Charles Sturt University Research Showcase

Message from the Deputy Vice-Chancellor (Research)

At Charles Sturt University, we believe that strong regions build a stronger nation.

Our research is firmly grounded in the needs and aspirations of regional Australia. We are tackling the most pressing issues facing our communities – food and water security, climate resilience, rural health, digital equity and democratic renewal – through bold, purpose-driven innovation that delivers real outcomes where they are needed most.

The need for regionally adapted science-based solutions has never been more urgent. That's why our strategic focus is on solving the complex challenges that shape life in the regions. In doing so, we not only serve our local communities but also offer models and solutions to national and global problems.

Research remains a cornerstone of Charles Sturt's mission. We are committed to growing our research footprint by leveraging our distinctive strengths, delivering measurable impact and fostering enduring, two-way partnerships. With an increasing emphasis on sustainable revenue and industry alignment, we are strengthening collaborations with governments, businesses and communities.

I'm proud that 2025 has seen a rise in research outputs across our institutes and faculties, stronger engagement with external partners and a growing portfolio of regionally focused, high-impact research.

This showcase offers a window into the remarkable work happening across our campuses. Whether it's pioneering RNA technologies to protect regional agriculture, restoring fragile ecosystems, improving mental health through nature-based solutions or informing democratic practice through a rural lens, our research is driven by place, by people and by purpose.

At the heart of our approach is Yindyamarra – a principle that guides Charles Sturt's research ethos. It brings Western knowledge into respectful dialogue with Indigenous wisdom, anchored in care for Country, deep listening and shared responsibility for future generations.

Yindyamarra teaches us about connection and stewardship. From science, we draw experimentation, evidence and innovation – try, test, learn – as pathways to meaningful change.

I invite you to explore these stories and partner with us in shaping a more sustainable, secure and just future that starts in the regions and reaches the world.

Warm regards,

Professor Neena Mitter
Deputy Vice-Chancellor (Research)

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SUSTAINABLE DEVELOPMENT GOALS

The United Nations Sustainable Development Goals (SDGs) provide a global blueprint for achieving a better and more sustainable future for all. Many of Charles Sturt University's research projects align closely with these goals. In this issue of Research Showcase, we've highlighted the most relevant SDGs for each article, where applicable, to demonstrate how our research contributes to global priorities.

Finding regional solutions to regional problems with global reach and impact

Research is, and will always be, vital to what we do at Charles Sturt. We aim to be the leading regional university known for solving real-world challenges in our targeted strategic investment areas by bringing together Western knowledge and Indigenous wisdom. Through strong and enduring partnerships with industry, government, local communities and international networks, we will meet the research needs of our communities.

Charles Sturt continues to be a global leader in climate action, gender equality and sustainability

Charles Sturt continues to deliver strong outcomes in the Times Higher Education (THE) Impact Rankings, reflecting our commitment to sustainability and all its facets in our university strategy.

THE's Impact Rankings are the only global university rankings that measure progress towards the United Nations 17 Sustainable Development Goals. They evaluate our university programs and initiatives, including research, teaching and learning, partnerships and engagement, and facilities and operations.

Charles Sturt achieved impressive results within individual SDGs, including ranking:

- In the top 1 per cent for SDG 13: Climate Action
- In the top 4 per cent for SDG 5: Gender Equality
- In the top 6 per cent for SDG 10: Reduced Inequalities
- In the top 7 per cent for SDG 6: Clean Water and Sanitation
- In the top 9 per cent for SDG 15: Life on Land.

These results are particularly impressive given increasing competition and participation of global universities in the THE Impact Rankings.

Times Higher Education Impact Ranking 2025

We're excited to announce the launch of a new dedicated LinkedIn page for Charles Sturt Research!

Follow us for the latest research and initiatives finding regional solutions to regional problems with global reach and impact.

Innovating regional agriculture: Circular, digital, prosperous

Research that enables sustainable production

The future of farming: Unlocking the potential of dsRNA biopesticides

As global demand grows for safer, more sustainable alternatives to chemical pesticides, a new article in *Nature Plants* calls for international alignment on regulatory frameworks to accelerate the adoption of RNA-based biopesticides – innovative technologies that promise to transform agriculture with precision, safety and sustainability.

At the forefront of this movement is Professor Neena Mitter, a global leader in agricultural biotechnology and Deputy Vice-Chancellor (Research) at Charles Sturt University. Her message is clear: “RNA technologies offer precision, safety, and environmental compatibility – but without global regulatory cohesion, this potential remains untapped.”

Professor Mitter’s vision goes beyond advocacy. She is spearheading the initiative to establish Australia’s first Agriculture RNA Innovation and Manufacturing Hub (ARIM) in Wagga Wagga, New South Wales, aiming to bolster domestic production capabilities and facilitate the integration of RNA-based solutions into regional agricultural practices.

The paper, ‘The future of dsRNA-based biopesticides will require global regulatory cohesion’, co-authored by Professor Neena Mitter and colleagues from the ARC Hub for Sustainable Crop Protection at The University of Queensland, identifies challenges, such as inconsistent test methods and differing regulatory approaches across countries, that are slowing global progress in the development and commercialisation of dsRNA-based biopesticides.

The article highlights successful international cases like GreenLight Biosciences’ Calantha, registered in over 30 US states, and Renaissance BioScience’s RNAi product approved for field studies in Canada, both illustrating the potential of dsRNA-based biopesticides when supported by cohesive policy.

The call to action is clear: with aligned global regulation, RNA-based biopesticides could shift the agricultural paradigm, reducing chemical load, preserving biodiversity and securing food systems for generations to come.

Read more.

The University of Queensland Research Fellow, Dr Karl Robinson with The Queensland Alliance for Agriculture and Food Innovation (QAAFI); and former QA-AFI researcher Dr Elizabeth Worrall; and Charles Sturt University Deputy Vice-Chancellor (Research) Professor Neena Mitter

Impact summary

The global adoption of RNA-based biopesticides has the potential to revolutionise crop protection by offering precise, environmentally friendly alternatives to chemical pesticides. Yet inconsistent regulatory frameworks remain a major barrier. Professor Neena Mitter and colleagues advocate for harmonised international regulation, while advancing sovereign production capacity in Australia through the proposed ARIM hub in Wagga Wagga.

Research problem

Despite their proven efficacy and environmental benefits, dsRNA biopesticides remain underutilised due to fragmented and inconsistent global regulatory frameworks that hinder commercialisation and field deployment.

Collaborators

This work builds on research led by Professor Neena Mitter at the ARC Hub for Sustainable Crop Protection (The University of Queensland), and is now championed by Charles Sturt University under her leadership as Deputy Vice-Chancellor (Research).

Outcomes

The Nature Plants article proposes a strategic roadmap for the global coordination of RNA biopesticide regulation and makes a strong case for localised manufacturing through ARIM to bridge the gap between research and large-scale agricultural use.

Impact

If supported through cohesive regulation and infrastructure investment, RNA-based biopesticides could significantly reduce chemical usage in agriculture, support biodiversity and bolster climate-resilient food production systems. ARIM would position Australia at the forefront of sustainable agricultural innovation.

Beneficiaries

Key beneficiaries include farmers, agri-tech developers, regulators and policymakers, with broader benefits to consumers, regional communities and global food systems through improved sustainability, job creation and reduced environmental impact.

Innovating regional agriculture: Circular, digital, prosperous

Research that enables sustainable production

Gulbali Institute to lead regional node in $47 million national Weed Management Initiative

Charles Sturt University's Gulbali Institute is delighted to be named one of four key nodes for the Grains Research and Development Corporation's (GRDC) landmark $47 million Weed Management Initiative (WMI) – a bold, 5.5-year national effort to deliver innovative, sustainable solutions for one of the most persistent challenges in Australian agriculture.

The initiative aims to revolutionise weed control practices through cutting-edge research, development and extension (RD&E), combining national collaboration with regionally tailored strategies.

The Gulbali Institute's Weed Science team will lead a regional node based at Charles Sturt's Wagga Wagga campus, working alongside leading institutions: The University of Queensland, the University of Adelaide and The University of Western Australia. Together, these nodes will address the escalating issue of herbicide resistance and the evolving dynamics of weed populations to directly benefit Australian grain growers.

The Charles Sturt node will be led by Professor Michael Walsh, Professor of Plant Science and Horticulture, with a highly experienced research team comprising Dr John Broster, Dr Asad Asaduzzaman, Dr Remy Dehaan, Dr Shawn McGrath and Professor Leslie Weston.

The WMI's research will focus on three critical pillars:

- evolutionary dynamics of weed adaptation and herbicide resistance
- biochemical, molecular and genetic basis of novel herbicide resistance
- mitigation and management using novel and integrated weed control approaches.

This national collaboration marks a significant investment in the future of Australian grains, strengthening our capacity to combat herbicide resistance and deliver regionally relevant, science-backed weed management solutions.

Read more.

Professor Michael Walsh, Plant Science and Horticulture

Dr John Broster, Herbicide Resistance, Agricultural, Environmental and Veterinary Sciences

Dr Asad Asaduzzaman, Weed Scientist and Crop Digital Agronomy, Agricultural, Environmental and Veterinary Sciences

Dr Remy Dehaan, Spatial Scientist, Agricultural, Environmental and Veterinary Sciences

Dr Shawn McGrath, Agricultural Scientist

Professor Leslie Weston, Research Professor of Plant Biology and Natural Products Chemistry

Impact summary

The $47 million GRDC Weed Management Initiative will transform weed control strategies across Australian grain-growing regions by addressing herbicide resistance through coordinated national research and regional innovation.

Research problem

Weeds remain one of the most costly and persistent threats to grain production in Australia, with escalating herbicide resistance reducing the effectiveness of conventional control measures.

Collaborators

The Gulbali Institute at Charles Sturt University, The University of Queensland, the University of Adelaide, The University of Western Australia.

Outcomes

The initiative will deliver new insights into weed adaptation and resistance mechanisms, trial integrated control approaches and support evidence-based recommendations for sustainable weed management.

Impact

Generating region-specific and nationally coordinated solutions, the program will reduce reliance on herbicides, improve crop yields, and enhance the long-term viability of Australia's grains industry.

Beneficiaries

Australian grain growers and agribusinesses, with broader benefits to rural communities, agricultural researchers and national food security.

Innovating regional agriculture: Circular, digital, prosperous

Research that enables sustainable production

Charles Sturt feedlot trial shows promising results for cattle quality

A recent feedlot trial conducted at Charles Sturt University's Wagga Wagga campus has delivered significant findings with potential benefits for cattle farming and beef production.

Led by Professor Jane Quinn in collaboration with renowned feedlot veterinarian and ruminant nutritionist Professor Paul Cusack (Australian Livestock Production Services), the trial examined the impact of Terragen Dry Ruminant Probiotic feed supplement on cattle growth and meat quality.

More than 260 Angus cattle from six breeders across southern NSW were fed for 106 days, with different dosage rates of the Terragen probiotic. The results were notably positive.

> "Angus cattle supplied a ration supplemented with the ruminant probiotic gained 4.6% more weight per day compared to the control group," Professor Quinn said.

> "Additionally, this group of cattle had a marble score that was 7% higher than the control group."

The Terragen Dry Ruminant Probiotic was tested against various supplement groups, including liquid MYLO, single-dose and double-dose Dry Ruminant Probiotic, and a control group with no supplement.

> "By testing different groups, we were able to measure the supplement's impact on production and carcass characteristics," Professor Quinn explained.

With consumers increasingly seeking natural alternatives to synthetic growth stimulants, the findings highlight the potential of probiotics as a viable commercial alternative for beef producers.

> "The Terragen probiotic is all-natural and developed in Australia, providing a sustainable alternative for cattle producers both nationally and internationally," Professor Quinn said.

> "Our trial demonstrated viable returns on investment while enhancing growth and performance in feedlot steers without reliance on chemical additives."

These results reinforce the role of probiotics in improving cattle productivity and meat quality, offering exciting possibilities for the future of beef production.

Terragen's Joss West and Charles Sturt's Professor Jane Quinn. Picture by Terragen.

Innovating regional agriculture: Circular, digital, prosperous

Research that enables sustainable production

Charles Sturt University and Elders forge strategic partnership to advance agricultural innovation

In a landmark move for Australian agriculture, Charles Sturt University has entered into a strategic partnership with Elders, one of the nation's leading agribusinesses, to drive forward innovation, sustainability and education in the sector.

The Memorandum of Understanding (MoU), signed on Tuesday 4 March, cements a shared commitment to address real-world agricultural challenges through collaboration between academia and industry.

A new era for agricultural advancement

The partnership will focus on three key areas:

- establishing a BioSolutions Innovation and Knowledge Hub
- advancing research, education and facilities activation
- delivering curated student engagement programs.

This alliance aims to accelerate innovation and ensure regional agricultural communities benefit from cutting-edge research and emerging technologies.

Dr Michele J Allan AO, Chancellor of Charles Sturt University, said the partnership reflects the university's mission to lead transformative regional change.

"This collaboration not only aligns with our strategic vision but also reinforces our commitment to innovation, sustainability, and educational excellence in agriculture. Together with Elders, we are creating meaningful opportunities for our students and helping to shape the future of Australian agriculture."

Mr Mark Allison, Managing Director and CEO of Elders, echoed the significance of the partnership.

"Our partnership with Charles Sturt University marks a transformative moment for Australian agriculture. By joining forces, we are equipped to push the boundaries of innovation and sustainability within the industry. This collaboration underscores our dedication to developing the next generation of agricultural professionals and ensuring the longevity and prosperity of Australia's agricultural sector."

Open collaboration for lasting impact

The partnership extends an open invitation to producers, advisors, researchers, startups, government agencies, investors and the wider community to contribute to the shared vision for a more innovative, sustainable and prosperous agricultural landscape.

As Australia's largest regional university, Charles Sturt produces over 25 per cent of the nation's agricultural graduates each year and is a national leader in applied agricultural research. Elders, with a 180-year legacy, delivers a comprehensive range of agricultural products and services to primary producers across the country and is widely recognised as a pillar of Australian agribusiness.

Together, Charles Sturt University and Elders are laying the groundwork for a future where education, research and industry expertise converge to elevate regional agriculture, making it more circular, digital and resilient.

Register your interest to learn more about, or get involved with, the BioSolutions Innovation and Knowledge Hub.

Mr David McKeon, Head of Thomas Elder Sustainable Agriculture, Elders; Mr Mark Allison, MD and CEO, Elders; Dr Michele Allan AO, Chancellor of Charles Sturt University; Ms Hsiu Ling Mai, Head of Sustainability, Elders; Mr Nick Pagett, Executive Director, AgriPark, Charles Sturt University; Ms Anna Bennett, Executive General Manager, Strategy, Sustainability and Innovation, Elders

Innovating regional agriculture: Circular, digital, prosperous

Research that enables sustainable production

Restoring life to saline soils: A sustainable path to boost crop yields and soil health

Soil salinity is a growing threat to agricultural productivity across Australia and the globe. Driven by natural processes and human activities, salinity depletes fertile land, disrupts plant growth and weakens soil ecosystems. But a new multi-phase study is exploring a promising, sustainable solution – using bio-fertiliser-based organic amendments to restore balance, improve nutrient uptake and reduce salt stress in crops.

Researchers are conducting controlled environment and field trials across two salt-affected sites in New South Wales to test how these amendments influence soil health and plant performance, with a focus on grain legume production. The findings could provide a powerful tool for farmers to reclaim saline land, increase yields and support long-term soil resilience.

Team

Associate Professor Jason Condon, Faculty of Science and Health, School of Agricultural, Environmental and Veterinary Sciences, Gulbali Institute

Dr Jeff McCormick, Faculty of Science and Health, School of Agricultural, Environmental and Veterinary Sciences, Gulbali Institute

Dr Shamsul Haque, Faculty of Science and Health, School of Agricultural, Environmental and Veterinary Sciences, Gulbali Institute

Mariam Khanam, Gulbali Institute

Mariam Khanam

Impact summary

This research aims to develop sustainable, organic solutions to rehabilitate saline soils, restore microbial function and enhance nutrient uptake and crop productivity. It offers a scalable approach to addressing soil degradation in Australia and beyond.

Research problem

Dryland salinisation – exacerbated by natural processes and poor historic land management¬¬ – affects millions of hectares of Australian farmland. It limits nutrient availability, reduces crop yields and degrades soil microbiomes, with few sustainable solutions currently available.

Outcomes

The study will generate data on salinity levels, microbial activity and plant response across seasons. It will determine the effectiveness of bio-fertiliser-based organic amendments in improving soil health, reducing salt stress and promoting metabolite secretion in legumes.

Impact

By validating organic amendment strategies through lab and field trials, this research could lead to practical, environmentally friendly techniques for improving crop performance in saline soils, contributing to food security, climate resilience and sustainable land management.

Beneficiaries

Primary beneficiaries include Australian farmers managing saline land, agricultural researchers and policymakers. Broader impacts will extend to global farming communities, environmental restoration initiatives and supply chains seeking resilient crop production systems.

Innovating regional agriculture: Circular, digital, prosperous

Research that enables sustainable production

Digital Agrifood Summit 2025

AgriPark is thrilled to announce that the Digital AgriFood Summit 2025 (DAS25) is set to take place on 3-4 September 2025 at Charles Sturt University, Wagga Wagga Campus!

This year's summit is your gateway to cutting edge education, research, innovation, and industry, bringing together the brightest minds and latest advancements in agri-tech. Prepare to immerse yourself in hands-on activities, gain exclusive research insights, and witness industry-leading innovations across diverse agricultural sectors.

Whether you're looking to network, showcase, or level up, DAS25 is where it all happens!

Learn more.

Resilient ecosystems for regional futures

Research that contributes to carbon reduction through renewable energy innovation, sustainable use of biomass and natural capital, and the protection and restoration of freshwater, terrestrial, and marine ecosystems.

Charting a course for water security: Gulbali Institute partners with Sustainable African Rivers Initiative

The Gulbali Institute is proud to announce a transformative partnership with Oppenheimer Generations Research and Conservation (OGRC) to advance the Sustainable African Rivers Initiative (SARI) – a bold step toward addressing some of the world's most pressing water security and conservation challenges.

Rivers are the arteries of ecosystems, economies and cultures. When healthy, they sustain biodiversity, agriculture and livelihoods. With strong ecological parallels between African and Australian inland river systems, this partnership brings together shared expertise to forge innovative, cross-continental solutions for river conservation.

A cornerstone of the initiative is the establishment of a Research Chair, supported by the Benjamin Raymond Oppenheimer Trust (BRO Trust). Under the leadership of Associate Professor Gordon O'Brien, the SARI program will focus on conserving rivers, lakes, wetlands and estuaries in Sub-Saharan Africa, with an emphasis on the Limpopo River Basin, a region critical to biodiversity and community resilience.

SARI was officially launched in March 2025 on the Sabie River in Kruger National Park, bringing together partners, researchers and community representatives to witness the challenges firsthand and lay the groundwork for impactful research and conservation.

This collaboration marks the beginning of a long-term commitment to freshwater stewardship. Together, the Gulbali Institute, OGRC and BRO Trust aim to deliver scalable, science-based solutions that protect river ecosystems and empower the communities that depend on them.

Read more.

Left to right: Zain Armien, Vi An Vu, Pumla Dlamini, Annelize Erasmus, Geoff Reid, Gordon O'Brien, Nicholas Mandrak and Troy Meston

Impact summary

This partnership will drive evidence-based solutions for freshwater ecosystem protection in Africa, fostering direct knowledge sharing between Australian and African river systems. It will strengthen global water security, support biodiversity conservation and advance sustainable development.

Research problem

Freshwater ecosystems in Sub-Saharan Africa are under increasing threat from over-extraction, pollution, land use change and climate stress. The lack of coordinated ecosystem-based management approaches risks further degradation of river health and community wellbeing.

Collaborators

Gulbali Institute, Charles Sturt University, Oppenheimer Generations Research and Conservation (OGRC), Benjamin Raymond Oppenheimer Trust (BRO Trust).

Outcomes

- Appointment of a dedicated Research Chair in freshwater conservation.
- Multi-site research across the Limpopo River Basin and broader Sub-Saharan Africa.
- Development of innovative, community-informed river management models.
- Knowledge exchange between Australian and African researchers.
- Scalable frameworks for ecosystem restoration and sustainable use.

Impact

SARI will build scientific capacity, inform national water policies and guide conservation action across Africa. The collaboration also enriches Australian understanding of river systems, supports global biodiversity goals and positions Gulbali as a leader in international water research.

Beneficiaries

- Local communities dependent on river ecosystems.
- Conservation organisations and government agencies in Africa.
- Researchers in freshwater ecology and sustainable development.
- Policymakers seeking data-driven water management solutions.
- Global networks committed to biodiversity, food security and climate resilience.

Resilient ecosystems for regional futures

Research that contributes to carbon reduction through renewable energy innovation, sustainable use of biomass and natural capital, and the protection and restoration of freshwater, terrestrial, and marine ecosystems.

What happens to Australia's coal regions when the power stations are shut down?

Dr Simon Wright, Gulbali Institute

A Charles Sturt University energy expert has investigated how communities which have been dependant on coal mining can survive and prosper as coal-fired power stations close in Australia in the coming years.

Senior Research Fellow in Energy and Circularity in the Charles Sturt Gulbali Institute, Dr Simon Wright, conducted the research through funding by the Churchill Trust.

The research focused on transitioning to renewable energies by investigating coal regions in transition in the European Union and Canada. The barriers and opportunities of how these transitions could inform Australia's approach were also considered.

"As our coal-fired power stations shut down in the next five years and the pressure increases to cease coal exports to Asia, it is critical that we start planning for the economic future of these regions whose economy has depended on mining for more than 100 years in some instances," Dr Wright said.

"We need governments to move swiftly and at scale to support these communities to build a long-term economic development plan."

Dr Wright's research focused on the potential to transition regions in Australia, such as Hunter Valley, Latrobe, Collie and Gladstone, to clean energy and other low carbon industries.

Read more.

Read the report online.

Educated, adaptive, and inclusive regional communities

Research that builds community capability and reduces barriers to social, economic and political participation

Reimagining democracy: Insights from Australia's New Democratic Audit

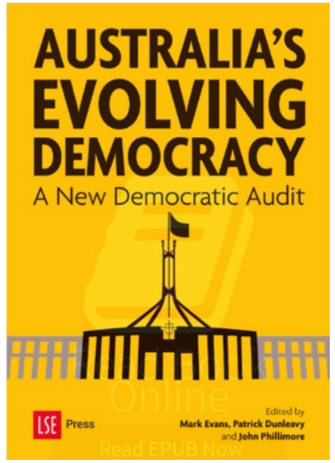
Watch a compelling conversation that brought together some of Australia's most respected voices in politics, journalism and academia. This special event, held at Parliament House, Canberra on 5 February, featured an expert panel including Michelle Grattan AO, Allegra Spender MP, Senator David Pocock and Professor Mark Evans, and was moderated by Distinguished Professor Stan Grant Jnr.

In this thought-provoking session, the panel unpacked the key findings from the *New Democratic Audit of Australia*, a landmark review of the health of our democratic system. While the audit found that Australian democracy was not in crisis, it revealed a significant policy crisis that demanded urgent attention, bold leadership, and democratic reinvention.

The discussion explored the critical challenges and promising opportunities that are shaping the future of Australian democracy—from the erosion of trust in political institutions to the need for more inclusive and transparent policymaking.

Watch recording.

Empower yourself with insights that matter, because the future of democracy depends on informed citizens and courageous ideas.



Download *Australia's Evolving Democracy: A New Democratic Audit* FREE from LSE Press.

Educated, adaptive, and inclusive regional communities

Research that builds community capability and reduces barriers to social, economic and political participation

Yes, it's a terrible idea to pick up or interfere with wild animals – especially baby wombats. Here's why

Professor Dale Nimmo
Gulbali Institute
Faculty of Science and Health
School of Agricultural, Environmental and Veterinary Sciences

Dr Hayley Stannard
Faculty of Science and Health
School of Agricultural, Environmental and Veterinary Sciences

It was hard to watch. In a now-deleted Instagram reel, American influencer Sam Jones is filmed picking up a young wombat, separating it from its mother, and running with it back to the car for a pose. In the background, the distressed mother tries to follow. At one point, Jones says: "Momma's right there and she's pissed. Let's let him go."

We have spent our careers working with wildlife. Seeing a joey separated from her mother for social media content was unsettling. The encounter will have made stress levels soar for the baby and mother.

Unfortunately, we are seeing a rise in people directly interacting with wildlife through feeding them or taking risks to get close to them, often driven by the pursuit of social media attention. These interactions can hurt wildlife in many different ways.

Read more.

This article first appeared in *The Conversation* on 13 March 2025.

World-first analysis of seabirds who've eaten plastic reveals slow, insidious health impacts

Dr Jennifer Lavers, Gulbali Institute

We all know microplastics are bad for the environment and our health, but do we really know how bad?

Our new study, published this week in the journal Science Advances, compared changes in 745 proteins found in seabirds with and without plastics in their stomachs.

We focused on young sable shearwaters (seabirds, Ardenna carneipes). They were less than 90 days old and appeared healthy. Despite their young age, the birds with plastic in their stomachs had signs or symptoms of neurodegenerative disease, as well as kidney and liver disease.

We also found evidence of significant damage to the lining of the stomach, likely from microplastics that became embedded in the tissue. It meant proteins that should only be found in the stomach were detected circulating in the blood.

While our findings don't directly relate to human health, this work paints a distinct picture of the insidious and slow impacts plastic can have on a bird's health – even if it doesn't kill them.

Read more.

This article first appeared in *The Conversation* on 13 March 2025.

Educated, adaptive, and inclusive regional communities

Research that builds community capability and reduces barriers to social, economic and political participation

Yindyamarra podcast

Join Distinguished Professor Stan Grant Jnr and Jack Jacobs as they explore the Wiradjuri philosophy of Yindyamarra and how it might guide us through the challenges facing nation-building and democracy in Australia and around the world.

Episode # 18 C.S. Lewis's magic: A walk around Magdalen College

Listen to Professor Stan Grant Jnr and Jack as they take a walking tour around Magdalen College, reflecting on the life and thought of C. S. Lewis at Oxford the role of magic and enchantment in our lives.

Listen to the podcast

Inaugural Colin Mackerras Chair in Australian Studies at Beijing Foreign Studies University

Congratulations to Professor Wayne Hudson, who was appointed the inaugural Colin Mackerras Chair in Australian Studies at Beijing Foreign Studies University (BFSU).

This highly prestigious appointment will see the Australian Centre for Christianity and Culture Research Professor teaching at the university and promoting a deeper understanding of Australia in China.

Jointly established by Foundation for Australian Studies in China (FASIC) and the Australian Studies Centre at BFSU, the program was established to honour Colin Mackerras's contribution to educational and intellectual exchanges between the two nations.

The initiative aims to strengthen the study of Australian culture and society, foster international collaboration and enhance academic exchange between Australia and China.

Educated, adaptive, and inclusive regional communities

Research that builds community capability and reduces barriers to social, economic and political participation

Provocations

The Provocations Public Lecture series celebrates Charles Sturt research. The lectures aim to challenge orthodoxy through new thinking but will also revive policy ideas and political thought from the past for one more encore.

Recordings

Distinguished Professor Chris Blanchard opened this year's Provocations Public Lecture series with a compelling talk that debunked common food myths and shed light on the real links between diet and disease.

If you're curious about the science behind what's on your plate, don't miss the *Functional Grains Centre Cookbook*, and listen to the lecture, where he shares Charles Sturt University research uncovering the truth behind food-related diseases.

Explore the cookbook.

Listen to the lecture.

Speaker:

Distinguished Professor Geoffrey Gurr

Date: 20 August 2025

Time: 6-7pm

Location: Online

Cost: free

Tickets: Register here

Speaker:

Professor Juliette Tobias-Webb

Date: 29 October 2025

Time: 6-7pm

Location: Online

Cost: free

Tickets will be made available closer to the event date.

Speaker:

Professor Jane Quinn

Date: TBA

Time: TBA

Location: Online

Cost: free

Tickets will be made available closer to the event date.

Educated, adaptive, and inclusive regional communities

Research that builds community capability and reduces barriers to social, economic and political participation

Provocations blog

Provocations is a series of blog posts written by prominent thinkers that seek to address the grand challenges confronting regional Australia and the world. It is a multidisciplinary academic blog run by Charles Sturt University. Provocations will challenge orthodoxy through new thinking but will also revive policy ideas and political thought from the past for one more encore.

EDUCATION |

Equity within the Academy: Rethinking the ‘why’ of higher education

BY SARAH O'SHEA | 12 MARCH 2025

Globally, higher education is undergoing a period of significant change, including a collective drive to...

READ MORE

AGRICULTURE |

Adapting to change: Invasive plants take up the challenge

BY LESLIE WESTON | 10 FEBRUARY 2025

Adaptive evolution influences invasive outcomes Summary. Highly successful invasive species, including plants, have shown us...

READ MORE

Cyber secure, innovative and connected regional communities

Linkage research across all domains that builds innovative and digitally connected communities free from the risk of cyber attack

Weaving culture and code: A First Nations-led revolution in digital fashion

The Artificial Intelligence and Cyber Futures Institute (AICF) is proud to launch Digital Threads – a groundbreaking digital fashion initiative entirely led, designed and delivered by First Nations creatives. Spearheaded by Sasha Sarago, AICF's First Nations Cultural Innovation Lead, this program places Indigenous cultural knowledge and creativity at the heart of Australia's digital future.

Digital Threads is more than a program – it's a cultural and technological movement. This visionary initiative empowers First Nations artists to explore 3D fashion design, augmented reality (AR) and virtual environments, while grounding each creation in storytelling, culture and community.

As the first Indigenous-led digital fashion program in Australia, Digital Threads blends design with cutting-edge tech training, supporting cultural sovereignty and economic opportunity.

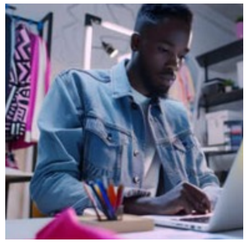
"Digital Threads is about digital sovereignty, economic inclusion, and the power of self-representation," says Sasha Sarago, a proud Yidinji and Jirrbal woman, filmmaker and digital innovator. "It's a cultural movement that recognises the strength of our First Nations communities and their leadership in shaping the digital future."

The program was developed through deep consultation with communities and cultural custodians, reflecting AICF's commitment to co-design, ethical innovation, and digital literacy and inclusion.

AICF is honoured to support this visionary initiative as part of its mission to ensure that AI and emerging technologies are inclusive, culturally respectful and regionally grounded.

For more information or to collaborate, contact Sasha Sarago at ssarago@csu.edu.au or visit the AICF website.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Impact summary

Digital Threads is a national-first initiative that empowers First Nations communities through digital fashion, blending design and storytelling with future-focused tech training. It sets a new standard for ethical innovation, cultural leadership, and digital literacy and inclusion in Australia's creative industries.

Research problem

First Nations creatives remain underrepresented in the digital innovation and fashion technology sectors, with limited access to culturally appropriate training pathways that recognise and respect Indigenous knowledge systems.

Outcomes

- Establishment of an Indigenous-led digital fashion program.
- Culturally grounded curriculum in 3D design, AR and digital storytelling.
- Strong engagement with community, cultural custodians and the creative tech sector.
- Pathways for creative expression, digital fluency and economic participation.

Impact

Digital Threads will amplify First Nations voices in emerging technology spaces, foster digital sovereignty and build inclusive innovation ecosystems that centre Indigenous knowledge in Australia's creative and economic futures.

Beneficiaries

- First Nations artists, designers and creatives.
- First Nations communities seeking tech training pathways.
- Cultural institutions and creative industries.
- The broader Australian technology, design and fashion sectors, which benefit from more inclusive innovation.

Cyber secure, innovative and connected regional communities

Linkage research across all domains that builds innovative and digitally connected communities free from the risk of cyber attack

Revolutionary ransomware defence: The REDWIRE project

Dr Arash Mahboubi
Faculty of Business, Justice and Behavioural Sciences
School of Computing, Mathematics and Engineering

As ransomware attacks grow in scale and sophistication, Charles Sturt University is leading the charge with a groundbreaking solution. Dr Arash Mahboubi, Senior Lecturer in the School of Computing, Mathematics and Engineering, has developed an innovative approach to safeguarding sensitive data with the REDWIRE project – Ransomware Resilient File Safe Havens.

About the REDWIRE project

Originating from Dr Mahboubi's PhD research, REDWIRE acts as a last line of defence when traditional security systems fail. It creates ransomware-resilient file safe havens that ensure sensitive cloud-stored data remains protected, even in the face of advanced cyberattacks.

Unlike conventional solutions, REDWIRE is designed to work even after an endpoint has been compromised, making it a vital tool in today's complex threat landscape.

Industry collaboration and development

Supported initially through seed funding in October 2022, the REDWIRE project has evolved into a large-scale, two-year initiative involving key partners such as CSIRO Data61 and the Cyber Security Cooperative Research Centre (CSCRC), as well as several government agencies across New South Wales and Western Australia.

Why it matters

Dr Mahboubi highlights the real-world risks posed by ransomware, from financial loss and data breaches to reputational damage. He stresses the importance of working with industry partners, especially small and medium-sized enterprises, to boost resilience at all levels of the digital ecosystem.

Dr Seyit Camtepe, co-researcher on the project, notes that REDWIRE represents the culmination of a decade of cybersecurity research, delivering a truly future-proof solution.

Recognition and impact

The project's recognition and impact has included:

- achieved Technology Readiness Level (TRL) 7
- successfully tested by the NSW Department of Customer Service
- finalist in the 2024 iAwards ('Technology Platform' category)
- patented under the title 'Ransomware Resilient File Safe Havens for Cloud Data Storage'
- recognised by the Cyber Security CRC
- featured by the Australian Computer Society's Information Age.

Looking ahead

The REDWIRE project is a critical advancement in ransomware defence, reinforcing Charles Sturt University's leadership in cybersecurity research. As cyber threats evolve, projects like REDWIRE will play a vital role in protecting both legacy and modern systems, ensuring a more secure digital future for all.

Health, safety and wellbeing in regional communities

Charles Sturt researchers are making new discoveries to ensure that all regional Australians lead dignified and rewarding lives

Bridging the gap: Major HIV prevention project secures $1.25 million funding

A Charles Sturt University research team has been awarded $1.25 million to lead a major public health study aimed at reducing HIV infection rates among at-risk young men in rural and regional Australia.

Led by Dr Brian Sengstock, Associate Head of the School of Nursing, Paramedicine and Healthcare Sciences, the project is titled Young Men Who have Sex with Men: Improving Access to HIV Pre-exposure Prophylaxis in an Identified High-risk Group.

Funded by the National Health and Medical Research Council (NHMRC) Ideas Grant scheme, the study will run from January 2025 to December 2027.

Read more.

Impact summary

This $1.25 million project will address a critical gap in access to HIV prevention for young men who have sex with men in regional and rural Australia. It will design and test peer-led interventions to improve access to pre-exposure prophylaxis (PrEP) – a proven medication that reduces the risk of HIV infection. The outcomes of this work will directly influence national strategies for HIV prevention and support greater health equity for vulnerable populations.

Research problem

Despite the effectiveness of PrEP in preventing HIV transmission, young men who have sex with men in rural and regional areas face unique barriers to access, ranging from stigma and limited awareness to a lack of local health services. These barriers result in significantly lower uptake of PrEP and higher vulnerability to HIV infection in these communities.

Collaborators

- Charles Sturt University – Lead institution.
- Multidisciplinary academic and clinical experts in public health, sexual health and rural healthcare access.
- Partnerships with community health organisations, LGBTIQ+ peer support networks, and rural sexual health clinics (to be confirmed as part of project development).

Outcomes

- Identification of key social, cultural and systemic barriers preventing PrEP uptake.
- Co-design and trial of peer-led interventions tailored for rural and regional settings.
- Generation of evidence-based policy recommendations for national HIV prevention frameworks.
- Enhanced awareness, acceptability and accessibility of PrEP among high-risk groups.

Impact

- Reduced incidence of HIV infections among young men who have sex with men in non-metropolitan areas.
- Creation of a scalable intervention model that can be adopted nationally to address rural healthcare gaps.
- Strengthening of Charles Sturt University's leadership in rural health equity and applied research.

Beneficiaries

- Young men who have sex with men in regional and rural Australia – a historically underserved and high-risk population.
- Community health providers and sexual health clinics, who will benefit from new tools and approaches.
- Policymakers and public health agencies, through access to robust research for improving HIV prevention strategies.
- Rural communities, through reduced stigma, improved sexual health literacy and better access to care.

Health, safety and wellbeing in regional communities

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Bringing diagnostics closer: Mobile CT research project to improve rural health access

Dr Catherine Keniry
Faculty of Science and Health
School of Rural Medicine

Charles Sturt University's School of Rural Medicine is leading a strategically significant research collaboration with the Western NSW Local Health District (WNSWLHD) to address one of the most pressing issues in rural healthcare – limited access to diagnostic imaging.

The study, titled Evaluation of Australia's First Acute Mobile CT Service Solution: Enhancing Access to Computed Tomography (CT) Services in Rural and Remote Areas of New South Wales, has now received full ethics approval and is moving into its early stages. Fourth-year medical student Nicholas Ruthenberg is in Walgett to engage with the mobile CT team, Aboriginal staff and local community leaders. Dr Catherine Keniry is the Chief Principal Investigator for this project.

Impact summary

This research evaluates a WNSWLHD innovation, Australia's first acute mobile CT scanner service, bringing essential diagnostic services to underserved towns including Walgett, Cobar and Bourke. The project has the potential to reshape rural healthcare delivery by demonstrating how mobile imaging can reduce patient travel, accelerate diagnosis and improve health equity. It will generate evidence to inform policy and serve as a model for replication across rural Australia.

Research problem

Nearly seven million Australians (28%) live in rural and remote regions, where access to diagnostic services like CT imaging remains critically limited. These communities face higher rates of hospitalisation and mortality, largely due to delays in diagnosis and treatment caused by geographical isolation and service shortages. Lack of timely access to CT scans significantly hinders early detection of severe conditions such as stroke, trauma and cancer.

Collaborators

- Charles Sturt University – School of Rural Medicine (Lead academic institution).
- Western NSW Local Health District (WNSWLHD) – Medical Imaging (District wide services).
- Local health professionals, Aboriginal community staff, and service delivery teams in Walgett, Bourke and Cobar.
- Medical student researchers and academic supervisors contributing to field research and community engagement.

Outcomes

- Comprehensive evaluation of the mobile CT service's clinical and operational effectiveness.
- Real-world data on usage, accessibility and patient outcomes in rural settings.
- Insights into community perceptions and the cultural appropriateness of mobile health service delivery.
- Recommendations for scaling and replicating mobile CT solutions in other rural health districts.

Impact

- Improved access to timely and critical diagnostic services in remote areas.
- Reduced travel and associated costs for patients and families.
- Empowerment of local health services to deliver more equitable, responsive care.
- Evidence-based input into rural healthcare policy and infrastructure investment decisions.
- Enhanced training opportunities for medical students in real-world, community-engaged rural health research.

Beneficiaries

- Rural and remote communities in Western NSW, particularly in Walgett, Cobar and Bourke.
- Patients requiring urgent or routine CT imaging for timely diagnosis and treatment.
- Aboriginal community members, through culturally responsive engagement and service delivery.
- Health service providers, who benefit from an innovative service model and improved clinical pathways.
- Policymakers and rural health planners, who will gain vital data to guide investment in diagnostic access.
- Future rural clinicians and researchers, through enriched educational and practical experience.

Health, safety and wellbeing in regional communities

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Improving emergency care for Alcohol Use Disorder in regional NSW

Dr Catherine Keniry
Faculty of Science and Health
School of Rural Medicine

Alcohol Use Disorder (AUD) remains a significant public health concern in Australia, particularly in regional and remote areas where alcohol consumption rates are significantly higher than national averages. A new collaborative research project led by Dr Catherine Keniry aims to address critical gaps in emergency care for AUD by evaluating and improving thiamine (vitamin B1) prescribing practices across four NSW hospitals. Unique to the study is a focus on the time taken between patient triage and the administration of the first dose of thiamine.

Impact summary

This research seeks to improve the emergency treatment of AUD and reduce preventable cases of Wernicke's Encephalopathy (WE) – a life-threatening condition caused by thiamine deficiency. By identifying inconsistencies in current prescribing practices and understanding barriers to compliance, the project will inform education, policy and standardised care protocols, particularly for resource-limited regional hospitals.

Research problem

AUD patients are at high risk of thiamine deficiency, which can lead to WE and, if untreated, progress to Korsakoff's Psychosis (KP) – a permanent and debilitating condition. Although WE is treatable with timely thiamine administration, up to 20 per cent of untreated or undertreated patients may die, and many more suffer long-term impairment.

Despite NSW Health guidelines recommending thiamine supplementation for patients with AUD in emergency settings, evidence points to inconsistent adherence, particularly in regional hospitals, where system pressures and resource limitations further compound the challenge.

Collaborators

- Charles Sturt University – School of Rural Medicine (Lead academic institution).
- **Participating hospitals:**
- Griffith Base Hospital and Wagga Wagga Base Hospital (Murrumbidgee Local Health District).
- Orange Base Hospital (Western NSW Local Health District).
- Gosford Hospital (Central Coast Local Health District).
- **Supporting team:**
- Clinical Lead – Dr Tony Floyd, Internal Medicine Specialist and General Physician, Gosford Hospital NSW.
- Emergency physicians and junior medical officers.
- Medical students from Charles Sturt University and the University of Newcastle.
- Ethics Approval: Greater Western Human Research Ethics Committee (GWHREC).

Outcomes

- Comprehensive audit of electronic medical records to assess current thiamine prescribing rates.
- Surveys of emergency department clinicians to identify knowledge and practice gaps.
- Evidence-based insights into barriers to guideline adherence.
- Development of targeted educational and training initiatives for clinicians.
- Recommendations to standardise treatment protocols for AUD in emergency settings.

Impact

- Improved clinical outcomes for patients with AUD through early intervention.
- Increased adherence to NSW Health guidelines on thiamine supplementation.
- Reduced incidence of WE and KP.
- Greater awareness and knowledge among frontline emergency clinicians.
- Foundation for potential state-wide policy and practice reforms, especially in rural and regional hospitals.

Beneficiaries

- Patients with AUD, particularly those in rural and regional communities.
- Emergency department staff across participating hospitals.
- Health services seeking to strengthen protocol-driven, evidence-based care.
- Policymakers and health administrators focused on improving public health outcomes in regional settings.
- Medical students and junior doctors, gaining exposure to applied rural clinical research and quality improvement.

Health, safety and wellbeing in regional communities

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LGBTQ+ people call for more support and services in rural and regional Australia

Associate Professor Clifford Lewis, Faculty of Business, Justice and Behavioural Sciences, School of Business

Research that revealed LGBTQ+ people in rural and regional communities feel they must conceal their identity has prompted a Charles Sturt University academic to ask why we are still having the same conversations around LGBTQ+ rights and experiences.

The Regional Rainbow Survey was conducted by Associate Professor in Marketing in the Charles Sturt School of Business in Bathurst, Dr Clifford Lewis, and Professor Suzanne McLaren from the Charles Sturt School of Psychology in Port Macquarie. Dr Lewis is also the Chair of Charles Sturt's Ally Network.

Dr Lewis said there is not much data on rural LGBTQ+ people in Australia and the survey was a way to compile enough data to start making meaningful changes.

The intention is to compile enough data, over time, to present compelling arguments for change to protect the health, wellbeing and identity of members of the LGBTQ+ community.

The survey was conducted in partnership with the AIDS Council of NSW (ACON) and surveyed members of the LGBTQ+ community from across the country.

Dr Lewis said the results were disheartening but not unexpected, with one third of those with diverse sexual orientation and half of trans and gender-diverse people having to hide their orientation to a significant degree.

The survey showed that LGBTQ+ members living in rural or regional areas had worse mental health and life satisfaction than those living in metropolitan areas.

"Rural people are calling for greater attention," Dr Lewis said.

"While factors like discrimination and belonging had an impact on psychological wellbeing for both metro and rural/regional LGBTQ+ people, for those in rural/regional communities age, education and income also played a role – with younger people and those with a lower education and income having poorer psychological wellbeing.

"If you can't really be yourself, you're constantly being vigilant."

Dr Lewis said rural and regional participants indicated they feel isolated with not much support or services for LGBTQ+ people in their area.

Read more.

Health, safety and wellbeing in regional communities

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Nature to nurture the mind

Over two thousand years ago, Hippocrates, the father of modern medicine said, “nature itself is the best physician”. Instinctively we may know that he was onto something – being out in nature usually makes us feel better, whether it’s a walk in the forest, time spent at the beach, or a picnic in the park. As a case in point, the recent restrictions of the COVID-19 pandemic curtailed access to nature for many, and the decline in our individual and collective psyche was noticeable.

But can being out in nature be more than just a mood lifter? The evidence of mental health benefits from spending time in nature is growing. Contact with nature is associated with improvements in memory and attention, lower stress levels, reduction in symptoms of depression and anxiety, and healthy sleep patterns.

Nature-based interventions – programs and activities where individuals engage with the natural environment with the aim of improving their health and wellbeing – have been increasing as a result. These vary from nature walking groups to community gardening, ecological conservation projects to exclusive forest ‘wellness’ retreats.

While nature-based interventions may improve mental health and wellbeing in the general population, can they confer the same benefits for individuals with long-term mental health conditions?

Professor Julaine Allan, Professor of Rural Health at Charles Sturt University, specialises in mental health and addictions, and with colleague Dr Nicole Snowdon is assessing how nature-based interventions may provide mental health benefits and could be structured to implement within existing mental health services.

Almost half of Australia’s population experiences a mental health condition at some point in their life, with the most common being anxiety, depression and substance abuse. The impact of enduring mental illness on people’s lives is significant, limiting many people’s ability to work, study and socialise. In 2023-2023, we spent $13.2 billion on mental health services across the country. Despite this, enduring mental health disorders that were not improved by treatment, rehabilitation or prevention activities are estimated to cause 13% of Australia’s total burden of disease.

With the increasing social and financial burden associated with the prevalence of mental illness, there is an urgent need to explore alternative, cost-effective interventions that can be used alongside traditional treatments.

Despite their cost-effectiveness and minimal invasiveness, nature-based interventions are not routinely offered in Australian mental health services.

“What we’re hoping to do is bring opportunities for nature connection to people with chronic mental health conditions and who are potentially socially isolated, socioeconomically deprived, and systematically demonstrate whether people get lasting benefits from it”. She elaborates: “The idea of nature having an effect on people fits into the ‘wellness’ space and vibe, but we need a western scientific diagnostic medicine approach to determine any benefits if we want to use nature-based interventions within mental health services more broadly”.

Central to that effort, Professor Allan is completing a study on Nature Walking Groups, exploring how structured, clinician-facilitated walks in nature can support individuals with severe mental health conditions. In collaboration with the University of Wollongong, Illawarra Shoalhaven Local Health District and researchers at the Charles Sturt Rural Health Research Institute, the study enabled 10 participants receiving long-term mental health support to attend weekly one-hour nature walks for 12 weeks, alongside their usual treatment.

Read more.

Research innovation facilities

Charles Sturt has a range of advanced facilities that provide a unique environment for interdisciplinary collaboration and cutting-edge research and development to support and validate our research outcomes

AgriPark: World-class facilities in a regional location

AgriPark is the innovation ecosystem in the heart of the Riverina dedicated to agricultural research, curated collaboration and sustainable production.

Bringing together researchers, industry, government and community, its goal is to meet the big challenges of regional Australia. AgriPark is where collaboration, experimentation and innovation make world-changing ideas a reality; where partners share and test ideas, students gain practical skills, and researchers and investors can fast-track both ideation and commercialisation.

Global Digital Farm

Global Digital Farm demonstrates the future of Australian farming through technology and data innovations.

Global Digital Farm is an integrated digital learning, innovation and research environment, working within a full-scale, commercial mixed farm operation. In partnership with Food Agility Co-operative Research Centre, it is transforming the university's 1,600-hectare commercial farm, located at the Wagga Wagga campus in New South Wales.

- 1,600-hectare commercial farm
- Aquatic laboratory
- Equine Centre
- Equine isolation facility
- eXtended Reality Centre
- Field trial sites
- Glasshouses
- Horticulture facilities
- Innovative Hub
- AgriPark
- National Life Sciences Hub (NaLSH), including Quarantine-approved research areas
- Phytotron and growth chambers
- Pre-clinical centre
- Research winery and vineyard
- Rhizolysimeter
- Sheep and cattle facilities
- Veterinary Clinical Centre
- Veterinary Diagnostic Laboratory

Join us in shaping the future of regional NSW

We extend a clarion call for research excellence – a call to academics, government, industry, community partners and philanthropists to collaborate with us in reimagining a vibrant, resilient and prosperous future for regional NSW.

At Charles Sturt University, our research tackles real-world challenges ¬– from sustainable agriculture and climate resilience to rural health and digital transformation.

But we can't do it alone.

Partner with us. Invest in bold ideas. Support regional innovation.

Together, we can create lasting impact – from the regions, for the world.

Every gift, large or small, helps shape and enhance the Charles Sturt community. We thank our generous supporters and invite you to consider giving to Charles Sturt.

To explore partnerships or learn more, visit the Advancement Office.