

# IMPACT

RESEARCH AT CQUNIVERSITY

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[www.cqu.edu.au/research](http://www.cqu.edu.au/research)

RESEARCH WITH IMPACT



Dr Ashfaque Chowdhury is researching decarbonising energy systems, focusing on transforming and efficiently using hydrogen in various sectors.

His team is exploring a unique approach to producing clean hydrogen from mixed landfill waste, such as plastics and end-of-life tyres, with the goal of creating high-purity hydrogen streams.

He is also overseeing a student project looking at the hydrogen refuelling process to optimise safety and energy efficiency parameters in hydrogen refuelling stations.

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# FOREWORD



Professor Nick Klomp,  
Vice-Chancellor and  
President

CQUniversity is emerging as one of Australia's great research universities.

The University's success is largely due to its determination to meet the needs of the communities it serves. After more than half a century working with stakeholders in regional Australia, CQUniversity has emerged as a research powerhouse, committed to engaging and collaborating with communities and industry to achieve real-world research outcomes in its regions and beyond.

The University has a strong ethos of doing things differently, which is reflected in its research initiatives. With an applied research focus, CQUniversity aims to achieve real impact for its communities and stakeholders, with a vision to be one of the top applied research institutions in the country.

CQUniversity aims to achieve complete relevance in its research efforts through strong links with industry, government and communities, as well as through close collaboration with national and international researchers and research networks. From agriculture to health, the University's research institutes and centres facilitate activity that involves its stakeholders and in turn makes a tangible impact to end-users.

As a university with a national presence, CQUniversity is uniquely positioned to establish and maintain networks and partnerships across the length and breadth of the country and the globe. This incredible power of place allows the University to engage deeply, thoroughly understand, and focus on the issues that matter to those the University seeks to support.



Professor Grant  
Stanley, Vice-President,  
(Research)

As a university with a strong engagement focus, CQUniversity is committed to conducting research that is innovative, creates impact and drives positive change, particularly for the regions.

By working collaboratively with communities and partner industries, CQUniversity is achieving some remarkable feats across a range of research fields.

CQUniversity research delivers solutions to complex challenges. In particular, it focuses on research in regional development and supply chains, growth in innovative industry (particularly for northern Australia), environmental management, agriculture, clean energy, healthcare and health promotion in regional and remote communities, social and human development, and equity and education delivery.

CQUniversity has more than 600 research higher degree students and over 200 research projects currently underway, from research impacting the life aspirations of regional, rural and First Nations youth, through to engaging with communities to solve complex health, social and sustainability issues.

This engaged research agenda is vitally important because, more so than ever before, universities have a crucial role to play in influencing the growth, success and prosperity of Australia. They also have a specific responsibility to find innovative, sustainable, and accessible solutions to the complex economic, social, environmental and health challenges currently impacting the world around us.

Working with stakeholders to understand problems and uncover solutions sets CQUniversity apart when it comes to the delivery of real-world research. This will continue to influence the University's research philosophy, guiding researchers to deliver outcomes that truly make a difference and improve the quality of life for those living in its communities.



Technical officer with CQUniversity's Institute for Future Farming Systems, Ian Learmont, provides crucial support to researchers undertaking projects as part of the Precision Livestock Management team. The team is recognised as an international leader in the field of tropical livestock research.

With strong links to industry, and producer participation in trials, the research program has an emphasis on being relevant to industry needs and delivering practical solutions to the challenges producers face.

# ABOUT CQUNIVERSITY

Originally founded in Rockhampton in 1967, as the Queensland Institute of Technology (QIT) Capricornia, CQUniversity Australia was granted full University status in 1992 and now has more than 30 000 students studying online and on-campus across Australia.

CQUniversity is proud to be recognised as Australia's most inclusive university with some of the highest ratios of students from disadvantaged, mature age, Aboriginal and Torres Strait Islander, and first-in-family backgrounds. This inclusive approach and commitment to access and participation means the University defines itself by who it embraces, rather than who it excludes.

It is this strong focus on participation and accessibility, that has seen CQUniversity firmly establish itself as one of the largest universities based in regional Australia, and one of the only Australian universities with a presence across the entire country. The University operates campuses in Adelaide, Brisbane, Bundaberg, Cairns, Emerald, Gladstone, Mackay, Melbourne, Perth, Rockhampton, Sydney and Townsville and also works in direct partnership with regional university centres throughout Australia, helping to ensure that no matter where students are located, that they have the opportunity to access world-class higher education. In 2020, CQUniversity also established an international presence with a delivery site in Jakarta, Indonesia, that offers executive and postgraduate education and training.

CQUniversity is Queensland's only dual sector university and delivers more than 300 education and training offerings, from short courses and certificates, through to undergraduate, postgraduate and research degrees. Study areas include apprenticeships, trades and training, business, accounting and law, creative, performing and visual arts, education and humanities, engineering and built environment, health, information technology and digital media, psychology, social work and community services, science and environment, and work and study preparation. As a pioneer in the delivery of distance education, CQUniversity continues to be a leader in online study with around one third of the current student cohort made up of students studying off-campus, many of whom are based in rural and remote areas. CQUniversity's flexible approach to learning and teaching, and continued innovation in this space, has provided opportunities for thousands of students to complete qualifications, regardless of their geographical location or personal circumstances.

After more than half a century working with stakeholders in regional Australia, CQUniversity is now a renowned research institution in several key disciplines and the benchmark leader for how universities should engage and collaborate with communities and industry. The University's applied research focus is oriented towards impact and real-world outcomes, with the purpose of providing solutions to challenges and identifying new opportunities for advancement in our regions and beyond.

This focus has seen CQUniversity achieve Excellence in Research Australia (ERA) results of 'at', 'above' or 'well above' world standard in 22 categories of research, including Mathematical Sciences, Applied Mathematics, Horticultural Production, Engineering, Psychological and Cognitive Sciences, Psychology, Agriculture and Vet Sciences, Agricultural, Land and Farm Management, Public Health and Health Services and Nursing to name a few.

CQUniversity has a strong alumni community with more than 120 000 alumni across the globe. CQUniversity graduates also have some of the best employment outcomes in Australia, with official data consistently indicating above average national undergraduate and postgraduate employment outcomes.

CQUniversity places a strong emphasis on social innovation and global outreach and fosters several key partnerships with communities, industry and government, both in Australia and overseas. This commitment to engagement and social advancement has led to CQUniversity being recognised as Australia's first and only Changemaker Campus by Ashoka U, and Australia's only certified social enterprise university by Social Traders.

CQUniversity's unique vision for diversity, outreach, engagement, research, learning and teaching, and inclusiveness, combined with its growth aspirations and continued expansion of student success, research excellence, social innovation and community engagement, has led to it being recognised within several world university rankings including Times Higher Education and QS World University Rankings.

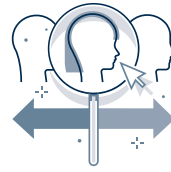


*CQUniversity's applied research focus emphasises the translation and uptake of research findings to meet stakeholder's real-world needs. As one of Australia's most engaged universities with an emphasis on globally relevant activity that benefits the regions we serve, CQUniversity is fast becoming one of the nation's most respected applied research institutions.*

# RESEARCH AT A GLANCE



**638**  
research higher degree students



**390**  
active researchers

**\$21 m**

in external funding in 2022



**200+**  
research projects

**\$92+ m**

in competitive research income 2018 – 2022



**2** research institutes  
**8** research centres



**730+**  
annual peer reviewed research publications

## RESEARCH IMPACT

CQUniversity's research focus and engaged research agenda continue to make positive impacts on individuals, communities and industries across the globe. This impact is expanding into new focus areas and transforming the way we think about current challenges. The University is becoming a central hub for research in the regions it serves by addressing the issues that matter most. It is cementing its unique power of place by undertaking research in practical and sustainable solutions, with national and international impact.

CQUniversity's research impact is demonstrated in improved industry processes and sustainability, regional and economic development, business improvement, productivity and innovation, social advancement and equity and healthier communities. The University's applied research focus emphasises the translation and uptake of research findings to meet external stakeholder needs – meaning the focus is not merely on increasing academic publications and citation rates, but oriented towards real-world outcomes.

## TRAINING AND DEVELOPMENT

CQUniversity is committed to supporting its researchers in producing world-class research that has impact nationally and internationally. The University encourages researchers to push the limits of current knowledge and share their expertise and outcomes to improve productivity, prosperity, quality of life and global sustainability.

## ENTREPRENEURIALISM

CQUniversity is strengthening its engagement with stakeholders and industry by creating new relationships and building on existing collaborations to encourage innovation. It is deepening its entrepreneurial relationships to produce new technologies, new products and new businesses. It is encouraging and supporting researchers into commercialisation opportunities.

## SOCIAL INNOVATION AND SUSTAINABLE DEVELOPMENT

CQUniversity is Australia's only social enterprise university, certified by Social Traders as a business that operates for social, community and environmental benefit. CQUniversity is also Australia's first Changemaker university, joining the Ashoka U international network of institutions committed to social innovation, entrepreneurship and impact.

This social impact reputation reflects CQUniversity's strong engagement agenda and innovative approach to inclusive, accessible and life-changing research, education and training.

CQUniversity actively supports the United Nations Sustainable Development Goals (SDGs), and participates in the annual *Times Higher Education (THE) Impact Rankings*. In 2023, the University was ranked 74th in the world for actions in line with the goals. Outcomes included 12th of 1081 institutions for contributions to SDG5, Gender Equality; 14th of 504 institutions for SDG14, Life Below Water; and 57th of 901 institutions for SDG10, Reduced Inequalities. Reflecting CQUniversity's collaborative engagement, for SDG17, Partnerships for the Goals, the University ranked equal 64th of 1625 institutions.



This commitment to the UN SDGs, accessibility and inclusiveness, engagement and social innovation, underpins the University's research, and is reflected across CQUniversity's research impact.

## LEARNING AND TEACHING INFORMED BY RESEARCH

The research conducted at CQUniversity helps to guide the design and delivery of learning and teaching. CQUniversity strives to achieve a connected approach to research, learning and teaching, believing that 'real-world' research impacts not only the community it operates in, but also a student's experience across disciplines. This is evident in the way academics draw on their personal research in designing and teaching courses, where their research informs learning activities and academic discussion on contemporary issues. Research tasks are also embedded in many undergraduate programs, providing students with opportunities to grow their understanding through knowledge creation.

## RESEARCH CENTRES AND INSTITUTES

CQUniversity has two research institutes – The Appleton Institute and the Institute for Future Farming Systems – and eight research centres including the Jawun Research Centre, Centre for Hydrogen and Renewable Energies, Centre for Intelligent Systems, Centre for Railway Engineering, Centre for Research in Equity and



Dr Amy Johnson (right) discusses her research project HomeFront Stories with community partner Beck Rayner from the podcast *Military Life*. HomeFront is a story telling initiative designed to support defence force families in sharing their unique experiences to grow connection and reduce isolation.

Advancement of Teaching and Education, Centre for Regional Economies and Supply Chains, Queensland Centre for Domestic and Family Violence Research and the Coastal Marine Ecosystems Research Centre.

## RESEARCH FOCUS AREAS

- » **Regional economies and supply chains**
- » **Work, employment, regulation and governance**
- » **Sustainable business and community justice**
- » **Education**
  - » Open and distance education
  - » Creative education in the arts
  - » Learning and assessment innovation for educational equity
  - » STEM education
  - » Education for global competence
  - » Transformative education practices in professions
- » **Railway engineering**
- » **Artificial intelligence and machine learning**
- » **Clean energy**
  - » Biofuels
- » **Pavement engineering**
- » **Big data analytics**
- » **Aviation human factors**
- » **Healthy behaviours at work, rest and play**
- » **Psychology and wellbeing**
  - » Sleep and biological rhythms
  - » Physical activity
  - » Emergency and disaster resilience
  - » Gambling and addictive behaviours
  - » Regional health and health services
  - » Human factors and safety science
- » **Agricultural systems**
  - » Agricultural management systems
  - » Agricultural extension/translation
- » **Environmental systems**
  - » Environmental monitoring and management
- » **Exercise and sports science**
- » **Applied medical health**
  - » Medical and applied physiology
  - » Advanced clinical practice
- » **Quality and safety in healthcare**
  - » Patient safety and consumer experience
  - » Clinician's capacity building
  - » Health workforce Clinical workforce
  - » Models of care
  - » Preparation for, and transition to, practice
- » **Safe communities**
  - » Gendered violence
  - » Violence, abuse and neglect
- » **Psychosocial wellbeing**
  - » Aged care
  - » Individuals, families, and communities
  - » Mental health nursing

# RESEARCH HIGHER DEGREE (RHD) TRAINING ACADEMIES

The Research Higher Degree (RHD) Training Academies aim to attract and train clusters of RHD candidates by specific discipline areas, by cohort profile or by geographic cluster. Each Academy has been established through demonstrated ability to deliver a culture of research excellence, research impact and research engagement, particularly with respect to timely completions, publications, and partnership opportunities with industry. CQUniversity has four RHD Academies: Creative Arts Research Training Academy, Health Workforce Academy, Clean Energy Academy, and the Jilbay Research Higher Degree Academy.

## JILBAY RESEARCH HIGHER DEGREE ACADEMY

The Jilbay Research Higher Degree Academy is an Aboriginal and Torres Strait Islander research-focused community of practice hosted within the Jawun Research Centre and the Office of Indigenous Engagement (OIE) in collaboration with the School of Graduate Research. The Academy is the first internally funded academy of its kind for any Australian university.

It aims to build the research capacity of Aboriginal and Torres Strait Islander Research Higher Degree (RHD) candidates and their supervisors by developing and undertaking Indigenous research projects and establishing partnerships in collaboration with other CQUniversity schools, research centres and institutes.

The Academy aims to support existing and future First Nations RHD candidates with a specific focus on addressing the known barriers to Indigenous RHD completions; grow capacity in Indigenous RHD supervision and the application of Indigenous research methodologies, with a focus on best practice; and contribute to CQUniversity's overall impact in Indigenous research.

Jilbay means old peoples' wisdom, and in every essence of the word, it's the sharing of old people's wisdom that makes students clever (Jilbaybili), likewise making supervisors and fellows more culturally clever (Jilbaymali). Therefore, Jilbaybili (students) and Jilbaymali (supervisors) are the two critical components of the Jilbay RHD Academy.



Jilbay RHD Academy staff and students at the 2023 residential in Rockhampton (Darumbal Country).



# RESEARCH BITES

## CATTLE GO NUTS FOR TRIAL

Farmers across Northern Australia might soon be able to take three bites of the proverbial peanut, with grain and graze trials delivering promising results for a new multi-purpose production system. Preliminary results from the Grain and Graze North project, led by CQUniversity, in partnership with the Peanut Farming Services team at Bega Group (Bega) and principal co-investment from the CRC for Developing Northern Australia (CRCNA), indicate that peanuts can provide up to one tonne per hectare of biomass for cattle fodder without significantly compromising end of season nut yields. Lead researcher Dr Tienieke Trotter said that if successful, the concept would open the way for farmers and graziers to diversify their revenue streams by producing the crop for nut markets, as well as harvesting biomass for livestock fodder both during and at the end of the growing season.

## MARINE PARASITES UNDER THE MICROSCOPE

CQUniversity's Dr David Vaughan is shining a light on some of the world's smallest and often overlooked creatures through new research into marine parasites. The fish parasite taxonomist, a biologist who specialises in the classification of organisms into groups on the basis of their structure, origin and behaviour, has described and illustrated new materials for a group of flatworms known as the Monogenea. Monogeneans are generally ectoparasites, which means they live on the external surfaces of their hosts, typically fishes. Dr Vaughan has a particular interest in those from sharks and stingrays. Monogenean infections are a significant concern in aquaculture and fisheries industries as these parasites can cause various health issues in fish, including tissue damage, reduced growth, and increased susceptibility to other diseases.

## HEALTH TASKFORCE APPOINTMENT

CQUniversity exercise science researcher Dr Melanie Hayman has joined a Women's Tennis Association (WTA) taskforce for championing women's health, alongside former World Number One star Kim Clijsters and Australian champion Rennae Stubbs. Dr Hayman, who has spent more than a decade driving research into women's exercise during pregnancy and postpartum, is one of only four Australian researchers invited to join the international panel of medical and sports science experts on the taskforce. Dr Hayman said the WTA's Health Taskforce came at a pivotal time for improving understanding, education and aspirations around competitive sport and motherhood. Current physical


activity guidelines are primarily written to service the general obstetric population, and therefore offer limited guidance for elite athletes who routinely exceed current guideline recommendations. She is also working with the Queensland Academy of Sport and the Australian Institute of Sport to develop evidence-based, best-practice guidelines for elite athletes during preconception, pregnancy, and in their return to sport postpartum.

## KETO TO HELP CHRONIC FAT CONDITION

A CQUniversity research study has shed light on the potential benefits of ketogenic diets for managing depression in women with lipoedema, a chronic medical condition that causes abnormal fat deposition in the legs, arms, and other areas of the body. According to researchers Chantelle Clarke and Associate Professor Talitha Best, the accumulation of fat cells can cause swelling, pain and bruising, which in about 40 per cent of lipoedema cases impact patients' mental health, leading to depression. This under-researched, regularly undiagnosed, and misunderstood condition is often misdiagnosed as obesity. There is currently no cure for lipoedema, making research into treatment options to help address the symptoms, improve quality of life, and slow progression, even more important. While a ketogenic diet is recommended as a lipoedema treatment option to manage the painful inflammation, Ms Clarke said more work is needed to understand the relationship between diet and mental health in lipoedema patients.

## REDUCING HOUSEHOLD WASTE

A toolkit developed by CQUniversity researchers with the Fight Food Waste Cooperative Research Centre is poised to help Australian households reduce their massive amounts of food waste. Food waste currently costs Australia \$36.6 billion, with households contributing \$19 billion – or over half – of that value. With Australia committed to halving its food waste by 2030, a reduction of at least 30 per cent by households is required to meet this target. *The Household Food Waste Reduction Toolkit: A Step-By-Step Guide to Delivering Interventions in Australia* is the first national and comprehensive guide to help practitioners design and deliver household food waste reduction interventions. The toolkit is a shared initiative by the Fight Food Waste CRC and CQUniversity, supported by funding from the Australian Government's Department of Climate Change, Energy, the Environment and Water.

A photograph of Dr. Biplob Ray, an academic in Information and Communications Technology, in a laboratory setting. He is wearing glasses, a blue collared shirt, and a dark sweater. He is holding a white IoT device with several ports. The background shows a desk with a computer monitor and a lamp.

Information and Communications Technology academic Dr Biplob Ray demonstrates Internet of Things (IoT) technology central to research projects across CQUniversity's Centre for Intelligent Systems and Institute for Future Farming Systems. CQUniversity's drone, IoT, mechatronics and agriculture specialists are leading an industry-partnered project which is targeting weeds in broadacre crops using artificial intelligence-driven drones equipped with mechatronics. The project is one of just 12 projects to share in \$18 million of funding in the new Emerging Aviation Technology Partnerships (EATP) program.

# CULTIVATING CAREERS WITH AGRI-TECH EDUCATION

Associate Professor Amy Cosby, Dr Jaime Manning and the Agri-tech Education and Extension cluster

Research-informed Agri-tech Education and Extension programs inspire primary and secondary students, via tech and problem-solving, for careers in agriculture, working with industry to ensure a passionate pipeline of future leaders for Australia's vital food and fibre sectors.



Associate Professor Amy Cosby

Careers in agriculture go far beyond milking cows or planting crops – and to future-proof Australia's \$76 billion agriculture industry, the next generation must understand the increasingly high-tech demands of the sector.

CQUniversity's Agri-tech Education and Extension cluster is leading practical school outreach projects to connect students with innovation, industry challenges, and employers, and has already

helped thousands of young people gain insight into the diverse agriculture industry.

The group of evidence-based researchers and practitioners collaborate with government, producers and industry bodies across Australia to tackle and solve real-world problems within agricultural supply chains, with a central focus on workforce and careers.

Delivering 10 projects in 2022, the Agri-tech Education and Extension team reached nearly 4500 students, delivering workshops at schools and on site with primary producers in 63 locations in five states across Australia.

The 2022 program also included agriculture education professional development for more than 440 teachers and industry representatives.

Associate Professor Amy Cosby is a CQU Senior Research Fellow, and leads the Agri-tech Education and Extension program.

Based in Gippsland in Victoria's south-east, Assoc Prof Cosby says that projects focus on creating connection with industry and young people to inspire and attract the next generation workforce.

"Our collaborators are all dealing with skills shortages, and some of our key projects began with comprehensive consultation about the prospects they could see for young people in the agricultural industry, and how to get students aware of those opportunities, and excited about them," she explains.

In 2021, Assoc Prof Cosby and the Agri-tech Education and Extension team surveyed more than 5000 primary and secondary students about their knowledge of agriculture, finding the majority considered agriculture to be a 'low-tech industry'.

Concerningly, four in five primary students and three in five secondary students believed commercial milking of dairy cows occurred by hand, rather than by machine.

"Modern farming practices are not being adequately portrayed to Australian students, and that's a likely contributing factor to skilled workforce shortages," says Assoc Prof Cosby.

But the Agri-tech Education and Extension cluster are actively bridging the gap.

EXCITED 4 Careers in Agriculture is a joint initiative between CQUniversity and seven primary production industry groups, and has attracted funding from the Australian Government's National Careers Institute.

The two-year project stretched across five states and territories, and supported students to identify their strengths and interests that might align with agriculture careers.

In South Australia's Clare Valley, CQU Agriculture Lecturer Dr Jaime Manning says students were keen to get their hands dirty as they uncovered careers in the wine industry, tested soil, assessed grapes, and explored local wineries.

"When we're face to face and delivering activities, we see students' joy of getting to try new things, to think outside the square, and most importantly break down some of those stereotypes about what a career in agriculture looks like," she says.

The hands-on activities are curated to embed career guidance activities in classrooms, and strengthen the ability of teachers, parents, and industry professionals to support students exploring their career interests.

Since 2020, the RACE (Raising Aspirations in Careers and Education) initiative has also worked with key Victorian communities to connect classrooms with ongoing career role models and potential employers from agribusiness, farming and processing companies.

Piloted in Gippsland, the successful project has now expanded to Victoria's horticultural heartland in the Goulburn Valley.



Dr Jaime Manning facilitates the Agri-tech Education and Extension Program at a school in Clare Valley in South Australia

Engaging, STEM-based activities challenged students in creative ways, from using accelerometers to simulate how animal behaviour can be monitored using technology, to comparing potato varieties for chip production and waste reduction, and measuring sugar, protein, fat and calcium content of cow milk compared to soy, almond and oat alternatives.

Other projects include GPS Cows, a collaborative project funded by the NSW Department of Education connecting researchers, industry professionals and educators in Australia and the USA, to skill up high school students and teachers with tools and systems for animal location and behaviour data.

The Farm Safety project, a Commonwealth-funded initiative, in collaboration with industry and local government across QLD, NSW and VIC, educates and upskills students, their parents and teachers about the safety risks inherent in agricultural work, and how to mitigate these to prevent injury and fatality.

Assoc Prof Cosby says across all the projects, increasing skills, knowledge and aspiration for students had immediate flow-on effects for businesses and industry.

"I really enjoy hearing from teachers that parents of students describe how excited their child was about the new technology they used in our activities, and now because of this their parent is considering using it within their agricultural business," says Assoc Prof Cosby.

"Young people are excellent agents of change, and are a really untapped resource for agriculture.

"Technology is transforming the way we produce food and fibre in Australia and across the globe.

"So, if we can give young people the confidence and skills to use agri-tech and get them passionate about it, they will be the catalyst that revolutionises the agriculture industry."

## DESCRIPTION

CQUniversity's Agri-tech Education and Extension programs are evidence-based and innovative to increase skills, knowledge and confidence of young people in agri-tech tools and systems. The programs are developed collaboratively with primary producers and industry organisations to future-proof the food and fibre sectors.

## PARTNERS

Australian Government's National Careers Institute; NT Farmers; Sugar Research Australia; AgForce; Australian Prawn Farmers Association; Cotton Australia; Wine Australia; GippsDairy; Victorian Department of Education and Training; TAFE Gippsland; VegNET Project Gippsland; Goulburn-Murray, Baw Baw Latrobe, South Gippsland Bass Coast and Gippsland East Local Learning and Employment Networks (LLENs); NSW Department of Education, Port Macquarie Hastings Council; and Kempsey Shire Council

## IMPACT

In 2022 alone, nearly 4500 students participated in activities, alongside more than 400 teachers, parents, and industry representatives. In post-activity surveys, the large majority of students said they had a better understanding of agriculture career options due to their participation.

# YOUTH ISSUES, NO DRAMAS

Dr Linda Lorenza and Dr Luke Price

A CQUniversity research project is using applied theatre to enable youth-led communication on health and justice priorities in regional Queensland.



Dr Linda Lorenza

An innovative take on research integrating applied theatre, community legal education and social media trends has taken on the oft-fraught landscape of addressing the social, health and justice challenges of regional young people.

Led by Dr Linda Lorenza, CQUniversity Head of Course for the Bachelor of Theatre, and Dr Luke Price, Head of Clinical Legal Education for the College of Law, Criminology and Justice, the *No Dramas* project aimed to elevate and improve the messaging around prevalent issues facing young people today, creating content by young people for young people, through a participatory action research (PAR) approach that challenged traditional law and health messaging to further enhance community education and engagement strategies.

Identifying a major disconnect between how information has been delivered to youth and their actual communication needs, the research team built on key foundations of community-identified priorities and youth forum findings, and integrated applied theatre and street law community education practices. Through this process, social media was identified as an under-utilised tool for delivering impactful key messages that would resonate with young people. A key outcome of this project was the development of an accessible platform for not only highlighting youth priorities, but also empowering young people to address health and justice challenges.

The research was initiated through a pilot study conducted in partnership with Darumbal Community Youth Service Inc and other regional community organisations, and informed by both the findings of this pilot and from follow-up forums and interactive drama workshops. Co-production of short-form content through collaboration between young people, academic researchers and community partners was central to the PAR methodology. It produced outputs that disseminated information to empower young people in facing complex issues, and to engage on equal footing with both this research and broader discourse.

“These participatory and applied theatre processes provided substantive information and education, both for the participant youth researchers and the broader community,” says Dr Lorenza.

“At the same time, the participatory framework voiced participants’ experiences of health and justice, integrating their understanding and thereby enabling the project to address the research question: What communication practices aimed at improving justice, health and wellbeing outcomes best align with young peoples’ lived experience and priorities?”

“So, we looked at providing platforms for young peoples’ voices on health and justice issues; enhancing relationships between state organisations and young people regarding health and justice matters; and empowering young people and organisations to seek better outcomes in health and justice by building communication skills and channels.”

Covering topics including interaction with the police and criminal justice system; impacts of drug and alcohol consumption; vaping; and cyber bullying, a team of young actors and a videographer comprised of both Indigenous and non-Indigenous talent were enlisted to bring these topics to life through engaging short-form content. This created a dynamic where participants were empowered to participate in content development, production, and importantly the sharing of content through peer networks. This knowledge sharing has seen the content clock over 10 000 views across YouTube Shorts, TikTok and Instagram Reels.

The PAR process was embedded within careful research design, facilitation and supervision by CQUniversity researchers. The academic research team also administered the project, ensured ethical compliance, and collected and analysed the data. Data from the research indicated that, within the context of high prevalence of significant challenges regarding substance abuse, police interactions and bullying, additional information sources and pipelines were needed to connect with and support young people in Central Queensland, in Australia.

Targeted engagement in these key areas produced educational, audience-specific content, and youth participation enabled greater understanding and recognition of current issues. Through the PAR process, youth participants were emboldened to take charge of the narrative and offer new perspectives, both in the co-production of videos in this project, and in ongoing discourse regarding responses to youth priorities. Young





Dr Linda Lorenza with the No Dramas team

people were then also able to identify where and how to source information to help in times of need and struggle or to support others, to participate in knowledge sharing and collaboration, and were empowered as voices for change.

Iterations of the project will continue with a view to re-engage with the same community youth groups to follow up and evaluate project outputs and responses. Subsequent iterations will also be integral to championing valuable youth perspectives within health and justice narratives and strategies, and demonstrating a commitment to youth voices irrespective of their isolated regional locations.

This project was approved for funding in 2022 by the Queensland Department of Environment and Science through a closed round of the Youth Research Grants Program which coincided with Youth Week and was supported by the then Queensland Minister for Science and Youth Affairs, the Honourable Meaghan Scanlon MP.

The aim of the Program was to stimulate interest in research which reflects the needs and views of young people through enabling them to be involved in setting priorities and selection of research projects. Participation was invited from youth under the age of 25 years and from a diverse range of backgrounds. The program was available to the following Queensland universities: CQUniversity, Griffith University, James Cook University, Queensland University of Technology, University of Southern Queensland, The University of Queensland, and University of the Sunshine Coast.

## DESCRIPTION

*No Dramas* is a participatory action research project using applied theatre in regional Queensland in Australia to enable youth-led communication on health and justice priorities.

## PARTNERS

CQU researchers Dr Corey Bloomfield, Dr Vicki Pascoe, Dr Alexandra McEwan, and Dr Masahiro Suzuki; young people from participating organisations and representatives of the CQ Health Youth Reference group, creative team comprising Jahvis Loveday (videographer), Agnes Mohan, Amy Stockow, Tibian Wyles, Lenny Donahue (actors); and Queensland Department of Environment and Science

## IMPACT

This participatory action research in conjunction with applied theatre has developed information sources and communication processes that empower young people in Central Queensland in Australia to navigate challenges related to health and wellbeing, and youth justice. In doing so, the research explored the complex lived experiences, needs, priorities and multi-layered disadvantage of Indigenous and non-Indigenous young people in Central Queensland, both in interconnected health matters such as alcohol and substance abuse, mental illness, and criminal justice interactions like street checks, arrests, and interviews. This research has received state recognition, being awarded the Queensland Family and Child Principal Commissioner's Award for Youth Advocacy and Youth Research Panel Wellbeing and Health Award.

# SALT EDUCATION ASSISTING PATIENTS WITH HIGH BLOOD PRESSURE

## Dr Saman Khalesi

Salt adds to the taste and flavour of our food, but too much of it can lead to many health problems including high blood pressure or hypertension – a silent killer and a significant risk factor of cardiovascular disease that takes around 18 million lives each year worldwide.

“Our body needs sodium to function properly, but most of us eat an excessive amount of it as salt (which contains 40 per cent sodium),” says Dr Khalesi.

“We tend to consume more than twice the five grams of salt per day recommended by the World Health Organisation and Heart Foundation to maintain a healthy heart.

“This excessive salt intake leads to water retention and pressures the blood vessels and the heart, and increases calcium loss. In fact, even a slight reduction in daily salt intake may reduce the risk of high blood pressure, cardiovascular events and bone loss.”

Dr Khalesi says the majority of salt in food was ‘hidden’.

“More than 70 per cent of the salt we eat is hidden in commercial and processed food products,” Dr Khalesi explains.

“They may not even taste salty, as the saltiness can be masked by other tastes and spices, making it difficult for us to understand how much salt we are consuming.

“Salt intake reduction is the first line of treatment for high blood pressure. But it is difficult to choose lower salt foods.

“Complex commercial food labels, availability of healthier food options, individual preferences and likes and dislikes – all need to be considered when planning to reduce salt intake.”

Along with fellow researchers, Dr Khalesi has developed a web-based salt education program called SaltED which interacts with consumers and provides personalised feedback on salt reduction.

“The program was developed as a result of years of research in collaboration with consumers, hypertensive adults, professionals and experts in the field, to help Australian adults with high blood pressure reduce their salt intake by providing personalised feedback on their current salt intake habits,” he says.

Adults with medically diagnosed high blood pressure or hypertension, or those with consistent systolic blood pressure  $\geq 130$  mmHg and/or diastolic blood pressure  $\geq 85$  mmHg have been encouraged to participate in the SaltED program.

“SaltED is an online platform that provides personalised content to educate individuals with high blood pressure about their salt intake habits and help them to choose lower salt foods, like a 24/7 salt coach,” says Dr Khalesi.

“Given that the majority of Australians have the internet, they can easily access SaltED from anywhere at any time.

“For those living in remote and rural areas, older adults, and those that are disadvantaged, access to a regular face-to-face consultation with health professionals can be limited. Personalised online interventions can mimic interaction with health professionals and offer an engaging and effective program that reaches large populations at a low cost.”

Now in its final ‘intervention’ phase, Dr Khalesi says that SaltED already has more than 500 users around Australia.

“It is a five-week intervention including personalised modules that focuses on specific salt intake behaviour and food groups each week.

“While we are still collecting information from participants, the feedback suggests that they have found it helpful and engaging.

“This is encouraging for us. If the results suggest SaltED helps with improving salt behaviour in adults with high blood pressure, then it can play a major role in hypertension management in Australia, especially for those who can’t easily access traditional face-to-face interventions.”



### DESCRIPTION

SaltED is a web-based behaviour change platform and research project, developed to help people reduce the salt in their diet and prevent and manage high blood pressure.

### PARTNERS

Professor Corneel Vandelanotte, Physical Activity Group leader, Appleton Institute, CQUniversity; Professor David Johnson, Director of Metro South and Ipswich Nephrology and Transplant Services, Princess Alexandra Hospital and Professor of Medicine at University of Queensland; and Professor Jacqui Webster, Director of the World Health Organisation Collaborating Centre on Population Salt Reduction at the George Institute, a leading independent global medical research institute with major centres in Australia, China, India and the UK.

### IMPACT

SaltED is an innovative, low-cost, highly accessible and personalised web-based coaching program to help Australian adults with high blood pressure reduce their salt intake and prevent and manage hypertension. Even a small reduction in salt intake can reduce the risk of cardiovascular events and save lives.

Dr Saman Khalesi



# THE RISK OF POORLY-CONSIDERED RAIL SAFETY TECH

Professor Anjum Naweed and Dr Stephanie Chappel



Professor Anjum Naweed

Implementing new rail safety technology is precarious business and a research partnership between CQUniversity and Keolis Downer Adelaide illustrates just how important it is to consider the broader operating environment, and the people who will use it.

Generic technologies, like Automatic Train Protection (ATP), often boast impressive safety capabilities. However, research led by CQUniversity

Professor Anjum Naweed points out that even the most safety-conscious tools won't perform well if they don't complement the end-user's working style, or unique track requirements.

ATP systems communicate with drivers through numbers, colours and instructions on a display in the cab. When these displays don't work synergistically with the driver, it can create unsafe situations. A system that overprescribes information or instructions to the driver also risks creating errors.

An untailored, or poorly considered, safety device could threaten safety and wreak havoc on the broader network, says Prof Naweed.

"The best way to describe it is using a puzzle analogy. If you try and squeeze the wrong piece into a jigsaw, you could damage that piece, damage the wider jigsaw and, even if you make it fit, create a picture that doesn't quite look right."

CQUniversity has been helping Keolis Downer Adelaide, the operators of the metropolitan rail services in Adelaide, South Australia, deal with the challenges of operating an untailored ATP system on the Belair line after it inherited one from its former management.

"There are sections of steep gradient and single track on this line and segments where lots of cyclists come on board and impact delays. When the track is already very challenging for drivers, issues with poorly calibrated devices are more pronounced," says Prof Naweed.

Some train drivers expressed a strong dislike for the safety device, complaining about its alerts and claiming it added pressure to an already stressful situation. It was also thought to be overly conservative and did not allow drivers to operate at speeds they considered safe. These issues negatively impacted the timetable, as well as the drivers' sense of job fulfilment.

"Not being able to keep to time can make train drivers question their competency and take pride out of the profession," says Prof Naweed.

"It's strange to think that these devices, which are intended to make things more efficient, can have the opposite effect. In this case, performance in the entire network was diminished along with the drivers' sense of purpose. It was a piece of the puzzle that sent ripples across the broader jigsaw and distorted the whole picture."

A well-designed ATP works in harmony with the driver's existing competencies and workload.

"Such a system is adaptive and steps in when the driver's workload is high and backs off when it reduces. A poorly designed ATP will make decisions that conflict with the driver's own and give instructions that correspond poorly with the outside world," Prof Naweed says.

"This breeds distrust and resistance. It is important to take a closer look at how ATP fits with the existing rail technology, and make adjustments that recognise the nuances of the track and driver population."

To compensate for the challenges and limitations around technology adjustments, developing a tailored training program is also a sensible idea Prof Naweed recommends.

"Rail operators need to analyse the training needs of their team before they begin upskilling them on new systems like ATP. Insufficient or poor-quality training leaves drivers unclear on how the system functions and creates a multitude of issues. When drivers aren't properly informed, they have little choice but to create their own theories and introduce new safety risks. When they are properly informed, there are performance and efficiency gains to be made."

Prof Naweed says consultation with drivers and wider stakeholders is critical before purchasing any new rail technology and protecting the delicate ecosystem of rail operations.

"Listening to driver concerns can ensure the technologies suit those drivers that make quick and accurate decisions, have clean safety records, and feel



uncomfortable changing their way of working. Equally, it can ensure they suit less experienced drivers who feel uneasy making rapid-fire safety decisions, and therefore need more help. Of course, you will never be able to design a fool proof system, but you can design one that doesn't create 'error traps' for the driver."

"Prioritising human factors in design speaks to the broader culture of safety engagement, particularly in a highly regulated, unionised industry. There is a lack of autonomy in train driving, so if you are not consulting with drivers before making a major change to their workplace, they will feel dehumanised. This will affect their wellbeing, decrease safety performance, and ultimately, impact the bottom dollar."

The research has been conducted in collaboration with Engineering. Systems. Management., and Tom Hampton Group, with tremendous support from Keolis Downer Adelaide, both based in South Australia.

"Research like this is difficult to undertake without organisational support and Keolis Downer Adelaide has welcomed the scientific and ethical needs of the project and provided an 'open door' policy, enabling unfettered access to existing data and collection of new data. It's been an exciting partnership, there's been lots of mutual support and learning, and this research will have high impact," says Prof Naweed.

The research was recently presented at the 2023 Annual Rail Safety Conference in Sydney, Australia, and biennial 2023 Conference on Railway Excellence in Melbourne, Australia.

## DESCRIPTION

The performance of the Belair line in Adelaide, South Australia, has been impacted by the introduction of Automatic Train Protection technology. Using a multi-pronged approach, researchers studied the technology and have shown that this impact is far-reaching and reflects a failure to appropriately consider human factors in its design and implementation.

## PARTNERS

Keolis Downer Adelaide, Engineering. Systems. Management. and Tom Hampton Group

## IMPACT

The research project targeted multiple improvements across different target categories and system levels. A total of 25 targets for enhancement across eight broad categories were identified. These are being used to develop an overall strategy and comprehensive roadmap to deal with business improvement needs associated with the Belair line and ATP, and improve overall system performance.

# TRANSFORMING PLASTIC WASTE INTO THE FUEL OF THE FUTURE

**Professor Mohammad Rasul and Dr Md Jahirul Islam**

A three-year first-of-its-kind plastics-to-fuel project could be the solution to the world's landfill woes and provide an alternative energy source to traditional petroleum fuels.

CQUniversity Mechanical Engineering Professor Mohammad Rasul and Advance Queensland Industry Research Fellow Dr Md Jahirul Islam have worked in partnership with Northern Oil Refinery (NOR), SynBio Pty Ltd, and RMIT on this innovative project.

Funded by the Cooperative Research Centre project for more than \$1.8 million, CQUniversity is receiving \$475 750 of that, to develop the testing and research.

"Landfill waste generates huge environmental pollution, and its management is costly. At the same time, petroleum fuel production is declining and is a carbon management issue," Prof Rasul says.

"This project developed processes for converting waste plastics, such as bottles, Styrofoam boxes, plastic furniture, toys, and PVC pipes into fuel, which is like Australian-standard grade diesel fuel," Dr Islam says.

"The project serves to supplement the Australian energy demand by providing long-term energy security and reducing landfill waste in an environmentally safe way."

Prof Rasul explains the process includes crude oil generation from waste plastic through a pilot-scale pyrolysis process and subsequent refinement through distillation and hydrotreatment process.

"Our research shows that the process can be scaled-up for commercial production of alternative diesel from waste. The diesel generated from total landfill waste can meet up to 70 per cent of Australia's fuel demand which can inject up to \$20 billion per year into Australian economy, while lowering the \$53 billion per year landfilling and waste management costs," he says.

The project has 3-stages: the first being crude oil generation from waste; the second refining crude oil into Australian standard diesel, and the final stage being fuel testing for engine performance and emission.

The project has since achieved all three goals and milestones. The crude oil from waste plastics has been produced at CQUniversity using its 20L size pyrolysis reactor. Crude refinement has been done at NOR and SynBio using their industrial-scale distillation and hydrotreatment process. RMIT has developed a catalyst to improve the fuel quality into diesel grade through a hydrotreatment process at NOR and SynBio. Engine testing has been done at CQUniversity.

No doubt, similar benefits can be achieved by any country in the world. The fuel generated from plastic waste has been tested in a full-scale diesel engine

which provided similar or better results in terms of engine performance and emission. It has successfully achieved the project goal and milestone.

Prof Rasul says the pilot-scale project was expected to be completed by mid-2023.

He says the project involves looking at the next phase which is upscaling to a more commercial-sized plant.

"The technology and processes have been developed at pilot-scale for processing plastic waste. The set-up, in particular the pyrolysis reactor, should be upgraded into a bigger commercial scale," he says.

"Therefore, the full potential of the project can be demonstrated and achieved. With CQUniversity's research expertise, the analysis and calculation can be done for scale-up design of the pyrolysis reactor."

For his outstanding expertise and contribution in the field of waste-to-energy technology, Dr Islam won the prestigious Advance Queensland Industry Research Fellowship (AQIRF) award in 2021 with a research grant reward of \$360 000 from the Queensland Department of Tourism, Innovation and Sport.

The Advance Queensland project budget is \$1 248 000 which includes \$360 000 Advance Queensland funding and \$885 000 industry injection from NOR and SynBio. While leading this project as chief investigator, Dr Islam has benchmarked, integrated and optimised waste-to energy technologies (pyrolysis, distillation, hydrotreatment) to establish an optimal commercial mixed waste-to-fuel value chain.

"The project focus is to scale up the waste-to-energy technologies that will lead to Queensland's first commercial (>500 ML/annum) renewable fuels refinery which will operate on mixed waste feed," Dr Islam says.

"The Advance Queensland aspect of the project is about integrating and optimising all the processes with an aim to scale-up to process both waste plastics and end-of-life tyres.

"This research project is the first of its kind in Australia conducted at pilot-scale and has the potential to create a new alternative fuel industry domestically, starting with waste conversion at the source, such as landfills and transporting the crude oil to a centralised refinery for upgrading and distribution."



### DESCRIPTION

CQUniversity is taking the lead in a three-stage diesel production project which sees crude oil generated from waste; refining crude oil into Australian standard diesel, and testing of the fuel for engine performance and emission.

### PARTNERS

Northern Oil Refinery (NOR), SynBio Pty Ltd, RMIT and Advance Queensland.

### IMPACT

This first-of-its-kind waste to fuel project is on its way to creating an alternative diesel fuel in Australia, providing up to 70 per cent of the nation's supply needs and injecting up to \$20 billion per year into economy, while lowering the national \$53 billion per year landfill and waste management bill.

Dr Jahirul Islam and Professor Mohammad Rasul

# DRIVING AGTECH INNOVATION

Professor Phil Brown, Dr Karli Groves, Dr Alison Jensen and Dean Collins

The Hinkler AgTech Initiative, managed by CQUniversity, has helped expand agricultural production and profitability throughout the Wide Bay Burnett region, in Queensland, by assisting local agribusinesses access the latest AgTech.

The Hinkler AgTech Initiative is led by CQUniversity's Institute for Future Farming Systems (IFFS) and is funded through the Hinkler Regional Deal. The Hinkler Regional Deal is a collaboration between the Australian Government, Bundaberg Regional Council and Fraser Coast Regional Council.

By taking a research-based approach, the Initiative sought to facilitate collaboration between AgTech innovators and primary producers to improve on-farm efficiencies and productivity.

The Hinkler AgTech Initiative facilitated 52 on-farm trials which directly involved 30 local agribusinesses and 30 AgTech product and service providers.

The range of AgTech trialled included a digital harvesting assistant; swarm drones; weather monitoring; laser-based bird control systems; automated pest-control; high-resolution crop monitoring; satellite-connected feral pig trapping system; honeybee pollination mapping; integrated farm management; unmanned terrestrial vehicles; robotic picking/packing units; automated spore trapping, crop imagery and analysis; on-farm connectivity, yield mapping and optimisation and intelligent spray control systems.

The commercial, on-farm nature of CQUniversity's AgTech trials, along with the one-on-one grower engagement and feedback processes facilitated between growers and AgTech providers, resulted in the refinement of many AgTech products and services to better suit grower needs.

CQUniversity's Professor Phil Brown, Director of the Institute for Future Farming Systems and team leader for the Hinkler AgTech Initiative, says a focus on grower needs maximised the impact.

"All of our project processes were grower-pulled, rather than product-pushed," says Prof Brown.

"The team focused on using our networks to match appropriate AgTech products and services with grower needs."

The technology monitors mould disease in strawberry crops, resulting in the development of a new model designed to detect downy mildew spores in crops such as basil.

In addition to trials of single AgTech applications, the team worked with several agribusiness on trialling different AgTech solutions in parallel.

"Bundaberg's Eden Farms is one of Australia's leading protected cropping enterprises and partnered AgTech providers to investigate the efficacy of various technologies within their enterprise," says Prof Brown.

"Bundaberg operator OzTech Drones was engaged to spray whitewash medium over seven hectares of greenhouse covers on the farm, which realised significant cost savings and safety benefits over traditional spray methods (helicopter or manual spraying), with the grower continuing to engage drones for this critical activity.

"Meanwhile, Bitwise Agronomy's 'GreenView' technology used off-the-shelf GoPro cameras attached to farm vehicles or machinery to capture video imagery of crops, which is then analysed using AI for yield estimation and forecasting purposes. An XAG unmanned terrestrial vehicle, fitted with a Go Pro camera was also deployed by Oztech Drones, capturing imagery of baby cucumbers. This resulted in a new system for detecting, classifying and counting cucumbers becoming commercially available for protected cropping growers.

"The Harvest Ant 'electronic harvesting assistant' was also trialled for monitoring the harvesting of baby cucumbers. Data provided to the grower was summarised by row and picker identification and used as a basis for performance-based incentives."

As well as implementing and reporting on the trails, the Initiative also worked closely with local high schools in Childers and Gin Gin in the development of AgTech curriculum within the secondary agricultural education program.

The curriculum is now being adopted by other secondary schools with the aim of promoting agriculture and AgTech as a viable and attractive career path for students.

## ROBOTIC PACKING / SORTING TECHNOLOGY

LYRO Robotics, and two local agribusinesses Marto Farms and Littabella Pines, trialled a robotic unit to determine its efficacy at packing zucchinis and sorting pineapple tops.

The trial data was used to make further refinements to the robotic unit so that it can be on a commercial basis in several horticultural packing and sorting lines throughout Queensland.





Dr Alison Jensen (CQU), Norton Kelly-Boxall (LYRO), Dr Karli Groves (CQU) and Juxi Leitner (LYRO) at Robotic Unit trial

### AUTOMATED DISEASE MONITORING

The BioScout platform was trialled with SSS Strawberries using a remotely operated spore trap and Artificial Intelligence (AI) models to identify airborne fungal spores. Prof Brown says that informing education programs was another key outcome of the Initiative, as this has the potential to raise agricultural career aspirations among a new generation.

Looking forward, Prof Brown says the Hinkler AgTech Initiative has resulted in many strong linkages between AgTech providers, local agribusinesses and CQUniversity researchers.

“The University’s ongoing agricultural research will continue to grow and utilise these connections, to further our understanding of factors leading to successful application of new technologies.

“This will help ensure Queensland agriculture remains at the forefront of AgTech adoption and productivity.”

### DESCRIPTION

CQUniversity’s Hinkler AgTech Initiative has facilitated expansion in agricultural production and profitability throughout the Wide Bay Burnett region by assisting local agribusinesses access the latest AgTech at early stages of commercial release.

### PARTNERS

**Key project partner:** Bundaberg Fruit and Vegetable Growers (BFBV).

**Local agribusinesses:** Stahmann Webster, Eden Farms, Perfection Fresh Australia, Dandy Produce, CD Herbs Pty Ltd, SunWorld Australasia, Agri-Con, Marto Farms, Macadamia Farm Management, Dicky Bill, Marquee Macadamias, Macadamias Australia, Red Rock Macadamias, DTR Holdings Pty Ltd (Auschilli), Greensill Farming, Littabella Pines, Marto Farms, SSS Strawberries, Makhoma Farms Ltd, Lyons Farming, Sweet Sensations, Sweet Potatoes Australia, Bundaberg Sugar Ltd, Sunripe, Piper Family Farms, Swan Ridge and Donnovans.

**AgTech product and service providers:** Oztech Drones, LYRO Robotics, Guardian Knight Pest Control, BioScout, Harvest Ant, iSCOUT, Bitwise Agronomy, Aerobotics, SwarmFarm Robotics Pty Ltd, RDO Equipment, Agri-Con Equipment, Bee Innovative, Bird Control Group, EE Muirs, Connected Farms, Corematic Pty Ltd, DTN, Green Atlas, Crop Scan Tech, Growlogic Pty Ltd, Inform Ag, Sentera, RapidAIM, Rhyne Horticulture, The Yield, Trimble, Zetifi, Ceres, Trimble, Connected Farms, Escavox and Rhino Instruments.

### IMPACT

The Hinkler AgTech Initiative facilitated 52 on-farm trials which directly involved 30 local agribusinesses and 30 AgTech product and service providers. Through the on-farm trial process, AgTech products and services were evaluated to provide agribusiness with actionable information including costings, performance data, indicative return on investment and product comparisons.

# BREAKING DOWN BEACH BARRIERS

Sasha Job, Dr Steven Obst and Dr Luke Heales

The U-BEACH study is a collaborative project led by CQUniversity Physiotherapy experts to inform planning for improved beach accessibility throughout Australia, facilitating beach-based therapeutic interventions to maximise health and wellbeing outcomes.

Led by CQUniversity neurological physiotherapy lecturer and research higher degree candidate, Sasha Job, the project will contribute to her PhD research thesis under the supervision of Dr Steven Obst and Dr Luke Heales.

As a practicing physiotherapist, Ms Job initially identified the need to develop and evaluate a collaborative and community-driven model of accessibility for beach environments.

"With one in five Australians living with some form of disability, there are a significant number of people who experience terrain and facility challenges when accessing the beach environments," says Ms Job.

"Not only do these individuals miss out on visiting Australia's most popular recreational destination, but they cannot experience the many physical, mental, and social health benefits of beach activities."

In response, Ms Job brought together community members who identified as having a disability, government representatives, surf lifesaving, local disability organisations, health professionals, volunteer organisations and mobility suppliers from across the Bundaberg region, in Queensland, Australia.

The collaborative meeting, and subsequent community research surveys, helped to identify the benefits, barriers and facilitators of beach access for older adults and people living with a disability or mobility limitation.

"Results indicated that beach accessibility was a significant issue in the local region and provided information on the perspectives and lived experiences of people with a disability," says Ms Job.

"Survey results provided key data to understand individual diversity, physical activity levels and beach usage patterns, and identified barriers and facilitators to both travelling to the beach and accessing the beach and surrounds."

These insights only strengthened Ms Job's advocacy for local beach accessibility initiatives, with the researcher securing funding of more than \$30 000 from the Bundaberg Regional Council for U-BEACH, supporting the development of a model of beach accessibility.

In collaboration with local government, industry and community stakeholders, U-BEACH has already been successful in helping to launch the region's first accessible beach at Nielson Park at Bargara, Queensland.

"Some challenges people face include moving through the soft sand and lack of mobility equipment," explains Ms Job.

"The Bargara Surf Life Saving Club is now equipped with specialist resources, such as floating wheelchairs, to allow every member of the community an opportunity to engage in beach-based activities."

According to Accessible Beaches Australia, Nielson Park is one of only 10 beaches in Queensland with accessibility matting.

These facilities at Neilson Park-Beach in Bargara, Queensland, were utilised by Ms Job through the launch of CQUniversity's U-BEACH Community Beach Day in 2023. The inaugural event was held in February 2023.

CQU staff, students and members of the community volunteered their time to help facilitate access to the beach for people of all abilities, providing physical assistance for beach transfers, specialist resources and equipment including beach mats and wheelchairs.

"The event also provided an enriched learning opportunity for CQU allied health students studying physiotherapy, occupational therapy, and speech pathology," explains Ms Job.

"Students applied academic learning to real life, improving problem-solving and teamwork, exposing them to diversity, and developing their sense of social responsibility."

As U-BEACH represents an innovative and community-integrated health initiative that aims to drive social change to improve physical activity rates within the community, it can inform a standard and make it easier for regions right around Australia to prioritise accessible beaches.

Other regional cities, including Gladstone and Hervey Bay, in Queensland, are currently working to implement U-BEACH strategies, ultimately helping to make the State's coast more accessible to people of all abilities.



## DESCRIPTION

The Universal Beach Accessibility Hub (U-BEACH): A pathway to increase physical activity participation, health, and wellbeing in individuals with mobility limitations, is an initiative to help break down the barriers of beach access for people living with disability or mobility limitations.

## PARTNERS

Accessible Beaches Australia, Australian Physiotherapy Association, Bendigo Bank (Community Bank Gin Gin), Bundaberg Regional Council, Bundaberg Surf Lifesaving Club, Cairns Regional Council, Community Lifestyle Support, Coral Coast Physiotherapy and Allied Health, Gladstone Regional Council, Heart of Agnes Community Association, IMPACT Community Services, Independent Living Specialists Bundaberg, Mable Community, Regional Health and Mobility, Rise-up Support Partners, Rotary Club of Bundaberg and Wide Bay Rehab.

## IMPACT

U-BEACH will be the first study to develop and evaluate the impact of a universal beach accessibility program on the health and wellbeing of Australians living with a disability. Consultation through this project has already helped create accessible beaches in Bundaberg, Cairns and Agnes Water, with improvements or modifications to accessibility made at Sunshine Coast and Gold Coast beach locations. The establishment of Bundaberg's first accessible beach subsequently allowed for the launch of the first CQUniversity U-Beach Community Beach Day event in 2023. More than 250 individuals attended the inaugural event, many of whom have not had the physical, technical or social support to access the beach for many years.



Researcher Sasha Job with a client

# AVERTING THE THREAT TO A NATIVE ICON

**Dr Flavia Santamaria and Dr Rolf Schlagloth**

Research and collaboration has driven improved conservation management outcomes for endangered koala populations across Central Queensland, in Australia.

Adverse health conditions and declining populations have been threatening the survival of koalas in certain regions around the country, but concerted efforts from a dedicated research team in Central Queensland are proving to reverse this trend in efforts to see koala populations thriving once more.

Led by CQUniversity researchers Dr Flavia Santamaria and Dr Rolf Schlagloth, the Rockhampton-based team are leading the charge in identifying and mitigating the cause of the decline in the native animals' health and their distribution specifically in Central Queensland, Australia, where little has been known about their habitation numbers.



**Dr Ludovica Valenza (Australia Zoo Wildlife Hospital) and Dr Flavia Santamaria**

While the native animal is known to be one of Australia's favourite icons, there are several threats facing them today including climate change, habitat loss due to natural disasters and urbanisation, disease and motor vehicle strikes, all resulting in declining populations and inducing chronic health conditions caused by stress.

Through Koala Research-CQ (KR-CQ), a community-funded research program hosted by the University, Dr Santamaria and Dr Schlagloth have supported research on koala biology, habitat, and the effects of rural, urban and industrial development on koala populations in Central Queensland.

"We believe that the koala is a flagship for conservation, education and community engagement and therefore

KR-CQ investigates all aspects of the koala," Dr Schlagloth says.

The insights of the research project have led to improved conservation management, strategic planning and policymaking in relation to the native animal, as well as challenging public and corporate perceptions around perceived barriers to conservation of the species. This has now led to changes in the conservation listing at state, national and international levels.

The team have been working in partnership and collaboration with key federal, state and local government departments and agencies to improve and implement policy revisions regarding regulatory oversight of koala-related developments, new state-based strategic planning, and revision of local habitat management practices.

One of the projects has seen the implementation of surveillance strategies with the Department of Transport and Main Roads in efforts to decrease the number of vehicle collisions along major highways. The team is also involved in the Government's consultation process to address the threat of chlamydial disease to koala populations in Queensland, Australia, and is supporting this with applied research.

Expert advice from the group has informed the National Koala Conservation Strategy, listing of the koala as endangered, and the development of the first set of Commonwealth Environment Protection and Biodiversity Conservation Act regulatory referral guidelines. These rich partnerships with state, federal and private organisations have proved to enable the translation of research findings into results with valuable, lasting impacts.

Furthering their work, the research team collaborate with international and national researchers, and they gather local knowledge through citizen scientists and community volunteers to not only aid their efforts but increase awareness. Having deployed a media engagement strategy and community survey, they are obtaining further knowledge to inform their future research and identify areas of much-needed restoration. From the outset, this important koala research has been driven by community partnership and engagement, which has resulted in a ripple effect of widespread awareness and action.

The combination of valuable insight and on-ground assistance from community volunteers and landholders has contributed to invaluable data collection and



analysis of the resourcing required for rehabilitation of sick or injured koalas. Detailed photographs of koalas identified in the wild has also assisted in identifying physical signs of clinical stress-induced disease, while faecal collection has allowed for non-invasive analysis of the animals' health through gut microbiome, in-depth analysis of stress levels and disease, further informing conservation strategies.

With the vast community awareness and media endorsement through local ABC (Australian Broadcasting Corporation) outlets and commercial media, deep and meaningful impact has resulted, in particular, from partnerships with Earthwatch Australia/International and the Fitzroy Basin Association, who engage with community members and corporate volunteer teams.

Beyond this, the important resonance of conservation of this species runs deeper, embedded into the historical relationship that exists between First Nations Australians and the koala, with research publications exploring this and identifying the koala's function as a flagship for conservation and community education.

According to Justin Foster, Director of Research Programs for Earthwatch Australia, "a broad spread of awareness in the source community resulted from KR-CQ projects"

This increased knowledge of issues around koala ecology and conservation is an important contribution to environmental awareness at a local, national, and international level. While greater awareness has been achieved with new policy development, the research team are still underway with their research efforts to ensure the longevity of koalas in Central Queensland for generations to come.

## DESCRIPTION

*Koala Research-CQ*, (Central Queensland, Australia), is a community funded research program, staffed and hosted by CQUniversity, designed to support research on koala biology, habitat, and the effect on koala populations by development in Central Queensland.

## PARTNERS AND COLLABORATORS

Queensland Parks and Wildlife Service, Department of Transport and Main Roads, Earthwatch (Australia and International), various intra/inter-state and international universities, natural resource management groups and citizen scientists/ community volunteers.

## IMPACT

This project has resulted in the provision of expert advice to the National Koala Conservation Strategy with the listing of the koala as endangered; and the development of the first set of Commonwealth Environment Protection and Biodiversity Conservation Act regulatory referral guidelines. It has also improved local on-ground management through the Queensland Parks and Wildlife Service, and the Department of Transport and Main Roads, as well as revised strategic planning, regulation, monitoring and management through state departments.

# INSTILLING A LOVE OF STEM IN INDIGENOUS CHILDREN

**Associate Professor Linda Pfeiffer**

Exposing Indigenous primary school children to Science, Technology, Engineering and Mathematics (STEM) experiences on Country is proving ‘life changing’ for hundreds of Gladstone-based students.

Indigenous literacy in STEM is being enhanced through two programs in Gladstone in Central Queensland, Australia – the *Buraligim Weiber* (place of learning) program for Year 4 students and the Yallarm (place of shells) STEM camp for Year 8 students.

STEM Central Lead Associate Professor Linda Pfeiffer is passionate about offering Indigenous students the opportunity to experience hands-on STEM in real-world settings, with strong links to land and sea.

Assoc Prof Pfeiffer led the development of the *Buraligim Weiber* program, a 20-week program designed to engage Indigenous primary school children in STEM learning experiences in partnership with local schools and funded by Australia Pacific LNG, operated downstream by ConocoPhillips Australia.

The second program, Yallarm STEM Camp is an annual camp for Year 8 Indigenous students from the Gladstone region in partnership with Boyne Island Environmental Education Centre (BIEEC) and funded by Monadelphous.

Through these innovative programs, the children learn about the world around them through their connection to Country, including environmental impacts, local flora and fauna, food and sustainability, and waterways.

Assoc Prof Pfeiffer says the STEM Central team has developed a framework for embedding authentic learning experiences which uses aspects of situated learning, social constructivism, and communities of practice.

“We use case studies, qualitative interviews and focus groups, and quantitative surveys in an evaluative approach.”

## **BURALIGIM WEIBER**

The *Buraligim Weiber* program was developed by a team of academics, educators, Traditional Owners, and local community members, and is implemented by school teachers in consultation with Traditional Owner groups.

The program is having huge success in improving literacy, learner engagement and reducing absenteeism among Indigenous students in the Gladstone region and is also inspiring students to consider STEM based disciplines when it comes to future employment aspirations.

“Now in its third year, the program is seeing positive outcomes and results with higher school engagement and participation rates,” explains Assoc Prof Pfeiffer.

“The students have connected really well with the program and are enthusiastic to keep attending each week.

“Some of these students have struggled with regular attendance at school, so this is a great achievement.”

There has also been support for the program from Gladstone Ports Corporation and Gladstone Healthy Harbour Partnership in Queensland, who present information sessions to the students during the program.

Indigenous primary school students participate in the program every Thursday for 20 weeks over two school terms. Gladstone West State School has been the pilot school and integral in the development of the program.



### Associate Professor Linda Pfeiffer

The children go on excursions around the Gladstone region to engage in hands-on, fun experiences with STEM concepts.

A highlight of the 2022 year was a trip to Quoin Island which involved the release of a rehabilitated turtle called Odin, the splitting of a native beehive into two colonies, and a beach clean-up.

Importantly, all the STEM learning experiences are embedded in the Australian curriculum.

The popularity of the program with students has led to many expressing an interest in pursuing STEM careers in the future.

### YALLARM STEM CAMP

The Yallarm STEM Camp is delivered in partnership with Boyne Island Environmental Education Centre (BIEEC), with major industry sponsorship and co-delivery from engineering company, Monadelphous.

Through the four-day Indigenous STEM camp, students are exposed to hands-on STEM experiences with links to land and sea.

Local Elders are involved in the design and development of the programs so that students obtain relevant cultural experiences.

Assoc Prof Pfeiffer says Year 8 students with an interest in science are invited to attend the camp, and are given opportunities to engage in interactive, environmental STEM activities in a variety of outdoor settings.

“This can be challenging and fun for students, and requires both problem-solving skills and team-work to solve challenges.”

At the end of the Yallarm Camps children are asked to sum up their day in one word. Some of the responses have included “cultural”, “connected”, and “life-changing”.

From early research findings, Assoc Prof Pfeiffer anticipates the *Buraligim Weiber* program and the Yallarm STEM Camp will improve the representation of Indigenous People in STEM careers in the future.



### DESCRIPTION

*Buraligim Weiber* (place of learning) a 20-week literacy program designed to engage Indigenous primary school children in STEM learning experiences, and the Yallarm (place of shells) STEM Camp, an annual camp for Gladstone region Year 8 Indigenous students.

### PARTNERS

Australia Pacific LNG, Gladstone West State School, Boyne Island Environmental Education Centre (BIEEC) and Monadelphous.

### IMPACT

Associate Professor Linda Pfeiffer has presented on these initiatives at four key conferences including the European Science Education Research Association (ESERA) and has contributed to book chapters on STEM education and partnerships.

Evidence has shown a positive impact on Indigenous children, parents, and grandparents in the Gladstone region, in Queensland, Australia, with many children expressing an interest in pursuing STEM careers in the future.

# ART TRAIL BREATHING NEW LIFE INTO COMMUNITIES

**Associate Professor Liz Ellison**

There's new life being breathed into the Far North Queensland townships of Georgetown, Croydon, Normanton, Karumba, Burketown and Doomadgee – thanks to the Savannah Way Art Trail project.

Project-managed by CQUniversity and designed to create unique, cultural visitor experiences in Far North Queensland, Australia, the Savannah Way Art Trail project engaged artists Glen Manning and Kathy Daly (Manning Daly Art) who worked with the communities to create six cohesive, large-scale, geographically and culturally significant permanent public art pieces.

The Savannah Way Art Trail project is a Regional Arts Services Network (RASN) initiative led by CQUniversity Deputy Dean (Research) Associate Professor Liz Ellison, with fellow School of Education and the Arts staff Patty Preece, Dr Sasha Mackay and Emeritus Professor Bobby Harreveld.



**Associate Professor Liz Ellison**

Situated within the Centre for Research in Equity and Advancement of Teaching and Education (CREATE), the project forms a key part of the Applied Arts and Regional Communities cluster.

“Through collaborative and consultative processes driven by residents, arts communities and councils, the unique local identity of the six townships are reflected in each installation and curated to connect the towns to the narrative through theme and materials,” says Assoc Prof Ellison.

“The artworks celebrate the beauty and unique characters of these communities and highlight the stories and identities which are important to community members. The vision is they will enhance visitor experience and tourism throughout the Gulf Savannah region, with positive social and economic outcomes for those communities.”

The collaborative project leverages the existing Savannah Way thoroughfare, using public art to build skills and capacity of the local community through artistic mentoring and connection, and works as a catalyst to uncover and communicate seldom-heard stories important to local people.

Communities engaged with the project and shared local stories through 10 community consultations and six school-based creative workshops.

Local First Nations artists Siyesha Douglas, Krystal Spencer, Frank Amini and Kelly Barclay collaborated with Manning Daly Art and their stories and designs feature on the sculptures.

Along with project managing the activity, CQUniversity has also undertaken a research project to identify the benefits and impacts of public art development activities in the remote communities.

“The research explored the potential of public art for very remote communities. We collected data through interviews, surveys and the hands-on creative workshops to understand how Council, local tourism operators and residents envisioned public art being useful to the Gulf Savannah region,” says Assoc Prof Ellison.

“In general, people thought that public art and artistic expression can be the catalyst for deep engagement with local culture as a driver of economic, social and cultural benefit to local communities.”

The research demonstrated that these remote local governments are positioning public art within their tourism strategy to signal the increasing sophistication of local tourism offerings, and to show their towns are ‘tourist-ready’.

For locals, community-informed public art tells important local stories and can help tourists feel connected to people and place, which was important for a town’s ongoing reputation as a destination.





## DESCRIPTION

The Savannah Way Art Trail is a series of six cohesive, large-scale permanent feature artworks located in the rural and remote towns of Croydon, Georgetown, Normanton, Burketown, Karumba and Doomadgee. Through interviews, surveys and hands-on creative workshops, researchers aimed to understand how Council, local tourism operators and residents envisioned public art being useful to the Gulf Savannah region.

## PARTNERS

The Savannah Way Art Trail, led by the Regional Arts Services Network (RASN), was funded under the Year of the Outback Tourism Events Program, the RASN, the Monsoon Trough fund and the Regional Arts Development Fund (RADF). RASN is an initiative of the Queensland Government through Arts Queensland.

RADF is a partnership between the Queensland Government and 59 local councils across the state supporting local arts and culture in regional Queensland.

## IMPACT

The Savannah Way Art Trail provided professional development opportunities for local First Nations artists and involved community members in the shaping of their town's identity. Each sculpture communicates the local stories important to community members. Long term, the intention of the Art Trail is to enhance visitor experiences along Queensland's section of the Savannah Way, and result in positive social and economic outcomes for the six communities.

This artwork is located in Karumba and provides a significant focal point for sunset watchers with two dancing broilgas taking centre stage

As one interviewee said, "people want to have an experience and have an understanding of a community that they can connect with ... if you can give them that experience, they can feel part of the tribe [and] they will be your best ambassadors going forward"

As well as the tourism potential, the research data shows that local government stakeholders viewed public art as a useful way of connecting their very remote communities and create a sense of shared identity and cohesion amongst people who live hundreds, if not thousands, of kilometres apart.

The participating councils are also inspired to extend the Trail into other towns within their shires and conversations are underway to add digital elements to the Trail experience, such as through creating digital narratives that tell the stories behind each sculpture.

With the Savannah Way Art Project now completed, RASN service provider Topology will take over management of the Trail.

# AUSTRALIAN GAMBLING POLICY A SAFER BET WITH RESEARCH

Professor Matthew Rockloff, Professor Nerilee Hing, Professor Matthew Browne, Associate Professor Alex Russell and Dr Hannah Brajkovich (née Thorne)



Professor Nerilee Hing

For nearly a decade, world-class research at CQUniversity's Experimental Gambling Research Laboratory (EGRL) has been monitoring Australia's rapidly-transforming gambling habits – and the evidence is informing better regulation of the gambling sector.

Australians are the world's most prolific gamblers, losing close to \$25 billion a year – nearly twice as much per capita than Singapore, the next country on the list.

Research from CQUniversity's EGRL shows that the national habit has negative impacts for one in six Australians, across gambling activities including poker machines, sports and race betting, online gambling, and even gambling related to video games.

Professor Nerilee Hing is a Research Professor in Gambling Studies at EGRL, led by Professor Matthew Rockloff, and she says the public health implications from gambling are huge.

"Our research indicates that population-level harm from gambling is akin to that from alcohol consumption, for instance," she says.

"Our team at EGRL aims to advance understanding of gambling problems and harm, and their impact on the health and wellbeing of individuals and society.

"Our research-based evidence has informed many policies and interventions for gambling-related issues, and we continue to deliver studies and projects to government, to ensure policy-makers understand the rapidly-changing landscape."

Professor Hing recently led a study commissioned by the New South Wales (NSW) Responsible Gambling Fund, in Australia, assessing the burgeoning habit of smartphone betting amongst young people.

She notes that 18 to 29-year-olds surveyed said the portability and range of gambling apps was driving increased betting, and many participants said they wouldn't bet at all if it required going to a physical bet shop, like a TAB or hotel.

"Using their phone to bet often means they can more easily keep the habit hidden, if they realise it is impacting on their wellbeing, or attracting concern of people around them," says Prof Hing.

The final report, titled *Smartphone betting on sports, esports and daily fantasy sports amongst young adults*, highlighted that smartphone betting characteristics interact in ways that can actually elevate harmful behaviours, including more frequent betting, impulsive betting, placing less well-researched and a wider variety of bets, and betting more than usual when smartphone betting is done in social situations.

Professor Hing says understanding these emerging gambling trends was vital to reducing harms.

"With technology, people have so many options to gamble already in their hands – through research like our smartphone betting report, and our NSW Youth Gambling Study in 2021, we're putting the latest trends and risks for young people in the hands of policy-makers, so their response can be timely and effective."

Across three decades, Prof Hing's commitment to better understanding of gambling harms has seen her make real impact in policy development.

Her research into sports betting and race betting, across several projects, has seen Prof Hing invited into consultations for the Australian Government's Review of Illegal Offshore Wagering 2015 and its subsequent National Consumer Protection Framework for Online Wagering 2018.

The work of several EGRL researchers informed key regulatory decisions within that framework, to ban wagering advertising during general television viewing times, and to restrict promotions and inducements targeting new customers, and inducements that require further expenditure to access a bonus.

Prof Hing has also been a chief and co-investigator on behavioural trials to refine two measures in that 2018 framework: limit setting and gambling messaging, both of which were innovated within the final framework, with Australian online betting agencies required to provide both since mid-2019.

She has also been a subject matter expert on the development of the National Self-Exclusion Register, the Commonwealth's free service for people who want help change their gambling habits.



Most recently, Prof Hing, along with her colleagues Professors Rockloff and Browne, has provided extensive research into simulated gambling in computer games, to inform the Commonwealth's current consultations to regulate the emerging and multi-faceted field.

In particular, results from the EGRL's NSW Youth Gambling Study informed action, as they showed about 40 per cent of NSW children aged 12 to 17 were playing video games and apps with gambling-related content.

"These platforms very much look and feel like traditional gambling, and things like pokies apps, and lucky-dip 'loot boxes' in gaming, have similar addictive qualities as traditional gambling," says Prof Hing.

"And we know gamers who buy loot boxes are more likely to gamble, including with some of the in-game items that they win in loot boxes.

"That study paved the way to explain to parents and young people what a dangerous gambling product looks like, and for instance, how buying loot boxes is something a player can do over and over at a fast pace, with no limit on the spend, much like a pokie machine."

The work has also influenced Australian Commonwealth policy-makers, and the current proposal for mandatory minimum classifications for gambling-like content in computer games.

## DESCRIPTION

Since 2013 EGRL has led world-class research into Australian gambling activity, habits and impacts, through experiment, simulation, and observation, delivering hundreds of studies, papers and publications to inform public policy and debate.

## PARTNERS (across various projects)

Australian Government, New South Wales (NSW) Responsible Gambling Fund, NSW Office of Responsible Gambling, Gambling Research Australia, Victorian Responsible Gambling Foundation, South Australian (SA) Department of Human Services and New Zealand Ministry of Health

## IMPACT

Ongoing provision of EGRL research evidence, into various Australian State and Federal Governments' policy and regulation of gambling, has informed proactive regulatory decisions including: to ban wagering advertising during general television viewing times, and ban promotion of various punter inducements; limit setting availability and mandatory gambling information messaging for online betting; youth-focused educational initiatives; the Australian National Self-Exclusion Register for pokies; and, Commonwealth-proposed mandatory warnings on computer games with gambling-like content.

# RESEARCH FELLOWSHIPS



## DR DIOGO COSTA

### The Advance Queensland Industry Research Fellowship (AQIRF)

**RESEARCH PROJECT/S:** Diogo is studying new methane mitigation technology and exploring methane inhibitors supplemented through water to increase the sustainability of Queensland's beef industry.

**RESEARCH IMPACT:** Diogo's research has the potential to significantly impact the beef industry's sustainability and contribute to global climate solutions. By delivering methane-reducing compounds to cattle via automated water systems, his research aims to decrease enteric methane emissions. If successful, this approach could help northern Australia's beef producers achieve carbon neutrality or zero net emissions by 2030, as targeted by the industry. Furthermore, the utilisation of technology for controlled delivery in extensive grazing systems addresses a major challenge in supplementing cattle in such production systems. Ultimately, this research has the potential to improve environmental outcomes and enhance the long-term viability of the beef industry.

**CAREER HIGHLIGHTS:** Driven by a genuine fascination with the relationship between soil, plants and animals, Diogo has built an impressive career in pasture agronomy and animal production, marked by his extensive contributions to the field. With more than

30 peer-reviewed papers published in distinguished journals, his research journey began on his family's livestock property in Brazil, igniting his passion for cattle production. Pursuing agronomy studies at the University of Sao Paulo, he delved into the use of supplements for beef cattle in both tropical pastures and feedlot systems during his master's degree. His subsequent PhD focused on advancing nutritional management practices for ruminants within the northern Australian beef industry. Recently, Diogo has been awarded an Advance Queensland Fellowship and leads the *Water-Based Livestock Methane Mitigation* project. In this project Diogo and his team are examining a range of methane-reducing compounds added to a water-based supplement to determine if they can be safely and effectively delivered to cattle via automated water systems to decrease enteric methane emissions.

**CAREER ASPIRATIONS:** Diogo aspires to continue harnessing technology to enhance livestock management practices. His primary goal is to collaborate directly with producers, understanding their unique requirements, and providing practical solutions to the livestock industries. By working at the intersection of research and industry, he aims to bridge the gap between scientific advancements and on-the-ground implementation, ensuring that his work directly benefits and addresses the needs of livestock producers.



### DR MD JAHIRUL ISLAM

#### The Advance Queensland Industry Research Fellowship (AQIRF)

**RESEARCH PROJECT/S:** The focus of Jahirul's research is centred on optimising renewable fuel production from mixed-waste to help produce greener and more sustainable communities.

**RESEARCH IMPACT:** Jahirul has won more than \$1.2 million worth of externally research funding. He has authored more than 75 peer-reviewed publications that have been cited over 3500 times. Among those, the paper *Biofuels production through biomass pyrolysis – A technological review*, published in *Energies* in 2012, has been cited over 1300 times, placed number one amongst all time top-cited papers in the Journal of Energies, and won the 10th Anniversary Best Paper Award from the *Journal of Energies* in 2018. Jahirul has developed research collaboration with industries and supervised PhD, Master and Honours students.

**CAREER HIGHLIGHTS:** With the research focus on renewable and clean energy, Jahirul has worked on 10 research projects with multidisciplinary team in Bangladesh, Malaysia and Australia. He received the Advance Queensland Industry Research Fellowship (AQIRF) award for mid-career, for the year 2022 – 2025 with a research grant reward of \$360 000. He has benchmarked, integrated and optimised waste-to-energy technologies (pyrolysis, distillation and hydrotreatment) to establish an optimal commercial mixed waste-to-fuel value chain. His current research focus is to scale up the waste-to-energy technologies that will lead to Queensland's first commercial (>500 ML/annum) renewable fuels refinery which will operate on mixed waste feed.

**CAREER ASPIRATIONS:** Jahirul aspires to develop innovative and sustainable solutions that maximise energy recovery from municipal and industrial waste while minimizing environmental impact. By advancing this field, he aims to contribute to a cleaner world, promoting a circular economy and more efficient future for waste management and energy production.



### DR UMME MUMTAHINA

#### The Advance Queensland Industry Research Fellowship (AQIRF)

**RESEARCH PROJECT/S:** Umme has worked on several projects on microgrid control, low voltage distribution networks, and reactive power compensation impact on distribution networks. The AQIRF project aims to examine the use of voltage control devices, demonstrate energy storage distribution, and conduct a feasibility study for a microgrid transition on Australian low distribution networks.

**RESEARCH IMPACT:** Umme has secured six grants with a total funding of \$1 642 406. These grants include funding from the Commonwealth Government, State Government (Queensland), and industry partners. Her high-quality research outputs have been acknowledged within CQUniversity by being awarded the Dean's Award 2023 within the School of Engineering and Technology. Umme's research works are being translated through commercialisation and end users of the utility grid are benefited from these.

**CAREER HIGHLIGHTS:** The hallmark of Umme's research career is winning the Advance Queensland Industry Research Fellowship (AQIRF) in 2023. Umme's project has attracted widespread attention in regional and industry focused media, including highly regarded platforms such the ABC, Reneweconomy, *CreateMagazine*, and more.

**CAREER ASPIRATIONS:** Umme's career aspiration is to be a research academic and be involved with the utilities industry to solve the power system's ongoing problems. Her goal is to create a pathway for renewable energy transition.

# RESEARCH ACCOLADES

## DR SAMAN KHALESI

### 2022 Queensland Young Tall Poppy Award recipient

CQUniversity's Dr Saman Khalesi received a 2022 Young Tall Poppy (YTP) Science Award for his research into helping consumers make informed food choices. Dr Khalesi is a National Heart Foundation (NHF) funded Postdoctoral Fellow and a Senior Lecturer and Discipline Lead in Nutrition at CQU.

Dr Khalesi's current research focuses on nutrition and health misinformation. According to Dr Khalesi, nutrition misinformation is an enormous public health challenge which risks overall health and expenditure for consumers. Unscientific claims about fad diets, dietary elimination, extracts and supplements can lead to dangerous side effects. Dr Khalesi believes that by people having access to online personalised coaching programs that provide evidence-based dietary information to fact-check dietary claims, they will have the tools necessary to detect misinformation. He hopes that his research and the YTP award will draw attention to the importance of dietary communication to empower consumers with the knowledge and tools to make food choices informed by scientific evidence.



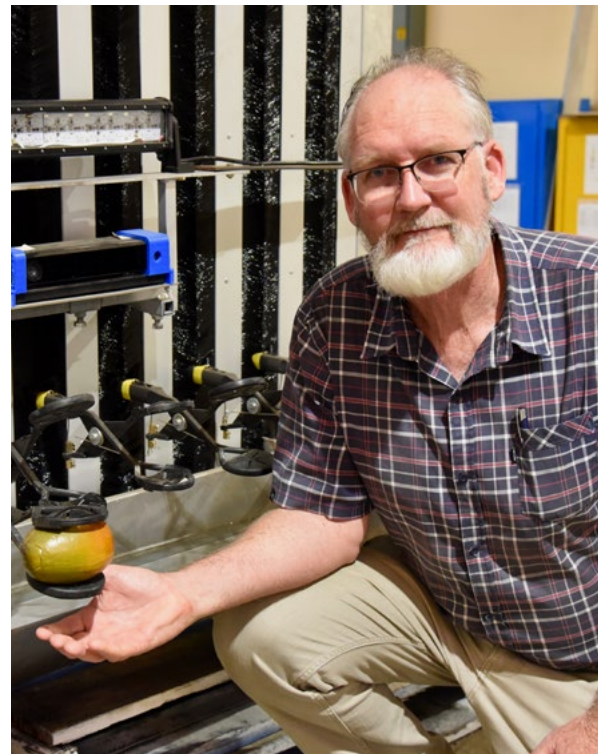
## PROFESSOR KERRY WALSH AM

### Croc Pitch winner

In 2023 a robotic mango harvester developed by a team of CQUniversity researchers led by Professor Kerry Walsh has snapped up \$1 million in venture capital at a national pitching competition for start-ups.

Founding Director of Agricultural Robotics Dr Amanda White, a partner of CQUniversity, pitched the innovation to a panel of Croc Pitch judges at the Developing Northern Australia Conference in Darwin, in Australia. This \$1 million investment from Paspalis Innovation Fund means that the technology will be able to go to growers sooner.

The ground-breaking, proprietary auto-harvester solution leverages advanced robotics and vision systems to streamline the mango harvesting process. It has multiple arms picking fruit at five seconds per arm, with a 76 per cent success rate. The solution is versatile with potential application to other soft tree fruit industries. The auto-harvester was developed in conjunction with the mango industry and Territory-based mango growers Niceforo Farms and has also received financial support from the Federal Government's Accelerating Commercialisation Program.



# ENGAGE WITH US

## CONSULTANCY

Industry organisations can engage with CQUniversity Australia researchers and/or facilities to provide expertise and a range of testing services on a fee-for-service basis. CQUniversity consultants can also be engaged to undertake confidential research activities where the data and results are owned wholly by the commissioning industry party.

## CONTRACT OR COLLABORATIVE RESEARCH PROJECTS

Contract or collaborative research projects range from small-scale, short-term projects to major multi-year collaborative projects. Industry partners may fully fund the direct research costs of the projects or partner with CQUniversity to leverage funding from agencies such as the Australian Research Council or state government programs such as Advance Queensland. Ownership of intellectual property arising from the research activities are negotiated on a project-by-project basis.

## INDUSTRY STIPEND SCHOLARSHIPS AND TOP-UP SCHOLARSHIPS

Industry stipend scholarships and top-up scholarships can target dedicated full-time or part-time student research projects in particular areas of industry need. Research projects may range from two years (Master by Research) or three to four years (PhD). Scholarship stipends typically cover living expenses and associated costs for students. Scholarship awardees may commence at any time during the year.

## TUITION OFFSET SCHOLARSHIPS

The Australian Government and CQUniversity fund a number of tuition offset scholarships for domestic and overseas research higher degree students. In addition, industry partners have the opportunity to sponsor offset places for nominated students to undertake research higher degrees in specified research areas. The industry sponsorship covers all or a part of the cost of a full fee-paying place for the student. Funded place-holders may commence their studies at any time during the year. Many of these students also enjoy the opportunity to work for the industry partner while undertaking their studies.

**For further information about sponsoring research or consultancy at CQUniversity please contact the Research Division.**

**Email [research-connect@cqu.edu.au](mailto:research-connect@cqu.edu.au) or call +61 7 4970 7330.**



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