energy transition.

The challenges facing the world are many. However, these challenges also offer scientists and researchers the opportunity to help the world adapt and evolve.

“Australia is a dream come true for geoscientists,” Professor Fiorentini said.

“From a geoscience perspective, Australia is the one place on earth that has its entire geological record preserved.

“If you were to imagine a giant library, Australia would have every single book that was ever written.

“That complete geological record that we have in Australia translates to an incredible endowment in metal resources, like potentially nowhere else on the planet.

“We have here in our hands, one of the greatest opportunities. Australia can play a really pivotal role globally, resourcing the planet.”

UWA’s energy revolution continues to build momentum

Less than a year after it was launched, what’s next for the Centre?

“The Centre continues to take great strides in establishing our reputation in Australia and on the international stage,” Professor Fiorentini said.

“Since the launch, our focus has been on laying solid foundations upon which to build the short, medium and long term future of the Centre.

“This includes driving recruitment and communication efforts, working closely with our partners to refine and align research projects, and ensuring our activities are responsive to real-world needs.

“We are also focused on expanding our networks and partnerships, building strong pathways between policy, industry, and research to support knowledge exchange, innovation, and the infrastructure needed to deliver our vision of a new energy revolution.”

Artificial intelligence is among the many tools available to manage data and achieve the Centre’s energy innovation targets.

“The Centre is exploring the use of big data and machine learning to assess regional mineral potential,” Professor Fiorentini said.

“This collaboration could revolutionise how we approach exploration, improving accuracy and efficiency.”

Construction of a new Centre in Critical Resources for the Future (CCRF) High-Pressure Lab facility is under way to target knowledge gaps.

“This initiative aims to deliver real-time, onsite mineralogy and elemental trend data, helping inform drilling decisions and optimise critical infrastructure deployment in remote areas,” Professor Fiorentini said.

“The ability to analyse data onsite will significantly enhance operational efficiency.”

Momentum continues to build towards establishing a global centre of excellence that will lead the energy revolution into the next century.

“This is only the beginning,” Professor Fiorentini said. “So much is happening here in Australia and overseas, and I look forward to sharing regular updates with our expanding network in the months and years ahead.

“We’re building a Centre that will become a global platform for energy innovation, benefitting future generations through research, training, knowledge translation and technology.” ■

UWA students examining samples in the lab

Future-proofing *life on land*

Company founded on state-of-the-art technology applications with precision seed delivery systems.

By Annelies Gartner

Associate Professor Andrew Guzzomi

Innovative technology is enabling efficient and sustainable agriculture and large-scale land restoration that benefits the environment and economy.

Founded in 2021, The University of Western Australia's Centre for Engineering Innovation: Agriculture & Ecological Restoration offers expertise across engineering, plant biology, agronomy, animal production and ecosystem restoration, and aims to enhance the social and economic value and sustainability of agricultural and environmental resources.

Associate Professor Andrew Guzzomi is UWA's inaugural agricultural engineer, as well as founder and director of CEI:AgER.

"Our interdisciplinary teams work with industry, government, farmers and scientists across Australia and increasingly internationally," Associate Professor Guzzomi says.

"Western Australia's unique agricultural and ecological systems are used as a proving ground to help tackle some of the biggest environmental issues including food security and conservation."

Associate Professor Guzzomi has twice been awarded WA Innovator of the Year in the emerging category — in 2016 for the Seed Flamer, a tool that makes native seeds easier to handle; and in 2019 for the Weed Chipper, a ground-breaking alternative to the use of herbicides for weed control.

The Centre's eco-tech inventions led to Associate Professor Guzzomi, Dr Todd Erickson (eco-restoration theme lead) and Dr Monte Masarei (eco-tech lead) to found a new company, Emergence Ecotech.

Emergence Ecotech was established after UWA partnered with Biologic Seed, a local company focused on implementing native seed use at scale through a variety of direct seeding and biodiverse planting programs.

Restoring ecosystems and biodiversity

The Seed Flamer alters native seeds to make them easier to handle and plant using machinery, leading to faster revegetation processes.

"Plant biologists run into problems when vast areas, such as abandoned mine sites, need to be replanted with native species," Associate Professor Guzzomi says.

"As many native seeds have hairy and fluffy appendages attached to them, this makes them difficult to handle and use through mechanised seeding devices."

The Seed Flamer removes high surface area features without damaging the seeds by exposing them to successive flames for short periods of time.

The seed flaming process reduces storage requirements for the treated seeds and can enable coatings to be applied, further enhancing and protecting the seeds.

The smoother seeds, whether coated or not, flow through seeding machines making it easier to assist large-scale sowing and increases plant recruitment at scale.

Dr Erickson says the Seed Flamer has the potential to treat more than 19 key WA restoration species and provides a significant boost for large-scale projects required to restore land post-mining.

"Globally 20 to 40 per cent of land, or between 2.6 and 5.2 billion hectares, is degraded and in Australia at least 52 million hectares is degraded," Dr Erickson explains.

"Existing methods of large-scale land restoration are insufficient – native land restoration has less than five per cent success rate of plant establishment and use of non-native plants fails to restore critical biodiversity.

> ‘We discovered a real need for design improvements to existing mechanised seeding equipment.’

“We have already improved the seed planting success rate from five to 40 per cent.”

During his PhD, Dr Masarei surveyed 183 entities around the world involved in large-scale land restoration.

“There is a global market for knowledge-informed approaches that have long-term environmental impact,” Dr Masarei says.

“We discovered a real need for design improvements to existing mechanised seeding equipment.”

The findings led the team to develop a more efficient device, the Mega Sweeper, to improve large-scale restoration success through the precision delivery of diverse seed types in challenging sloped and rocky landscapes.

The CEI:AgER team offered a Flash Flaming Seed Service to industry and early adopters, included long-term research partners BHP and Rio Tinto, and in the first season (2022-2023) processed 1600kg of seeds.

The Seed Flamer and the team’s precision planting machines have garnered interest with industry and end-users locally and overseas.

Through these developments, state and federal regulators can have more confidence in approving the build of mine sites, knowing once the mining process is finished, these areas can be easily and successfully replanted with native species.

“We are combining our state-of-the-art seed enhancement technology applications with our precision delivery systems,” Associate Professor Guzzomi says.

“Emergence Ecotech offers a complete service to optimise native seeding for large-scale ecological restoration and post-mining land rehabilitation from planning, precision treating and seeding.

“The service is practical, cost-effective and time-efficient and will generate significant societal, technological and economic benefits, and have a profound and positive impact on the future of Australia and Australian lives.”

Inside the Seed Flamer, two blow-torches are directed towards the swirling seeds

Weeding out a pest for farmers

In agricultural farming regions, herbicide-resistant weeds are a major challenge for food production – the weeds remove nutrients and moisture, which results in reduced yields.

Before the Weed Chipper was invented, farmers used blanket and site-specific herbicide treatments and tilled the entire field for weed control.

“While herbicides can be effective in controlling weeds and unwanted vegetation, it can have negative impacts on the environment and human health,” Associate Professor Guzzomi explains.

“Tillage is effective but causes soil disturbance and disrupts soil structure. We wanted to develop an alternative system that was practical, site-specific and non-chemical to enable more sustainable cropping.”

The Weed Chipper uses sensor precision to activate targeted tillage via an active tyne. The tyne, a tool used for aerating soil and preparing seedbeds, is triggered when it senses a weed and then chips it out.

This approach results in low soil disturbance in paddocks and testing has confirmed very high (90 per cent) weed control efficacies and low levels (1.8 per cent) of soil disturbance.

“An important part of our process has been taking machines into the paddock for farmers and industry partners to test,” Associate Professor Guzzomi says.

In 2021, the team was funded by Department of Agriculture, Fisheries and Forestry to research a targeted tillage device for the inter-row region (between rows of crops) during the growing season.

“We developed an electrically powered tool that reduces carbon emissions and further minimises soil disturbance,” Associate Professor Guzzomi says.

“The active tool’s electric control system also permits different control strategies.”

With one strategy, the technology permits fast tractor (platform) speed more than 15km/h with an innovative slow and low-power draw tool motion that permits efficient weed removal at scale. Additionally, the alternative strategy facilitates chip-in-chip-out Weed Chipper motion, which is advantageous for slow-moving autonomous platforms.

As a result of growing commercial interest in the Weed Chipper and mechanical weeding approaches, the team has partnered with sustainable crop solutions company Demagtech.

The company aims to commercialise both targeted tillage technologies to offer solutions for the fallow and in-crop situations across diverse cropping systems.

“Our emerging technologies have significant environmental and economic benefits for farmers, agriculturalists and government bodies,” Associate Professor Guzzomi says.

“A healthier soil and increased yields with reduced herbicide use flows to consumers with produce that has less exposure to herbicides.” ■

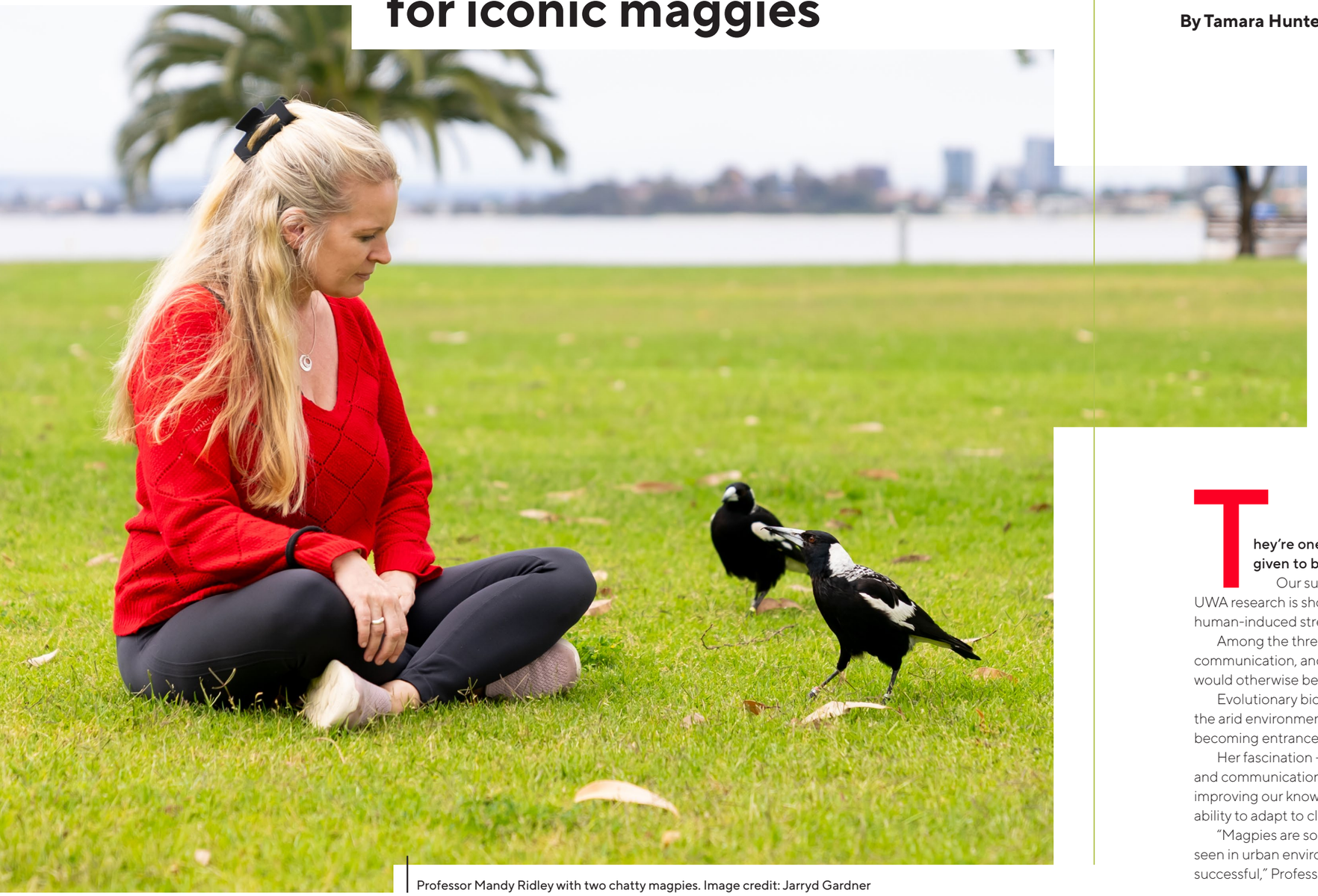
Associate Professor Andrew Guzzomi, Dr Monte Masarei and Dr Todd Erickson

CLIMATE IMPACT

black and white for iconic maggies

As the impacts of climate change become ever more apparent, UWA researchers are monitoring how some of our favourite animals are – or aren't – coping with an increasingly hostile environment.

By Tamara Hunter



Professor Mandy Ridley with two chatty magpies. Image credit: Jarryd Gardner

A magpie suffering from heat stress. Image credit: Kito Ridley

They're one of Australia's most iconic birds – playful, intelligent and given to bursts of complex, joyful song.

Our suburban streets wouldn't be the same without magpies, but UWA research is showing these cheeky favourites are struggling to cope with human-induced stressors that could jeopardise their future survival.

Among the threats are noisy urban environments which interfere with magpie communication, and heatwaves that kill offspring and sap the energy of birds that would otherwise be foraging, being social, or looking after their babies.

Evolutionary biologist Professor Mandy Ridley spent years studying birds in the arid environment of the Kalahari Desert before moving to UWA in 2012 and becoming entranced by the resident magpies.

Her fascination – combined with decades of experience studying cooperation and communication in bird societies – has led to a program of research which is improving our knowledge of magpie cognition, behaviour and, more recently, their ability to adapt to climate change and man-made noise.

"Magpies are so familiar and symbolic for Australians, and because they're often seen in urban environments people see them as a species that is common and successful," Professor Ridley says.

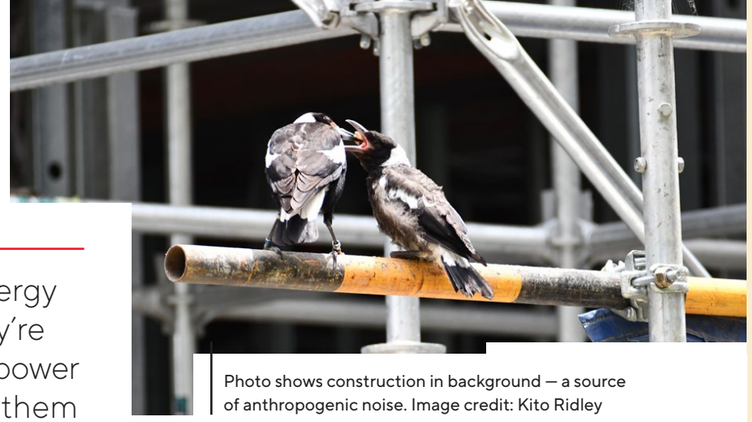


Photo shows construction in background — a source of anthropogenic noise. Image credit: Kito Ridley

‘They’re investing so much energy in thermoregulating that they’re not able to invest much brain power into what’s going on around them anymore.’

“But what we’re seeing in our research is that the urban environment is having a really big effect on them – they’re struggling with both heat and noise.

“As larger-bodied birds, magpies are much more vulnerable to heat than smaller birds, which heat up faster but can also cool down faster.

“When we started seeing a 100 per cent loss of some magpie reproductive attempts during heat, I realised we really needed to measure this carefully.”

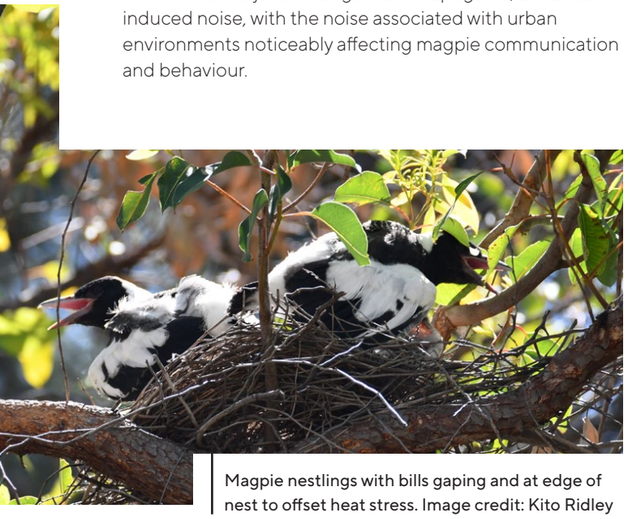
Professor Ridley and recent UWA PhD graduate Dr Grace Blackburn use non-invasive techniques to monitor 15 magpie groups around Perth. They’ve found magpie cognition declines significantly under heat stress, with the birds less able to complete associated learning tasks in heat compared to normal conditions.

“They fall off a cliff in terms of cognition, and they’re also less responsive to predators,” Professor Ridley says.

“They’re investing so much energy in thermoregulating that they’re not able to invest much brain power into what’s going on around them anymore.

“The other thing we found is when it gets very hot, the birds face a tough decision over their own survival versus that of their young, and we tend to get some abandoning of babies.”

Another major challenge is anthropogenic, or human-induced noise, with the noise associated with urban environments noticeably affecting magpie communication and behaviour.



Magpie nestlings with bills gaping and at edge of nest to offset heat stress. Image credit: Kito Ridley

“Being heard and understood is really important for a species that passes a lot of information this way, especially for mate selection and communicating warnings,” Professor Ridley says.

“But what we found was when there was a lot of noise, birds simply weren’t calling. They were waiting for the noise to stop before communicating – but what that means is that in really noisy areas, they may not be communicating things that urgently need to be communicated.”

That includes predator alarms, with the team finding magpies were less likely to notice warnings from other birds when there was competing noise – creating a survival risk.

“We’re also seeing that when there’s anthropogenic noise around, the magpies forage less and catch less food,” Professor Ridley says.

She says it’s important to recognise that animals such as magpies aren’t just coping with one challenge.

“While most research tends to look at one stressor at a time, we’re looking at multiple stressors because this is the reality the birds face.

“When we look at the combined impact of heat and noise – both of which are increasing in cities – we think we do have a problem with magpies in urban environments, and that we won’t see them as much in the future.”

While that news is bleak, Professor Ridley says understanding these kinds of impacts on magpies’ longevity, reproductive success and responsiveness to predators can help identify conservation priorities and focus attention on ways to help.

She points to simple things urban planners and householders can do – like creating microsite refuges that offer magpies and other animals shade, safe watering points and a haven from noise.

“Good urban planning in our parks can help reduce that urban heat island effect quite a lot and allow our wildlife to persist in these areas,” she says.

“We need to plan in a way that provides a good amount of canopy and under-canopy that birds can use as thermal refuges. They need enough shade, but also elevated watering points that can’t be accessed by cats and dogs.

“Importantly, microsites like these can also buffer birds from big noise events in the city, like planes, buses and construction.” ■

Elusive mouse digs deep

By Tamara Hunter

A tiny native mouse that lives in one of Australia’s harshest environments will have to dig deep to survive predicted temperature rises over the coming decades, according to new research from UWA.

Temperatures are on track to rise 3°C by 2050 in the Pilbara region, where the elusive western pebble mouse makes its home in a complex burrow system topped by a mound made up of hundreds of pebbles that the female pebble mouse shifts itself.

Currently the burrows are believed to run to a maximum depth of about 60cm, but a new study from UWA behavioural ecologist Dr Renee Firman suggests pebble mice may have to dig up to a metre underground to survive in the future.

“The predicted depth required to escape the heat of future summers – 100cm – is striking,” Dr Firman says.

“If those burrows are getting to 60cm now and in another 25 years we’re expecting them to go to a metre, it’s kind of concerning. I’m not sure they would be able to do that — there could be a massive decline in the population.”

Dr Firman started her career studying sex selection in invasive house mice but in recent years switched to studying how native rodents in arid and semi-arid areas are responding to climate change.

“I think we’re all fairly certain now: things are bad, but they’re only going to get worse,” she says.

“That’s obviously going to have massive implications for humans but as a zoologist, my primary concern is how animals can respond to those changes.

“I was particularly drawn to the western pebble mouse, I guess because it’s a WA mouse and I’m a West Aussie myself, plus they build these fascinating burrow systems to form a mound.”

Those systems buffer the pebble mouse from some of Australia’s most extreme climatic conditions, with the Pilbara region regularly recording daytime summer temperatures of more than 43°C.

“The burrow-mounds are a massive resource not just for the individual females who build them, but their offspring, successive generations, and other non-burrowing species that need refuge,” Dr Firman says.

Image credit: Aline Gibson Vega

‘The pebble mouse is a keystone species – really important for the ecosystem – and once you start losing species like that, things can start shutting down fairly quickly.’

Dr Renee Firman

“We’ve found little marsupials like dunnarts using them, other rodent species like sandy inland mice, lots of skinks and invertebrates.

“In a way the pebble mouse is a keystone species – really important for the ecosystem – and once you start losing species like that, things can start shutting down fairly quickly.

“That’s obviously not going to have a huge impact on people living in the city, but if we want a world that’s full of wildlife, we need to care about those ones that are doing amazing things like creating habitats.”

The little-studied western pebble mouse currently has no conservation status but is listed as a species in need of monitoring.

“I’m on a bit of a current mission to get their conservation status reassessed,” Dr Firman says.

“Being restricted to the Pilbara region, they’re very much impacted by mining activity and feral species, and my concern is those things are not only destroying individuals, they’re destroying the mound systems they rely on.” ■

Help for kelp

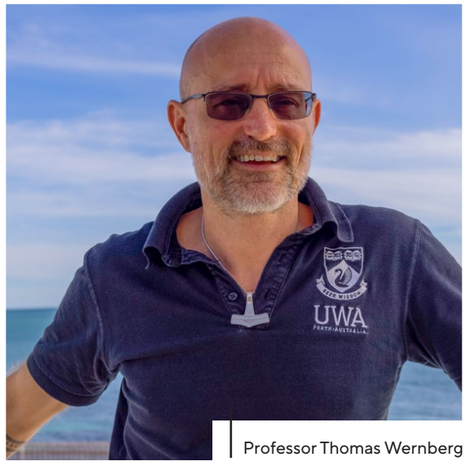
Finding solutions to restore declining kelp forests damaged by climate change.

By Annelies Gartner

Kelp forests dominate temperate and coastal rocky shores worldwide, where they create a habitat for many marine species, store nutrients and capture underwater carbon as efficiently as tropical rainforests capture atmospheric carbon.

Seaweed such as kelp can help us address many problems including several of the United Nations Sustainable Development Goals.

It can help improve food security, be used in manufacturing sustainable products, become a biofuel or used to feed livestock. Kelp has nutritional properties, aids carbon sequestration, supports ecosystems and biodiversity and provides economic benefits for coastal communities.



Professor Thomas Wernberg

> ‘It’s important we find solutions to habitat decline through protection and restoration and increase knowledge of the many benefits our marine ecosystems provide, such as their potential role in climate mitigation.’

ARC Laureate Fellow Professor Thomas Wernberg, from UWA’s Oceans Institute and School of Biological Sciences, and a team of marine biologists are helping secure the future of kelp forests.

“We’re working to understand how coastal habitats where kelp grows respond to stressors such as climate change, marine heatwaves, invasive species and nutrient run-off from the land,” Professor Wernberg says.

“It’s important we find solutions to habitat decline through protection and restoration and increase knowledge of the many benefits our marine ecosystems provide, such as their potential role in climate mitigation.”

Professor Wernberg and colleagues have compiled a database containing thousands of time series points for kelp forests, consulted almost 40 experts globally, and found that 40 to 60 per cent of the world’s kelp forests have been in decline over the past 50 years.

The decline has been caused by many factors including overfishing, direct harvesting, nutrient run-off and, in particular, global warming including increasingly frequent marine heatwaves.

During the past 20 years, the team has repeatedly surveyed 2000km of coastline from Albany and Cape Leeuwin to Ningaloo Reef in Western Australia.

In 2011, WA experienced an extreme marine heatwave, which lasted 10 weeks. The climate event featured ocean temperatures up to six degrees above normal and had devastating impacts across WA’s marine environment.

Based on the team’s extensive data collection and modelling, they estimated that 385 sq km of kelp forest was wiped out by the 2011 marine heatwave.

“We found the event was responsible for altering the ecological structure of the ecosystem,” Professor Wernberg says.

“Among the factors preventing re-establishment of kelp were expanding turf algae and an increase in tropical grazing fish species.”

This year, Professor Wernberg, Dr Karen Filbee-Dexter and Dr Shinae Montie led a review into the long-term impacts of marine heatwaves on biodiversity and management strategies required to mitigate further damage.

“The past two years – 2023 and 2024 – have been the most extreme years on record for marine heatwaves,” Professor Wernberg explains.

“Globally, marine heatwaves are a natural phenomenon, but they have become stronger, longer and more frequent since 1980 because of man-made climate change.”

The team found marine heatwaves had a direct impact on species’ productivity and distribution, and indirect impacts through altered species’ interactions.

“We found a shift in species’ abundance and distribution, decimation of seagrasses, corals and kelps and megafauna mortality,” Professor Wernberg says.

“Impacts on species that play an important part in the ecosystem resulted in cascading changes to the biodiversity, through loss of food sources and habitats.”

Professor Wernberg and an international team of ecologists, oceanographers and atmospheric scientists have proposed a framework and categorisation scheme for marine heatwaves, based on similar schemes for cyclones and other extreme events.

The framework has helped increase scientific and public awareness of severe marine events and is now being applied globally to the study of marine heatwaves.

"Marine heatwaves have been at the core of environmental, biological, ecological and socioeconomic change in marine ecosystems in virtually all oceans and seas and these impacts have increased exponentially," Professor Wernberg says.

The marine heatwaves have had a significant impact on one of Professor Wernberg's key research focus areas, the Great Southern Reef.

Kelp forests dominate the interconnected ecosystem of temperate rocky reefs of the area that stretches 8,000km around the southern coastline of Australia, from the mid-west coast of WA, along South Australia and Tasmania, and up along the east coast to the northern border of New South Wales.

The biodiversity hotspot is home to thousands of species including seaweed, giant cuttlefish, sea urchins, leafy sea dragons, reef fish, snails and great white sharks.

Depending on the group, somewhere between 30 to 80 per cent of the species in the reef system are found nowhere else on the planet and the kelp species that dominates this ecosystem is the Golden Kelp Ecklonia radiata.

"Although around 70 per cent of Australians live within 50km of a temperate coastline, few are aware of their spectacular blue front yard and its importance," he says.

"This motivated us to not only understand the ecology of the kelp forests, but also to work to boost local and global awareness of the this truly unique temperate marine ecosystem."

In 2019, The Great Southern Reef was acknowledged by Mission Blue's founder, ocean pioneer, marine biologist and ocean activist Dr Sylvia Earle, as a Hope Spot. Hope Spots are recognised as places that are critical to the health of the oceans.

In 2024, Professor Wernberg was awarded more than $3.6 million for his project The Great Southern Reef: Surviving and Thriving in the Anthropocene.

"The project will integrate long-term ecological field data with seascape genomics and novel breeding and stress experiments to better understand the functions, challenges, opportunities and trajectories for Australia's Great Southern Reef and its kelp forests," Professor Wernberg explains.

In Australia, decisions affecting the Great Southern Reef are divided across five states and the Federal Government.

As human impact and climate events continue to take a toll on the world's kelp forests the biggest priorities are protection and restoration, but it comes with difficulties.

"Traditional methods for restoring kelp under water rely on scuba divers manually planting the reef with kelp one by one, which can be inefficient, expensive and potentially dangerous," Professor Wernberg says.

In 2020, with funding from the Australian Research Council, and in collaboration with scientists at the Institute of Marine Research in Norway, the team developed green gravel – small rocks seeded with kelp.

"Green gravel can be an efficient solution for the safer, and potentially large-scale restoration and replenishment of damaged kelp forests," he explains.

The restoration starts in the lab where during its early stages of life the kelp secretes a sticky substance, which it uses to attach itself to the small rock.

Once established, the kelp and their rock anchors can be scattered from a boat on to the reef where some species can reach full canopy height in about a year.

The green gravel work has gained international recognition, and the team now leads the Green Gravel Action Group, whose mission is to develop, test and apply green gravel and other seeding-based methods to restore carbon-capturing forests.

Professor Thomas Wernberg examining green gravel

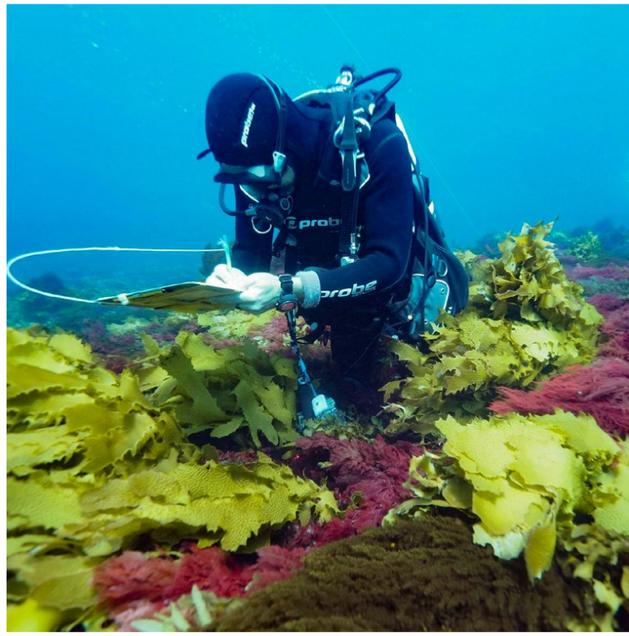
Countries trialling and testing these green gravel techniques include Norway, Portugal, Sweden, UK, US, Canada, Peru and Chile.

"Initial trials have shown promising results, and we are now working to develop the technology for cost-effective, large-scale production," Professor Wernberg says.

Interest in the team's work is growing from fish and seaweed farmers who see the potential of green gravel as an alternative revenue stream.

They have also collaborated with the Schmidt Marine Technology Partners who have funded the team to develop a concept to upscale green gravel seeding and make it available to community groups and local municipalities.

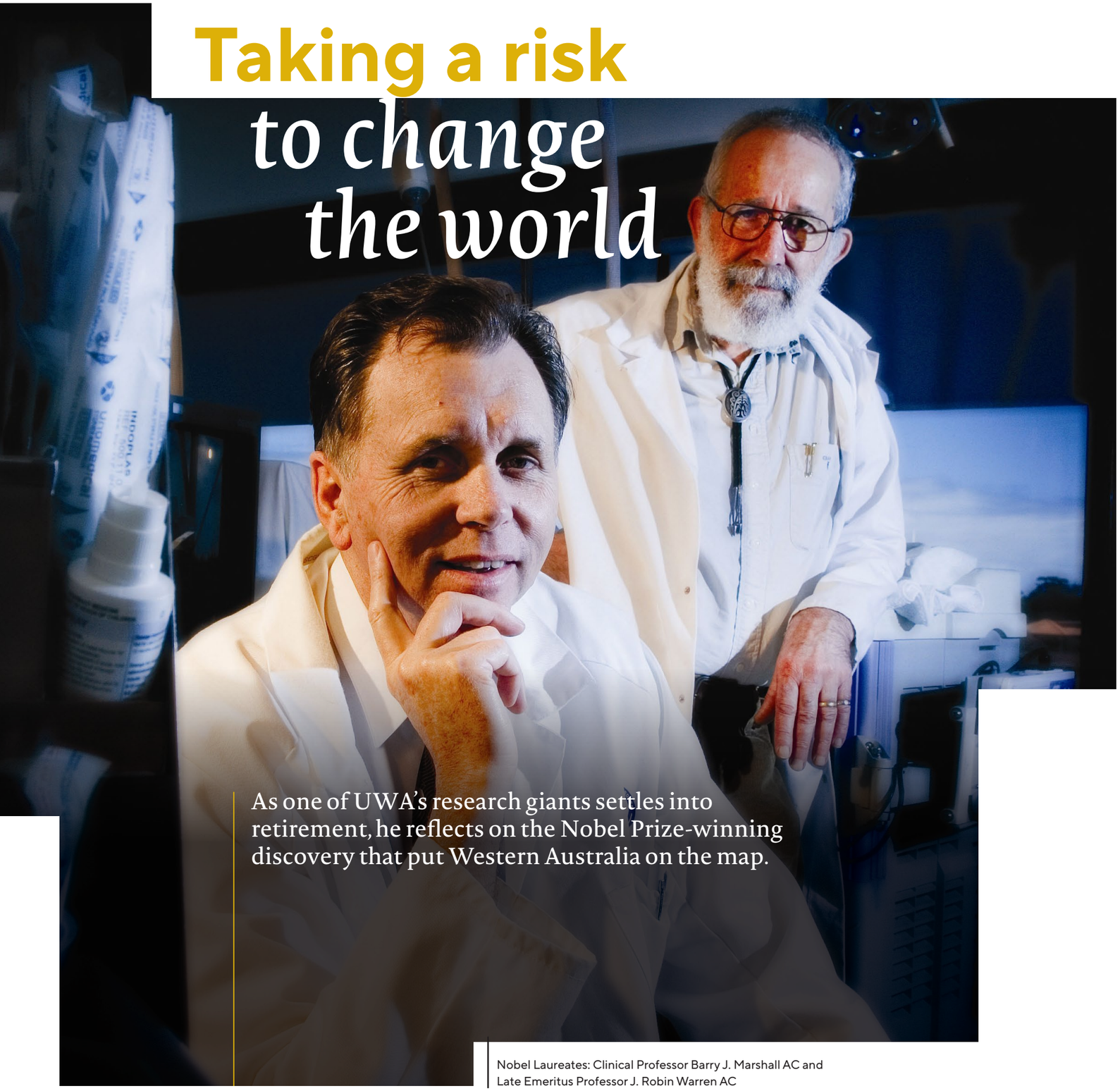
"We want to promote the value proposition for kelp: not only ecological, but also socio-economic services that kelp forests provide," Professor Wernberg says. ■



Professor Thomas Wernberg with past and current students

THOUGHT LEADERSHIP

Taking a risk to change the world



As one of UWA's research giants settles into retirement, he reflects on the Nobel Prize-winning discovery that put Western Australia on the map.

Nobel Laureates: Clinical Professor Barry J. Marshall AC and Late Emeritus Professor J. Robin Warren AC

By Tamara Hunter

Professor Barry J. Marshall AC is feeling contrite. He and his wife of 53 years, Adrienne, are reminiscing about that time in 1985 when he swallowed a broth of dangerous bacteria to prove a scientific point.

Adrienne had recently had a car accident and wasn't paying full attention when Professor Marshall, then working as a gastroenterologist at Fremantle Hospital, blamed his raspy throat on a recent endoscopy.

"I said: 'Why did you have an endoscopy?' and he said: 'I wanted to show I didn't have Campylobacter.' I said 'Oh, that seems reasonable.' At the time I was thinking 'That's weird — I should ask him more'."

Within days Professor Marshall's breath had turned foul and he was becoming increasingly ill. It was only when he returned from a second endoscopy — excited after discovering he was now infected with *Campylobacter pyloridis* (later renamed *H. pylori*) — that she realised he had deliberately infected himself.

He and pathologist Robin Warren, whom he had met while working at Royal Perth Hospital in 1981, had been trying for four years to prove Robin's paradigm-shifting theory that stomach ulcers were caused not by stress, as was commonly held, but bacteria.

Although supportive of the theory, Adrienne was cranky Professor Marshall had risked infecting not only himself, but her and their four children.

"Could have happened," Professor Marshall admits. "Sorry."

In part two of the experiment, Professor Marshall successfully treated himself with antibiotics – eliminating the bacteria and further proving Robin's theory.

Four decades on, as the Marshalls reflect on all that followed — the scientific battles, the cure, the Nobel and other prizes and, most importantly, the millions of people whose lives have been transformed by having their ulcers successfully treated — both know he would do it again.

"There's a big tradition of doctors doing self-experiments with infectious diseases and horrible devices," Professor Marshall says. "Not all of them survived, unfortunately.

"Nowadays I could probably get it approved if I sat down and put a proper protocol together, but back then I felt time was running out for me."

Even after Professor Marshall and Robin's findings were published in *The Lancet* and the *Medical Journal of Australia,* it would take another decade of research for the medical world to be convinced.

"The wrong science that caused all this was 'bacteria cannot survive in acid'," Professor Marshall says.

"When Robin and I started work, we were saying 'bacteria *can* survive in our stomach because we can ***see*** bacteria'."

As specialists continued to demur, Professor Marshall successfully treated individual patients and got the word out via receptive GPs and the media. In a US magazine article, he told readers if they sent $2 his office would send information they could take to their doctor. Within days, 12,500 letters and $25,000 had poured in.

The overwhelming response spoke to patients' desperation for a cure at a time when chronic ulcers could lead to massive bleeds, peritonitis, radical stomach surgery and even death. It was their stories that spurred Professor Marshall on.

"Their lives had been ruined by the presence of an ulcer or something that felt like an ulcer – but they didn't actually have it, they just had the helicobacter," he says.

By 2005 the science behind Barry and Robin's *H. pylori* work was so rock solid and the impact so significant, it jointly earned them the Nobel Prize for Physiology or Medicine.

The prize put the pair on the world stage, setting off a 20-year whirlwind of media engagements, lectures, research, advisory roles and relentless international travel.

Robin – the quiet perfectionist whose eagle eye and professional curiosity had first nudged the journey into motion in 1979 – died in July 2024 aged 87.

Professor Marshall, now 73, stepped down this year from his role as co-Director of the Marshall Centre for Infectious Diseases at UWA, established in 2007 to celebrate the Nobel Prize.

The Centre has several sister versions in China, a relationship that has seen China invest large research sums and send many postdoctoral students to UWA to study in Professor Marshall's lab. Almost all have returned home to develop distinguished careers of their own.

Although he still works on pet projects and continues to travel to significant international meetings, Professor Marshall has embraced the slower pace of retirement.

Part of him wishes he'd achieved a better work-life balance earlier, so Adrienne's own career in psychology could have flourished. But both know Professor Marshall's hyper-focused, curiosity-led nature meant that once fixed on a thing, he was never going to leave it half-done.

"Robin and I pretty much laid the roadmap for curing ulcers early on," he says. "At that point I didn't need to be the one doing it, so I could have stayed in Australia and taken a less accelerated career. But let's face it – that wouldn't have been as exciting." ■

Professor Marshall is a keen musician. Image credit: Jarryd Gardner

(L-R): Pro Vice-Chancellor of Industry and Commercial, Samantha Tough, Barry J. Marshall AC, Chancellor Diane Smith-Gander AO and Deputy Vice-Chancellor (Research), Professor Anna Nowak. Image credit: Jarryd Gardner

Focused on Experience

By Liz McGrath

UWA's new Deputy Vice-Chancellor (Education and Student Experience), Professor Guy Littlefair, brings not only passion for the student experience but also a connection to Western Australia that dates back decades.

The English-born and educated mechanical engineer says his longstanding ties with the University began during his doctoral studies when he was invited to UWA as a conference speaker.

"UWA was the very first university that I ever visited outside of the UK and I took the opportunity to stay on beyond the conference for a couple of weeks and had a wonderful experience," he recalls.

Professor Littlefair's connection to WA runs deeper than academia – his late brother was a respected member of the York community, where he owned two farms and was known for his bell-ringing both in York and Perth. These family ties have brought him back to the State numerous times over the years.

He joins UWA from Auckland University of Technology (AUT), where he served as Pro Vice-Chancellor International and Executive Dean of the Faculty of Design and Creative Technologies.

Professor Littlefair previously held roles as Pro Vice-Chancellor for Industry and Strategic Partnerships and Dean of Engineering at Deakin University in Victoria, where he led a transformation of the academic program.

His dual commitment to academic excellence and real-world application stems from an academic career complemented by hands-on industry experience in the automotive, defence and marine sectors.

"I think it's really important that we offer the student community the opportunity to engage with industry, businesses, not-for-profits, and government organisations as part of their study," he says.

"It's about understanding the organisations that we can get involved with, and what will be beneficial, and then leveraging those relationships for the best interests of our students."

Professor Littlefair also brings a strong track record in global engagement, having established key academic and research partnerships across Latin America, Southeast Asia, China, Europe, the Middle East and South Asia, where he's been connected with the education sectors for more than 30 years.

Looking ahead, he sees both challenges and opportunities for universities.

"I think the social licence that we've been very proud to hold for so long is not as clear as it was," he reflects. "Engaging with our communities to rebuild that is going to be an important piece for all universities."

His vision for the student experience at UWA is centred on deeply understanding students' aspirations and expectations.

"It's an interesting time and I'm very much a believer that education is not a product," he says. "Education is an experience. So offering students a fantastic experience is absolutely front and centre of mind." ■

Illuminating a WORLD OF ARTS

Ali Bodycoat and Embassy Big Band. Image credit: Perth Festival

Karla Bidi. Image credit: Jess Wyld

By Annelies Gartner

A little bit of truth and mischief come together for a big celebration of arts at this year's Perth Festival.

It is the second season for Perth-born and raised Artistic Director Anna Reece who remembers waiting every year in anticipation to see what the Festival would bring.

"My first Festival experiences as a teenager made me feel connected to a bigger world, and that sense of wonder and global curiosity is what I hope to pass on through every program I shape," Reece says.

Audiences can look forward to the return of the large-scale light and sound installation *Karla Bidi,* Fire Trail in Noongar, a gentle celebration of culture and Country signalling the arrival of the 2026 Festival along the Swan River, from Guildford to Fremantle.

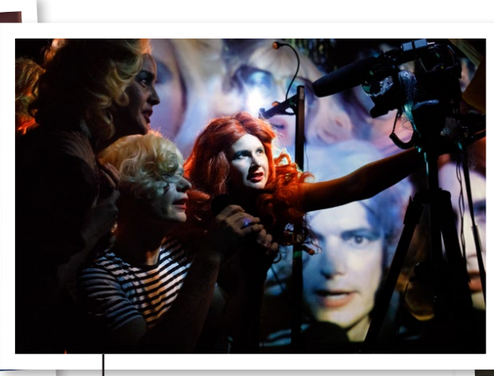
East Perth Power Station will be brought back to life again as a major cultural precinct and community hub, open Thursday to Sunday, with a mainstage program filled with contemporary live music and DJ sets opening with UK electronic and techno music producer Max Cooper.

"January 2026 will mark 10 years since David Bowie passed away," Ms Reece says.

"We are thrilled to collaborate with the Perth Symphony Orchestra to deliver *Let's Dance* – a huge night in celebration of Bowie's music featuring special guest artists each delivering their ultimate Bowie song."

Baker Boy will also feature as part of a Tri Nations line up of exceptional artists before closing act Sudan Archives (US) takes the stage.

STRUT Perth Moves Dance Battles. Image credit: Perth Festival



Lé Nør [the rain]. Pictured Adriane Daff, Chris Isaacs, Arielle Gray, Jo Morris. Image credit: Daniel Grant

The Embassy. Image credit: Marnie Richardson

Casa Musica, a free program of music hailing from across the Indian Ocean Rim and around the world, invites festival goers to enjoy food and drink while soaking up the sounds on balmy summer evenings.

As part of Boorloo Contemporary, Lance Chadd, a Bibbulmun Nyoongar/ Budimia Yamatji Aboriginal artist, has been commissioned to create the artwork that will light up and animate the exterior of the old station each night.

"The power of a Festival lies in its ability to gather us all together, which is why accessibility must always sit at the centre of what we do," Reece explains.

"Art is for everyone, and we certainly are committed to Perth Festival ensuring that everyone feels welcome"

The glory days of the Embassy Ballroom of the 70s and 80s will be revived when Ali Bodycoat and The Embassy Big Band perform within the transformed Perth Town Hall. The glamourous CBD festival hub program a will offer a local, national and international line up of jazz, cabaret and intimate music.

New to 2026, the Sanctum Series will offer audiences a line-up of choral and instrumental performances within St Mary's Cathedral, including Grammy award-winning US vocal ensemble Roomful of Teeth and acclaimed Irish musician Martin Hayes.

Theatregoers will be tantalised by *Lacrima,* meaning tear in Latin, at Heath Ledger Theatre – the Festival's major international production for 2026.

"This is truly gripping, entrancing theatre – it's a fictional piece that draws on the realities of what it takes to create an object of such global significance and the stories behind all those who play a part," Reece says. "A story of fabric, a story about society. It is unmissable."

POV will see Bub, a 14-year-old girl who's obsessed with documentary filmmaking, trying to unpack the aftermath of a family breakdown. Each night two new guest actors play her mum and dad, live on stage.

"It's a playful, provocative theatre production," Reece says. "It is about power dynamics, the opportunities for truth and honesty between children and their parents and the stigma around mental health."

Also taking to the stage are *Le Nor (The Rain)* produced by Perth's own The Last Great Hunt and *Haribo Kimchi* – where Korean artist Jaha Koo weaves food, pop culture and personal history into a bittersweet reflection on identity and belonging.

Songs of the Bulbul, a dance work by Aakash Odedra at His Majesty's Theatre, and *U>N>I>T>E>D,* a collaboration with Chunky Move and Indonesian artists at the Heath Ledger Theatre, will satiate dance enthusiasts.

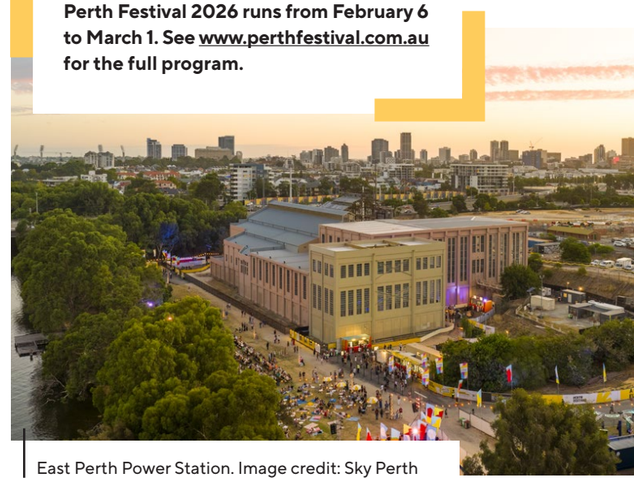
Perth Moves, a free program of dance workshops and performances by STRUT, is back at Forrest Place, as is *Astral Weeks Sessions* - a series of secret gigs for music lovers hosted in Northbridge's beloved intimate bar.

A striking visual arts program includes *Birrundudu Drawings,* curated from the Berndt Collection at Lawrence Wilson Art Gallery.

Under the stars, surrounded by majestic pines, the Lotterywest Films season at Somerville Auditorium returns on November 24 and runs through to March 29.

Expect to see the best of world cinema direct from the film festival circuits, including *Sentimental Value, It Was Just an Accident and The Mastermind.* ■

Perth Festival 2026 runs from February 6 to March 1. See www.perthfestival.com.au for the full program.



East Perth Power Station. Image credit: Sky Perth

Hackett Professor Kadambot Siddique in a canola field

Agricultural research and innovation leading global response to climate change

By Thomas Smith

Innovative research from The University of Western Australia is leading a global response to some of the most complex challenges of climate change.

Floods, drought and rising temperatures are impacting the lives of people in almost every region. And of great concern is the risk climate change brings to global food and nutritional security.

The United Nations (UN) has placed hunger on its list of Global Issues impacting the world today and in the future.

Climate change makes it more difficult for farmers to produce crops and livestock.

Even a marginal decline in crop yield can trigger a ripple effect throughout the world, leading to food shortages and inflation.

Also, on the UN's list of Global Issues is record population growth. Today, the population of the world is more than eight billion and the UN predicts it will reach a peak of 10.3 billion by mid-2080.

According to current estimates, food production must double by 2050 to match population growth.

The impact of climate change on crop yield, combined with population growth, places food security at the top of a growing list of critical issues that must be addressed.

UWA is leading research to help farmers adapt to changing environmental conditions by pushing the boundaries of traditional agriculture.

Researchers at The UWA Institute of Agriculture (IOA) are working with farmers in some of the world's harshest environments.

Efficient water use, dry land agriculture and adapting crops that can survive in a changing climate are among the many ways UWA is reshaping global agriculture through scientific research.

UWA's role in reshaping global agriculture

The IOA is reimagining traditional farming through the development of a more agile, less labour- intensive and technology-led industry.

Leading the IOA's research is a man who has dedicated his life and career to improving agriculture through science – Hackett Professor Kadambot Siddique, IOA Director.

Professor Siddique is an internationally renowned agricultural scientist who has spent more than four decades immersed in research, training, technology exchange and industry development.

"The world today is facing many complex challenges," Professor Siddique says. "Climate change and record population levels present an increasing threat to global food security.

Temperature, water and soil quality must remain within optimal levels for crops to grow and climate change affects this delicate balance.

Doubling food production to feed a 25 per cent rise in global population brings even greater challenges to the industry.

"Agriculture must evolve and adapt to our natural environment. It is no longer about just planting seeds, driving tractors and kicking soil Professor Siddique says.

"The digital age of agriculture is already here. We rely on GPS technology, drones, sensors, robotics, machines and learning from big data.

"This is where technology meets science. Agriculture is adapting to our changing world through cell biology, nanotechnology, and genomics genetics."

The challenges facing the global agriculture are many. How do crops survive in arid, dry farming systems, or regions affected by floods? How can we sustain and increase crop yield?

"Industry, research and government collaboration is vital in our search for solutions to the challenges facing the world," Professor Siddique says

"We have established significant connections with the agriculture industry within Australia and internationally. This includes many universities around the world engaged in agriculture research, teaching and industry development.

"The IOA is pursuing a number of research themes including crop roots and rhizosphere, genetics and breeding, sustainable grazing systems, water for food production, food quality and human health.

"Our research is focused on unlocking agriculture engineering solutions for food production, agribusiness and ecosystems."

The search for answers to agriculture's present and future challenges requires the international community working together in sharing data and experience to understand and solve problems.

Since his days as a student, Professor Siddique understood the vital importance of fieldwork and engagement with farmers.

His hands-on, practical approach ensured a thorough understanding of the complex challenges facing the agriculture industry.

"After completing my masters at Indian Agriculture Research Institute, I worked with grain legumes in Aleppo, Syria, at the International Centre for Agricultural Research in the Dry Areas," Professor Siddique says.

'Our research is focused on unlocking agriculture engineering solutions for food production, agribusiness and ecosystem.'

"I often thought the drylands climate of Australia would be similar to that environment, so I wanted to do my PhD on chickpeas at UWA, but I was told to work on something else.

"The chickpea was nothing in Australia then. But I insisted, and it was the first PhD on chickpeas completed in Australia. Today, we have a thriving pulse export industry in this country."

Australia is now the world's largest exporter of chickpeas, producing about one-third of global exports over the past 10 years.

Professor Siddique has contributed immeasurably to that growth, having developed 13 new varieties of pulses, including seven chickpea varieties.

Among these is the very successful "Kimberley Large" Kabuli chickpea, grown in the Ord River Irrigation Area, which consistently yields large-sized peas.

Professor Siddique's work has been instrumental in developing opportunities for yield improvements in wheat and pulses across southern Australia.

His international collaborations include ground-breaking projects with researchers in China, India, Pakistan, the Middle East, Timor-Leste and Africa.

"It's important to me that our research is making a difference to agriculture," Professor Siddique says. "I enjoy working on practical problems and applying a scientific rigour out in the field."

The UWA Institute of Agriculture

Re-established in 2006, the IOA has a clear vision.

"Our vision is to foster innovation and provide research-based solutions to food and nutritional security, environmental sustainability and agribusiness," Professor Siddique says.

"The Institute works with the agricultural and natural resource sectors to create knowledge and improve workforce skills, contribute to local and regional prosperity and exercise responsible stewardship of the environment.

"UWA Agriculture is now rated number one in Australia and 9th in the world in Agriculture (ARWU, 2024 ranking). I am surrounded by very clever, passionate people and I'm immensely proud of what we have achieved together."

Professor Siddique wants to ensure that the next generation of researchers is equipped to meet the imminent threats facing agriculture — climate change and sustainability — and that the industry more broadly rises to the challenge of feeding the world.

"Around 800 million people throughout the world go hungry every day, and that number is rising," Professor Siddique says.

"The average Australian farmer produces enough food to feed 150 people at home and 450 people overseas — that's not a bad effort.

"However, the United Nations predicts that by 2050, agricultural production must increase by at least 50 per cent globally to meet food demand.

"Key to overcoming hunger and malnutrition is greater funding and support for innovative, impactful agricultural research that is conducted in collaboration with industry and working with farmers."

Solving problems through research, transferring knowledge to regions impacted by climate change, and ensuring the IOA continues to grow by inspiring the next generation of students, is key to the professor's vision.

"We may not be able to feed Asia entirely, but we can certainly help them feed themselves by building their capacity with our knowledge and technology," Professor Siddique says.

"I believe that UWA's strategy in combating global challenges through science, technology, innovative research and building capacity can help solve many problems.

"There is a great demand for agricultural graduates all over the world, due to the complex food production system and the challenges the world faces in relation to food security.

"We must work together to find solutions, share this knowledge and ensure future generations have the food they need to survive and flourish." ■

A delegation of consular staff with UWA's Deputy Vice-Chancellor (Education and Student Experience) and Education Department officials in India

UWA to **establish Branch Campuses in India**

Earlier this year, India's University Grants Commission approved The University of Western Australia's application to establish international branch campuses in India, making UWA the first Group of Eight university from Australia to receive such recognition under India's National Education Policy 2020.

The first UWA campus will open in Mumbai, followed by Chennai, which will offer a wide range of undergraduate and postgraduate programs in STEM and business to meet the aspirations of Indian students and evolving needs of the global workforce and economy.

UWA Vice-Chancellor Professor Amit Chakma said the University was honoured to receive UGC's approval and excited to deepen its partnership with India.

"This milestone reflects our shared commitment to academic excellence, innovation and global collaboration, and solidifies our commitment to being a leading university in the Indo-Pacific region," Professor Chakma said.

As part of its commitment to inclusive education, UWA has partnered with the Avasara Academy, a philanthropic initiative dedicated to empowering young women leaders, to offer full scholarships to girls from low socio-economic backgrounds. The initiative aims to create pathways for talented students who may otherwise lack access to world-class education.

In a move to foster innovation and industry collaboration, UWA has also signed a Memorandum of Understanding with HCLTech, one of India's leading global technology companies. The agreement includes plans to develop short courses and university-innovation hubs across UWA's campuses in India and Western Australia creating a dynamic network for research, entrepreneurship and digital transformation.

UWA Deputy Vice-Chancellor (Education and Student Experience) Professor Guy Littlefair said the University's collaboration with HCLTech would connect academic research to real-world innovation, benefiting students, startups and industry.

The approval follows high-level discussions between UWA leadership and Indian government officials earlier this year. UWA's expansion into India is expected to promote research collaboration, student mobility, innovation connections and industry partnerships, further strengthening the Australia-India bilateral relationship and fostering strengthened intergenerational relationships between both nations.

UWA's Indian campuses will uphold the same academic standards and quality assurance frameworks as its Perth campus while ensuring students receive a globally recognised education close to home. ■

From the **Warden of Convocation**

Ignite the magic of Reid Library: your gift can bring history and knowledge to life.

Libraries are not just buildings — they are environments for the future as gateways to knowledge, keepers of memories, and beacons of learning and culture.

For more than 60 years, our iconic Reid Library has stood at the heart of Crawley campus. Now, through its online *Book of Memories*, you can relive its rich history and your student memories.

From the days of rows of catalogue boxes, a multitude of single desks and huge book stacks to today's vibrant, light-filled spaces, the Reid has been transformed for a new generation.

A magnificent Reading Wall with a mirrored ceiling creating the illusion of a two-storey wall of books, houses the library's Australian literature collection. The carpet graphics reveal the stream far below that once flowed into the Derbal Yerrigan (Swan River) and the Bilya Biddi (River Walk) alongside it.

The Reid Library safeguards priceless historic treasures in its Special Collections: medieval manuscripts, rare maps, original manuscripts from renowned writers and unique theatre memorabilia. These hidden gems are cultural legacies — ready to be preserved and shared with the world, thanks to your support.

This year, we proudly launched the Reid Library Convocation Creator-in-Residence program — a bold new initiative to unlock our library's cultural magic. It is part of a global trend among university libraries, such as Oxford, Harvard, University of Sydney and Melbourne University, that are introducing fellowships for artists, writers and other creators to uncover the magic of their collections.

Your support will help fund exhibitions, digital experiences, lectures, art installations, and musical performances — inviting students and the community to engage with our hidden treasures in innovative new ways.

Those who donate $1000 will have their name or the name of a loved one inscribed on one of only 100 shelves of the library's superb new Reading Wall.

Your donation is more than a gift; it is an investment in the magic of knowledge, history and creativity. Join us in keeping Reid Library vibrant and inspiring for future generations. Together, we can ignite the magic. Donations can be made online at *giving.uwa.edu.au/reid-librarycreator-in-residence* ■

The Reid Library Memory Book can be found at uwa.edu.au/library/stay-updated

Alumni perspectives on Future environments

We're throwing it to alumni experts in climate law, environmental engineering, marine planning and landscape architecture to provide some insight and understanding on this edition's theme.

How are things looking?

"Australia is expected to be one of the developed countries worst affected by climate change. That could mean that we live in a much harsher and more hostile world than we do today. A place where food and water are scarce; extreme weather events more frequent; and infectious diseases more common. But our future environment is not set in stone: every increment of a degree is going to matter."

Zoe Bush LLB, BA '16
Barrister at Banco Chambers, Sydney, and expert in environmental law

"Future environments" make me think of a future where people and nature thrive together, supported by science, good policy and strong ethics. It is about adapting to climate extremes, turning waste into valuable resources, restoring damaged ecosystems and shifting from a "take–make–dispose" mindset to a circular way of living."

Dr Raj Kurup MEngSc '02
Director and CEO, Environmental Engineers International Pty Ltd

What can we do?

Let's be hopeful in facing the challenges to the future of our environment. There has been massive advancement in how we view and resolve environmental issues. Some examples are the ongoing development of nature-based solutions, sustainable agricultural practices and land use, and advocacy and policy changes from local to international scale.

We are more resilient, interconnected and collaborative in our solutions. Look at the big picture and make your next step count."

Shian Liau BE '10, MEngSc '15, MLArch '21
Landscape Designer, City of Wanneroo

"The future depends on how we choose to effectively reduce pollution, conserve biodiversity, sustainably manage resources, and address climate change. I realise it's a lot of homework, but everyone should play their roles in this matter. Universities and research institutions, government, non-profit organisations, the business sector, and communities, everyone should contribute to make change happen."

Dinah Yunitawati MEnvSc '14
PhD candidate and Marine Planner for the Ministry of Marine Affairs and Fisheries, Republic of Indonesia

What should we know?

"We are already seeing progress in renewable energy, water recycling, regenerative farming and low-carbon technologies. Advanced treatment systems are turning wastewater into high-quality water for reuse. Agricultural and mining waste is being transformed into valuable products through resource recovery. Digital tools are helping us manage environmental performance more efficiently. Circular economy models are replacing the old "waste and replace" approach; and we are increasingly drawing on Indigenous knowledge to guide land and water stewardship. These ideas, technologies and collaborations give me confidence that we can create a future that is both sustainable and fair for all."

Dr Raj Kurup

"Transnational cooperation is essential to address global issues and safeguard our future environment. In the context of ocean management, currently, there are various regional and international partnerships that focus on better managing and protecting our oceans. These partnerships enable the sharing of data and information, knowledge and technology, and financial support to collectively secure the ocean's future."

Dinah Yunitawati

"In July, the International Court of Justice held that countries that fail to take appropriate action to protect the climate system from greenhouse gas emissions - including through fossil fuel production, fossil fuel consumption, granting of fossil fuel exploration licences, or the provision of fossil fuel subsidies - may commit a wrongful act at international law and be liable to pay reparations if that act results in damage to the climate system. The Court's opinion is not binding but may play a significant role in shaping future litigation and domestic climate change policy."

Zoe Bush

"I have been reading about sustainable construction materials that can reshape how we plan, design and manage our built and natural environment. Examples include self-healing living bricks and biodegradable plastic alternatives made from seaweed.

The policy space is set to change when green infrastructure is recognised as an asset class by Infrastructure Australia in the near future." ■

Shian Liau

Partnering for a Healthier Ocean

The Rowley Shoals 2021.
Image credit: Michael Cuttler

The Jock Clough Marine Foundation and UWA's collective commitment to preserve our blue backyard.

It's no exaggeration to say that oceans are the lifeblood of our planet. Covering more than 70 per cent of its surface, they sustain countless forms of life, regulate climate, and provide food and energy, all while inspiring wonder and influencing cultures across the globe. Protecting these vast waters, their treasures and shorelines is not just a choice – it's a vital responsibility.

At a time when the health of our oceans is at a critical crossroads, a long-standing partnership between The Jock Clough Marine Foundation (JCMF) and The University of Western Australia's Oceans Institute (OI) plays a leading role in advancing ocean conservation and sustainability worldwide.

With rising concerns over climate change, ocean warming, marine ecosystems degradation and biodiversity loss, the OI's mission has never been more vital. Located on one of the world's most biodiverse coastlines, and on the rim of the world's least-explored ocean, the OI is uniquely positioned to lead marine science across the Indian Ocean region and, for close to a decade, the JCMF has played a transformative role in the institute's ability to advance marine research at UWA.

From supporting early-career researchers and postdoctoral fellows, to the prestigious establishment of the JCMF Oceans Chair, there is a steadfast shared vision to protect, restore, and sustain the delicate balance of our planet's marine ecosystems and ensure a thriving future for generations to come.

A cornerstone of JCMF's investment is the Robson & Robertson Awards, launched in 2017 to support early-career researchers with bursaries for fieldwork, travel, and equipment. In just eight years, more than 85 researchers have benefited, advancing research in critical areas such as seagrass and kelp restoration, coral reef resilience, species conservation, marine megafauna, Indigenous knowledge integration, shoreline protection and environmental DNA (eDNA).

One such success story is Dr Matt Fraser, who used his five-year Robson & Robertson Fellowship to develop innovative approaches to seagrass ecosystem management. Western Australia has some of the largest seagrass meadows in the world, playing a vital role in protecting our coastlines, filtering water, storing and sequestering carbon, and providing habitat to iconic and valuable marine animals.

Now at Minderoo Foundation, Dr Fraser is leading ecology and biodiversity initiatives, including a collaboration with the International Union for Conservation of Nature. Using eDNA — the collection and analysis of the genetic traces that every species leaves behind as they move through an environment — this collaboration will provide timely information to support evaluation of species' extinction risk under the Union's Red List protocol, a strong example of how early support translates into global conservation impact.

In another major milestone for the partnership, Professor Steve Swearer was appointed as the inaugural JCMF Oceans Chair in 2017. A marine ecologist of international standing, Professor Swearer relocated his REEF (Research on the Ecology and Evolution of Fishes) lab from the University of Melbourne to UWA. Spanning habitat restoration, aquaculture, and marine ecosystem responses to environmental change, his research is already shaping sustainable marine management strategies.

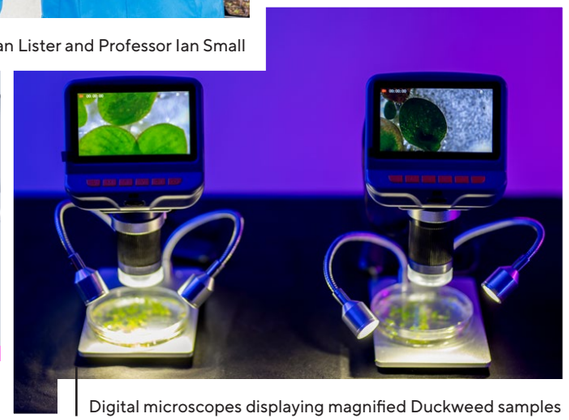
In thanking Jock Clough and JCMF for their vision, passion and generosity, Professor Nicki Mitchell, OI Deputy Director, said even beyond the immeasurable value of the research, the partnership had enabled the appointment of the Ocean's Chair, a key driver of the Oceans Institute's strategic growth.

"Professor Swearer plays a pivotal role in identifying new research opportunities, fostering high impact multidisciplinary collaborations, and strengthening UWA's postgraduate research training," said Professor Christophe Gaudin, OI Director. "His leadership enhances the Institute's engagement with government, industry, and academia, drawing upon the expertise at the Oceans Institute."

The partnership between the Oceans Institute and the Jock Clough Marine Foundation continues to drive innovative, research and action, supporting the resilience of marine ecosystems for future generations to come. ■

Space for growth on Earth

Professor Ryan Lister and Professor Ian Small



Digital microscopes displaying magnified Duckweed samples

Professor Harvey Millar

By Annelies Gartner

Autonomous agriculture created for space exploration has spin-off benefits on Earth where climate change is affecting crop growth and yield while compelling farmers to find innovative ways to adapt.

ARC Centre of Excellence in Plants for Space node at The University of Western Australia is led by three WA Scientist of the Year Award winners, Professor Harvey Millar, Professor Ryan Lister and Professor Ian Small, all from the School of Molecular Sciences.

The project team is researching fast-growing, zero-waste, 'pick and eat' plants designed for long-term survival in space, and engineering plants as biofactories for useful medicines and materials in remote environments.

The findings can benefit growers on Earth where climate events and an increasing population are driving demand for global food and nutritional security, plant-derived products, and the need for a reduced carbon footprint.

Professor Millar, Director of the UWA Centre for Plant Energy, said researchers were working with UWA's International Space Centre to use high CO2 simulated plant growth chambers, hydroponic growth systems and camera systems to monitor how algorithms used to predict plant growth would perform under conditions expected in space stations.

"Growing plants as food in space stations or a future lunar base requires robust processes to ensure crops are available on-time and in the expected quantity to meet demand," Professor Millar said.

"We aim to create new commercial options for automating plant growth at scale in space and on Earth.

"We will develop plant varieties and production systems for pick-and-eat plants like water spinach, tomatoes and strawberries.

"We'll also develop food plants for long-term space nutrition using duckweeds, which are one of the fastest growing plants."

While long-term off-Earth habitation is on the horizon, growers on Earth are already being impacted by floods, drought and rising temperatures and need help to develop sustainable alternatives.

"The centre's mission goes beyond food, we aim to design biobank plants that provide medicines, plant-based building materials, and sustainable solutions both on and off Earth," Professor Small said.

"Many of the challenges needed for long-term life on Moon and Mars are also faced by agriculture on Earth and need to be researched to advance the efficiency of plant-based foods for example, increasing fertiliser use efficiency.

"The impact extends beyond scientific innovation – it is helping shape future careers in the space, agriculture and food industries, as well as in sustainability, and cultivating a workforce ready for tomorrow's challenges."

The team is working to develop 'complete nutrition' plants that could sustain human health in space for an entire year.

"The success of these missions depends on having medicine and nutritious food without the need for resupply missions from Earth," Professor Lister said.

"Requiring light, water, carbon dioxide and minimal nutrients, plants are the ultimate solar-powered bio-factories for supporting human nutrition and health, as well as production of useful medicines and materials.

"Creating methods to breed and modify plants for space exploration could just be the answer to providing long-term solution for human nutritional wellbeing, and a secure and sustainable agriculture sector here on Earth." ■

In the **frame**

Connected: our alumni, staff and students snapped at UWA events this year.
Stay in touch or update your details at:
alumni-update@uwa.edu.au

GRADUATION **HIGHLIGHTS**

Credit Csmith Photography

OPEN DAY 2025

Credit Csmith Photography

Credit Csmith Photography

PEAT SOUTHWEST PROJECT LOTTERYWEST CERTIFICATE PRESENTATION

SINGAPORE ALUMNI RECEPTION

PHARMACY 20TH ANNIVERSARY EVENT

UWA MALAYSIA ALUMNI RECEPTION

2025 **RISING STARS**

Seek Wisdom

A $10,000 Engineering scholarship for those ready to change the world*

Engineering at UWA is about shaping a better future, from tackling climate change to driving sustainable solutions and bold innovations.

If you know someone passionate about making real-world change, UWA is the place to start.

Students who achieve an ATAR of 90 or above and enrol in UWA's Bachelor of Engineering (Honours), or a combined degree that includes it, will automatically receive our new **$10,000 Engineering Excellence Scholarship** in their first year of study.

Search UWA Engineering

UWA
PERTH · AUSTRALIA

*Terms and conditions apply. See our website for eligibility.