Researcher Kishor Dahal is addressing the seasonal yield variations in sub-tropical table grape production in the Central Highlands in Queensland.
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CONTACT US

Domestic Students
13 27 86 (within Australia)
+61 7 4930 9000 (outside Australia)
www.cqu.edu.au

International Students
+61 3 9616 0606
www.cqu.edu.au/international-enquire

Research Division
CQUniversity Australia
Building 32, Bruce Highway
Rockhampton QLD 4702
AUSTRALIA

research-connect@cqu.edu.au
www.cqu.edu.au/research

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CQUnderstanding University is Australia’s fastest growing regional university with more than 30,000 students undertaking 300-plus courses at locations across Australia and online.

CQUnderstanding University is unique in that it gains its strength through power of place, informing its research, learning and teaching, engagement, student experience and social innovation agendas.

The University has a strong ethos of doing things differently, which transpires into its research initiatives. With an applied research focus, CQUnderstanding University 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, CQUnderstanding University is forging ahead with innovative research in sleep, gambling and addictive behaviours, physical activity, regional tourism, resource economics, domestic and family violence, health and aged care, railway engineering, clean energy, and agricultural systems, to name just a few.

As the only university in Australia with a physical presence across every mainland state, CQUnderstanding University is uniquely positioned to establish and maintain networks and partnerships across the length and breadth of the country. This incredible power of place allows the University to engage deeply, thoroughly understand, and place a complete focus on the issues that matter to those we seek to support. After all, great research is brought about by engagement, and a need to seek relevant and meaningful solutions to complex issues.

The future of research at CQUnderstanding University looks bright as we actively work towards creating sustainable and successful outcomes for communities and industries across Australia and the world.

As a university with a strong engagement focus, CQUnderstanding University is committed to conducting research that creates impact and drives change for the regions we operate in.

By working collaboratively with the communities and industries we serve, we are achieving some remarkable feats across a range of research fields.

At CQUnderstanding University we place a focus on research that will create impact and deliver solutions to complex problems. In particular, we focus on research that looks into regional development, growth in resource industries, environmental management, healthcare and health promotion in regional and remote communities, social and human development, and equity and education delivery.

CQUnderstanding University has about 420 research higher-degree students and about 130 research projects currently underway, from research impacting the Great Barrier Reef and Australian water quality through to the well-being of FIFO workers and those facing homelessness.

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 and environmental challenges currently impacting the world around us.

Working with end users to understand problems and uncover solutions sets CQUnderstanding University apart when it comes to the delivery of real-world research. This will continue to influence our research philosophy, guiding our researchers to deliver outcomes that truly make a difference.
CQUUniversity PhD researcher Holly Hosking is evaluating the potential of using a person’s rate of DNA repair as a guide to cancer susceptibility. She hopes to complement genetic testing, or even replace it, by checking if the rate of DNA repair is a reliable guide to the likely onset of cancer.
CQUniversity Australia has been on a phenomenal trajectory in recent years. Its remarkable growth in student numbers, new courses, new campuses, infrastructure and reputation has seen it emerge as one of Australia’s truly great universities.

Originally founded in Rockhampton in 1967 as the Queensland Institute of Technology (QIT) Capricornia, it was granted full university status in 1992 and was named Central Queensland University. It now has more than 30,000 students and has firmly established itself as one of the largest universities based in regional Australia, with campuses in Adelaide, Brisbane, Bundaberg, Cairns, Emerald, Gladstone, Mackay, Melbourne, Noosa, Perth, Rockhampton, Sydney and Townsville. Along with these campuses, the University also operates study centres in Biloela, Broome, Busselton, Charters Towers, Karratha and Yeppoon, and delivers courses in Cooma and Geraldton, thanks to partnerships with the respective university centres in those communities.

In 2014, the University merged with CQ TAFE, bringing together more than 175 years of combined experience in the delivery of education and training and establishing Queensland’s first comprehensive, dual sector university. As a result, CQUniversity now 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 English, study and work preparation. As a pioneer in the delivery of distance education, CQUniversity also continues to be a leader in this area with almost half of the current student cohort made up of students studying off campus, many of whom are based in rural and remote areas.

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. Its applied research focus is oriented towards real-world outcomes, with the purpose of providing solutions to challenges and identifying new opportunities for advancement in our regions and beyond.

In 2015, this research focus saw CQUniversity achieve Excellence in Research Australia (ERA) results of ‘at’, ‘above’ or ‘well above’ world standard in 14 categories of research including Mathematical Sciences, Applied Mathematics, Psychological and Cognitive Sciences, Nursing, Other Medical and Health Services, Agriculture and Veterinary Sciences, Environmental Sciences, Medical and Health Sciences, and Mechanical Engineering.

CQUniversity is proud to be recognised as Australia’s most inclusive university with the highest ratio 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.
Graduates from CQUniversity also have some of the best employment outcomes, with recent data released by Graduate Careers Australia (GCA) indicating that 80.6 per cent of domestic undergraduate students find full-time employment within three months of graduation. This figure is more than 10 per cent higher than the national average of 69.5 per cent. Data released by the Quality Indicators for Learning and Teaching (QILT) website also shows that CQUniversity outperforms the majority of Australian universities when it comes to study support, graduate employment and graduate salary outcomes.

CQUniversity also places a strong emphasis on social innovation and global outreach and fosters a number of 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, an exclusive global social innovation group made up of only 40 other education institutions across the world, driving initiatives that help to overcome social disadvantage, by working with stakeholders to develop solutions for whole of community.

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 the top 600 universities in the world by the prestigious Times Higher Education World Rankings, and among the world’s top ‘young universities’ by both Times Higher Education and the QS World University Rankings.

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 community, industry and government. Its applied research focus is oriented towards real-world outcomes, with the purpose of providing solutions to challenges and identifying new opportunities for advancement in our regions and beyond.
RESEARCH AT A GLANCE

340 research staff

420+ research higher degree students

$12.5m research income 2017

$70+ m in competitive research income 2010 – 2018

650+ annual peer reviewed research publications

130 research projects

2 research institutes

6 research centres

RESEARCH IMPACT

CQU University’s research focus and engaged research agenda are already making positive impacts on individuals, communities and industries across the world. In coming years, this impact will continue to grow, expanding into new focus areas and transforming the way we think about current challenges.

The University’s research impact is apparent in improved industry processes, regional and economic development, business improvement, productivity and innovation, social advancement and equity and healthier communities.

ENGAGED RESEARCH

CQU University’s research agenda is built around deep engagement with communities, industries and government. The focus is firmly on the delivery of research that is primarily relevant to the Northern Australia region. To deliver great research that is meaningful and relevant, researchers work directly with stakeholders to identify challenges and deliver solutions. The end user is involved throughout the entire research project. This approach ensures CQU University’s research delivers direct benefit and long-lasting impact.

SOCIAL INNOVATION

CQU University is officially recognised as Australia’s only Changemaker Campus by global social innovation group Ashoka U. CQU University achieved this reputation because of its strong engagement agenda and inclusive approach to the delivery of research, education and training.

Social innovation is about working with communities in a collaborative way, using a range of strategies, to find innovative and sustainable solutions to social needs or problems. Ultimately, the philosophy is driven by the simple need to improve lives and create positive change within the world around us.

At CQU University, social innovation is at the core of our strategic vision and for many years has been entrenched in our core values. This approach sets CQU University’s research apart, as it means end users are involved in the research process, and research success is measured by the visible impact it is having on the communities and industries we seek to help.
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 so too 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 coursework programs, providing students with opportunities to grow their understanding through knowledge creation. High achieving undergraduate students also have the opportunity to work closely with discipline research leads through programs such as the Rising Stars program.

RESEARCH FOCUS AREAS

» Sleep and biological rhythms
» Physical activity
» Human-animal interaction
» Community and disaster resilience
» Gambling and addictive behaviours
» Health promotion
» Human factors and safety science
» Ageing and health
» Agricultural management systems

» Environmental monitoring and management
» Medical and applied physiology
» Advanced clinical practice
» Creative and professional writing
» Digital media
» Education, training and employment pathways
» Performing arts
» Special education
» Scholarship of learning and teaching

» Critical social enquiry
» Health workforce development
» Quality and safety of health and aged care
» Mental health nursing
» Indigenous health equity
» Lived experience led mental health
» Domestic, family and sexual violence
» Simulation and innovative education
» Railway engineering, technology and innovation

» Intelligent systems
» Clean energy
» Building forensics and civil engineering
» Mechatronics, automation and mobile technology
» Engineering and technology education
» Resource economics
» Health economics
» Workforce management
» Regional tourism
» Regional development and opportunity

Dr Padraig Strappe is undertaking a research project that hopes to develop a treatment for human joint damage using crocodile cartilage.
RESEARCH CENTRES AND INSTITUTES

CQUndustry’s contribution to Australia’s research and innovation agenda is led by the activity, engagement and excellence of our research centres and institutes.

THE APPLETON INSTITUTE

The Appleton Institute is a multidisciplinary research hub based in Adelaide, South Australia. Established in 2012, the Appleton Institute combines excellence in research, teaching and community engagement, and focuses on a range of scientific areas including sleep and biological rhythms, applied psychology, occupational health and safety, safety science, human factors, risk management, cultural anthropology and immigration. The Institute’s researchers also provide specialist consulting services and advice across a number of industries. The Appleton Institute has worked with organisations including BHP Billiton, The Kimberley-Clark Corporation, Mobil Industries Australia, National Rail, Pacific National Rail, QANTAS, Queensland Rail and RailCorp.

CENTRE FOR INDIGENOUS HEALTH EQUITY RESEARCH

The Centre for Indigenous Health Equity Research (CIHER) was established in 2016 with an aim to set a pioneering agenda for change in Indigenous health research by nurturing high-impact, applied research. The Centre focuses on interdisciplinary and cross-cultural aspects of health and determinants of health to maximise outcomes through five streams: Public Health Research, Research Impact Assessment, Research Education and Training, Policy, Advocacy and International Relations, and Economic Assessment. The Centre has a regional focus with extended national and international networks of researchers, communities, service providers, government and industry, to collaboratively meet the priority health needs and aspirations of local and international Indigenous communities.

CENTRE FOR INTELLIGENT SYSTEMS

The Centre for Intelligent Systems (CIS) conducts outcome-driven and theoretical research in the field of complex intelligent systems. The Centre places a strong focus on applied technologies related to information technology and engineering applications. The core research areas are computational intelligence, simulation, automation, robotics, smart networked devices and clean energy technology. The Centre comprises a group of leading researchers with interests and collaborative partnerships that span across the globe. The Centre strives for excellence by not just identifying problems and solutions, but through involving stakeholders and end-users in the delivery of research projects. The Centre’s work is world-renowned because of the emphasis placed on community and industry collaboration.

CENTRE FOR RAILWAY ENGINEERING

CQUndustry’s Centre for Railway Engineering (CRE) is a well-established research organisation that boasts extensive expertise and impressive infrastructure, built on leadership and participation in three national cooperative research centres. Over the past two decades the Centre has made a major contribution to Australia’s rail industry by initiating, supporting and championing research efforts that have involved and benefited industry organisations and professionals. Through its research objectives and close collaboration with industry, CRE has become internationally recognised as a leader in the provision of applied engineering research for rail operators and manufacturers in areas of mechanical, civil and electrical engineering. Specifically, the Centre is a world leader when it comes to rolling stock and multi-body dynamics, condition monitoring and non-linear modelling.

CENTRE FOR REGIONAL ADVANCEMENT OF LEARNING, EQUITY, ACCESS AND PARTICIPATION

The Centre for Regional Advancement of Learning, Equity, Access and Participation (LEAP) provides regional and national leadership in education and equity-related research. The Centre aims to achieve significant impact through engaged research in equity, access and participation policy and practice, the scholarship of learning and teaching, education, training and employment pathways, and healthy communities. The Centre for Regional Advancement of LEAP operates at the intersection between policy and practice and was founded on a commitment to develop strong community partnerships that inform and utilise the Centre’s research. With partnerships established across Australia, LEAP researchers have demonstrated success in attracting funding, releasing high-impact publications and implementing community outcomes for projects that address education and employment pathways and the use of innovative technologies to foster learning, teaching and professional education.
CENTRE FOR TOURISM AND REGIONAL OPPORTUNITIES

The Centre for Tourism and Regional Opportunities (CTRO) was established to provide leadership, engagement and direction into Australia’s regional futures, with a specific focus on Northern Australia. The Centre responds to the many research gaps that exist when it comes to the role our regions play. The Centre directs its resources and focus to community and industry engagement which informs applied and multidisciplinary research that investigates tourism, resource activity and regional development. Specifically, the Centre’s activity generates new information and understanding about tourism development, best practice resource management for regional outcomes, natural resource management and protection, human capital, entrepreneurial thinking, business and industry development and respecting and supporting Indigenous culture and communities in regional Australia.

INSTITUTE FOR FUTURE FARMING SYSTEMS

CQU’s Institute for Future Farming Systems is Northern Australia’s agricultural innovator. Established in 2015 to drive the delivery of new agricultural innovations, the Institute for Future Farming Systems is now recognised as a world-leader in the development of precision management tools. Its teams of researchers are focussed on working closely with their communities – such as Bundaberg (Australia’s most diverse vegetable producing region) and Rockhampton (Australia’s Beef Capital) – to deliver practical solutions which bolster productivity, profitability and sustainability of the livestock and horticulture sectors. New research programs at the Institute are developing innovative agricultural education and extension practices to ensure research and development outputs are widely adopted and deliver real impact to industry.

QUEENSLAND CENTRE FOR DOMESTIC AND FAMILY VIOLENCE RESEARCH

The Queensland Centre for Domestic and Family Violence Research (QCDFVR) was established in 2002 and works with communities, service providers, government and law enforcement agencies across Australia. The Centre provides leadership when it comes to research into domestic, family and sexual violence. The Centre’s focus is on initiating and undertaking collaborative, interdisciplinary research that supports the development of policy and practice when it comes to domestic, family and sexual violence prevention, service provision, victim and survivor support, and perpetrator intervention programs, particularly within rural and regional communities. The Centre also promotes and supports coordination, production, and review and customisation of training resources to support the development of a standardised and effective knowledge base for service providers.
CRABTASTIC STUDY
The Gladstone Healthy Harbour Partnership has been able to add a mud crab indicator to its annual report card, thanks to new research by CQUniversity. CQU researcher Dr Nicole Flint says a new indicator compiling information on abundance, sex ratios (the ratio of males to females) and the prevalence of rust lesions will be a valuable means of comparison over time. The CQU team catches mud crabs at seven sites in Gladstone Harbour. Each crab is measured, weighed, graded, checked for lesions or other abnormalities and released alive at the capture location. Funding from the Gladstone Healthy Harbour Partnership (GHHP) has also enabled the monitoring of mud crabs in an unfished creek in the 1770 area, as a point of comparison with fished areas in Gladstone Harbour.

CROC HOPE
Crocodiles could hold the key to turning human stem cells into cartilage for the treatment of joint injuries and arthritis. Dr Pardraig Strappe and a small team of researchers at CQUniversity are working to perfect a process that extracts valuable growth factors from the cartilage of crocodiles and removes proteins that trigger an immune response in humans. Dr Strappe says the resulting ‘soup or glue’ could promote human adult stem cells (taken from fat tissue or bone marrow) to become cartilage. “We hope that might promote cartilage repair, which is a big challenge and becoming more so in elderly populations.”

SPICING IT UP
Farmers could one day spice up their chicken feed with oregano as a way of replacing the common use of antibiotics to prevent disease. That’s according to CQUniversity Masters researcher Benjamin Bauer who is keen on finding out because bacteria are increasingly educating themselves and becoming resistant to various types of antibiotics. In only a few months, Mr Bauer hopes to have some preliminary results from his initial trials of adding oregano to chicken feed. If the treated chickens are healthier than those with a non-oregano diet, Mr Bauer will have some worthwhile data to build on.

NEW CANCER PREDICTOR TOOL
Genetic markers have proven useful for gauging a person’s susceptibility to certain types of cancer, but there could be another powerful assessment tool on the horizon. CQUniversity PhD researcher Holly Hosking is on the cusp of a project evaluating the potential of using a person’s rate of DNA repair as a guide to cancer susceptibility. “We hope we can complement genetic testing or maybe even replace it by checking if the rate of DNA repair is a reliable guide to the likely onset of cancer.” Ms Hosking is working towards the participant recruitment phase of her study. She will seek out healthy participants with no family history of cancer and participants who have had cancer, or who have a strong family history of cancer. Meanwhile, she is optimising her ‘DNA repair test’ in the laboratory.

BEHAVIOUR IN THE SPOTLIGHT
Young people entering the hospitality industry often have traditional values and may prefer face-to-face interactions over phone apps and other technological innovations. That’s according to CQUniversity Masters researcher Jacobus Vorster who is studying the organisational behaviour, motivations and needs of younger generations entering the hospitality industry, including Millennials and Gen Z workers. Mr Vorster is analysing interviews with Rockhampton region hospitality workers in the heritage hotel sector, while comparing them with those in the Whitsundays. He’s already drawn on statistics, industry reports and labour force reports to assess the trends and external drivers of change facing the industry.

VIOLENCE ON THE RISE
The rate of violence against paramedics in Australia continues to rise, according to recent research revealed in the Public Health Research & Practice journal. In an alarming increase, the new figures show that the rate of violence against paramedics has doubled from six to 12 cases per million ambulance calls worked and the number of cases has dramatically increased from five to 40 per year. The figures were derived from an analysis of data provided by SafeWork Australia for the years 2001 to 2014. The author of the research project was CQUniversity Professor Brian Maguire who has previously released papers on injuries, fatalities and violence against paramedics.
CQU researchers are celebrating the success of Australia’s first trial crop of black sesame. The trial has been a joint project between CQU, Rockhampton Regional Council, AgriVentis Technologies and local farmer Peter Foxwell to test the viability of the condiment as a commercial crop to be exported domestically and internationally. Pictured is CQUI’s Dr Surya Bhatttarai, farmer Peter Foxwell and Young Beamish from Rockhampton Regional Council.
RESTORING THE ‘KIDNEYS’ OF THE GREAT BARRIER REEF

Dr Emma Jackson

Seagrasses are disappearing at an alarming rate globally. In Australia, seagrass meadows are at critical levels which potentially could have disastrous outcomes for our coastal ecosystems.

That’s why CQUniversity marine science researcher Dr Emma Jackson and her seagrass restoration project team, have attracted the attention of experts around the world. Dr Jackson hopes that investigating the science of restoring seagrass beds in the Port of Gladstone, will go some way towards putting the brakes on the decline in seagrass numbers around the world, and will help restore health to the world’s coastal ecosystems.

This is a massive task given the magnitude of the problem. In 2009, seagrasses globally were shown to be disappearing at an accelerated rate. Interestingly, in the same year the United Nations Environment Programme (UNEP) alerted the world to the fact that seagrass rank among the most intense carbon sinks on the planet, and that by preventing further loss and promoting the recovery of these habitats could contribute to offsetting current fossil fuel emissions.
Dr Jackson says that in Australia, seagrass meadows have also been in the conservation spotlight. “In Queensland seagrass conservation has legally been enforced under various State and Commonwealth legislation and there has also been statutory protection of seagrass under the Queensland Fisheries Act. In 2015, the risk of further seagrass losses in Queensland was mapped, shining a light on the Port of Gladstone region as one of the highest risk regions,” explains Dr Jackson.

“The Port of Gladstone is one of the largest multi-commodity ports in Australia which also sits within the Great Barrier Reef World Heritage Area. The seagrass in this area has shown over 50 per cent reduction in seagrass cover over the last two decades.

“Unlike losses of seagrass in temperate regions, seagrass in Queensland are very dynamic and may come and go depending on the conditions. This makes “restoration” difficult since it is hard to detect where seagrass has actually been lost and intervention is needed.” However, these extreme conditions makes the project all the more important for the global research into seagrass loss and restoration.

Unlike seaweed, seagrasses are flowering plants that returned to the ocean a few million years ago. Here, their role cannot be underestimated.

Seagrass meadows deliver a number human benefits. They function as nursery, spawning and feeding grounds for a large number of commercial and recreationally important fish and shellfish. The leaves of these meadows help to prevent erosion and trap carbon.

“They are also great filters, taking up nutrients and pollutants and earning the title the ‘kidneys of the Great Barrier Reef’. Finally, and slightly at odds with that, they are also a major food for green turtle, dugong, fish and a range of shorebird populations.”

Seagrasses tend to grow in sheltered parts of the coast and estuaries. Unfortunately, this tends to be the places where humans develop towns and cities, build ports, and dispose of wastes either deliberately or accidentally.

Restoring seagrass beds in a dynamic sub-tropical estuary like the Port of Gladstone has a number of challenges and identifying methods for promoting resilience is much harder than just finding a suitable site and planting.

In situ and mesocosm-based trials are used to assess the environmental tolerances of the different species. Potential methods for restoration, including the use of donor cores from healthy meadows and seed based approaches, continue to be investigated. Investigations into meta-population dynamics of the seagrass populations are also allowing researchers to identify areas where seagrass habitats can be created or restored.

“I am a strong believer that we must work with other researchers, community and industry to achieve real impact from our research. That’s why early on in this project I involved the local community in seagrass restoration activities. Most recently, this has involved seagrass flower collecting. We’ve had people aged 5 to 75 participating in the project.”

Local Indigenous sea rangers at the Gidarjil Development Corporation have also supported the seagrass project by collecting and planting. The research team have also worked with the organisation to develop techniques they can use to help restore seagrass to Sea Country.
When it comes to protecting crops from pests and diseases, rapid detection is a vital element for ensuring a successful response. But across Queensland’s large-scale agriculture, primary producers can struggle to cover the hectares required often enough to spot problems as they appear.

A research project at CQUniversity aims to harness drone technology, to ensure monitoring is efficient and economical – while gathering a vast amount of crop and environment information. The drone project is led by Dr Chengyuan (Stephen) Xu, based at CQUniversity Bundaberg campus, and supported by the Institute for Future Farming Systems.

“We know that the sector wants continuous improvement in its management practices and precise manipulation of crop production – so future precision horticultural systems will require on-farm data collection across unprecedented broad spatial and temporal scales,” explains Dr Xu.

“As a cutting edge technology, unmanned aviation vehicles (UAV) like drones provide an efficient and economical way to gather a vast amount of crop and environment information, which can be applied across many aspects of horticulture.”

Home to 10 per cent of all Queensland’s agriculture, Bundaberg and Wide Bay’s $1.4 billion agriculture industry makes it one of Australia’s largest horticultural regions – and ideal for precision research. In the new trial, six drones loaded with high-definition, thermal and multi-spectrum cameras (funded by a $43 000 CQUniversity Research Infrastructure Block Grant) are collecting image data to map vegetation density and build 3D structures of crop canopies.
The use of drones loaded with high-definition, thermal and multi-spectrum cameras as research tools for monitoring crops is increasing across the horticultural sector. This study seeks to understand the best uses of the technology, and its effectiveness in early detection of pests and disease.

**PARTNERS**
AustChilli, Queensland Department of Agriculture and Fisheries (various sugarcane researchers) and Peanut Company of Australia

**IMPACT**
Working with primary producers to measure the impacts on horticultural management supported by drone monitoring data will allow the growers and the horticulture industry to make informed decisions about large-scale adoption of the new technology.

As well as detecting pests and diseases, the information delivers numerous industry applications, including yield prediction, crop nutrient and water status, and ability to develop variable rate fertilisation schemes, and assess irrigation system performance. “All these outputs will support the operation, management and decision-making of local industries,” says Dr Xu.

“And the farmers we’re working with are really excited to get that extra confidence, that they’re seeing issues in their crops as they emerge, and while there’s still time to react and protect their crops.”

Dr Xu is a plant ecologist whose broad research and work in plant ecophysiology, invasive plants, and plant-soil interaction has taken him from his homeland of China, to the United States, and eventually to Australia. Previously a postdoctoral research fellow at CSIRO, Dr Xu’s been with CQU since 2016, and has also worked closely on protected cropping systems (greenhouses, polytunnels) in the Bundaberg region to combat crop issues.

Two CQU research higher degree students working on drone applications recently published their papers in the conference proceeding of the 30th International Horticultural Congress, and presented their study at the 2018 event in Istanbul, Turkey.

In Australia, there is a huge need for the information delivered from drone monitoring data to help reduce the impacts of pests and diseases. As a cutting edge technology, unmanned aviation vehicles (UAV) like drones provide an efficient and economical way to gather a vast amount of crop and environment information…”

**DESCRIPTION**
The use of drones loaded with high-definition, thermal and multi-spectrum cameras as research tools for monitoring crops is increasing across the horticultural sector. This study seeks to understand the best uses of the technology, and its effectiveness in early detection of pests and disease.
GPS TECH UNLOCKS FRESH FIELDS FOR STOCK MONITORING

Associate Professor Mark Trotter

It’s a world-first trial of global positioning technology in the grazier’s field, and CQUniversity’s Satellite-Based Augmentation System (SBAS) research project aims to make locating livestock a centimetre-perfect process.

Announced in late 2017, the $14 million research is coordinated by Geoscience Australia and the Cooperative Research Centre for Spatial Information, and funded by the Australian and New Zealand governments. Across several stages, researchers aim to improve the accuracy of GPS-tracking for livestock, from about five metres currently, down to less than 50 centimetres.

It’s a project that complements a range of research initiatives at CQUniversity’s Institute for Future Farming Systems, and all of them aim to deliver big benefits for local graziers – and primary producers globally.

A member of CQUni’s Precision Livestock Management Team, Associate Professor Mark Trotter specialises in developing GPS, biomass and behaviour sensors for animal monitoring. “Our animal monitoring work is essentially about providing graziers with remote measurements of where their cattle are, what they’re doing, and even relating this behaviour to things like how much feed they have in the paddock,” explains Assoc Prof Trotter.

Eventual improvements in global positioning, like the SBAS, will markedly improve on-animal monitoring – a technology that CQUniversity has already been analysing and finessing through several years of research projects.

Partnering with graziers across Australia, CQUniversity’s trials have seen cows and sheep fitted with GPS collars or ear tags that allow remote evaluation of location, behaviour and state of individual animals – including feeding habits, water access, health and vulnerability, and social networks.

“Our research working with producers across Australia has demonstrated that there is enormous opportunities to increase efficiency and welfare outcomes for animals,” says Assoc Prof Trotter. “Improving the accuracy of that data down to just centimetres will have huge implications, especially for identifying animal relationships – which bull has bred with which cow, for instance, and how well a cow might be looking after a calf or a ewe her lamb, too.”

These monitoring systems are starting to be implemented on commercial properties and have already been shown to reduce on-farm labour costs, and on-going trials aim to continue data gathering techniques.

Dr Trotter began working with CQUniversity in 2016, after growing up and building his career in New South Wales. “I grew up on a dairy farm on the mid-north coast of NSW, and have been working on the Northern Tablelands in sheep and beef, so I’ve been learning a lot about tropical production systems here in Central Queensland.”

“There is some really significant work being done by the team here which is being noticed by the global animal science community, and I was really keen to be a part of a team that is so focused on providing benefits to producers through precision technologies.”
DESCRIPTION
The use of global satellite navigation system tracking as a research tool for monitoring livestock activity is increasing across the agricultural sector, and commercial systems are being developed for the livestock industry. This project looks to improve accuracy and function of Satellite-Based Augmentation System (SBAS) in a range of monitoring applications.

PARTNERS
Geoscience Australia, Australian and New Zealand Governments, Cooperative Research Centre for Spatial Information, GMV, Inmarsat and Lockheed Martin

IMPACT
The SBAS trial aims to improve the accuracy of GPS-tracking for livestock, from about five metres currently, down to as little as 50 centimetres, while ensuring the technology is compatible with existing platforms. Strong partnerships with cattle growers mean developments will be in line with requirements of producers in the livestock sector, as they seek to invest in real-time and near-real-time GPS monitoring of behaviour and well-being on extensive properties, and capitalise on new efficiencies in welfare management and proactive response.
PRESERVING REEF REPUTATION AS CORAL BLEACH COVERAGE HITS

Professor Bruce Prideaux, Dr Julie Carmody and Dr Anja Pabel

Coral bleaching on the Great Barrier Reef (GBR) has made headlines around the world – but what do visitors to Far North Queensland think about the news? The answer could have big implications for the future of eco-tourism in the region, and in 2015, CQUniversity researchers from the Centre for Tourism and Regional Opportunities (CTRO) embarked on a journey to find out.

Based in Cairns, CTRO director and Tourism and Marketing Discipline Lead Professor Bruce Prideaux said the forecast bleaching in 2016 and a further event in 2017 provided a unique opportunity for researchers to understand the changing landscape. “We designed a survey that captured visitors’ views on the bleaching, and enabled comparisons to be made of the pre-, during and post-event reactions,” explains Prof Prideaux.

Conducted twice-monthly throughout 2016 and through to June 2017 in the domestic lounge of Cairns International Airport, the survey formed part of CQUni’s long-running tourism monitoring program. The 10-minute survey gathered 1817 responses across those 18 months, with 45 per cent domestic visitors, and 55 per cent international travellers.

“Across both groups, we saw respondents were generally aware that coral bleaching was occurring – and there was a high and increasing level of concern amongst visitors about bleaching events,” says Prof Prideaux. “Obviously, these were visitors who had made the trip despite these concerns – but the results suggest further bleaching events could prompt decisions to avoid the region, if potential visitors perceive patterns of degradation in the future.”

Interestingly, domestic visitors were much less motivated by the reef than international visitors, and may have been more impacted by bleaching reports – over the 18 months of the survey, the average ranking of the GBR as a key travel motive for Australians fell from third to ninth position, after lifestyle attributes such as fun, rest and relaxation, tropical lifestyle and climate.

The global brand of the GBR remained strong across this time though, consistently ranked as the number one reason for international visitors to come to the region.

And more good news in the results – across the survey timeline, events of coral bleaching didn’t appear to impact the GBR experiences of those surveyed during and after the events.
The health of the Great Barrier Reef has huge economic importance and value to the reef tourism dependent Queensland communities of Cairns, Port Douglas and the Whitsundays. Over 18 months, CQUniversity’s Cairns Airport Survey heard from nearly 2000 visitors to the region about how global coverage of coral bleaching impacted both expectations and experience, even as coral bleaching events were occurring.

And yet we know that the only time respondents’ consistently “good” rating of their experience dipped was in Quarter 2, 2016 – about the same time that reports of coral bleaching first appeared in the media.

The ‘good’ rating recovered by the next quarter, and stayed consistent throughout bleaching in 2017 – suggesting the impact of the media message may have played a bigger part than the condition of the coral itself.

“Going forward, understanding how visitors and potential visitors are being impacted by reporting of bleaching, but also how they’re experiencing it, is vital for industry to be proactive with its messages about the condition of the reef.”

The report Impacts of the 2016 and 2017 mass coral bleaching events on the Great Barrier Reef tourism industry and tourism-dependent coastal communities of Queensland was funded by the Reef and Rainforest Research Centre.

Since its establishment in 2015, the CTRO has focused on a range of tourism development initiatives, with research projects including the Cairns Region Visitor Survey, an industry research needs analysis, history and tourism development, and supply analysis for the region’s Indigenous tourism industry.

CTRO is jointly run by CQUni’s School of Business and Law, and the Office of Indigenous Engagement, and administered from CQUniversity’s Cairns campus. Research is organised into four thematic areas: tourism development, Indigenous development and cultural capital, regional communities and growth and natural assets and environment.

The report paved the way for local tourism bodies to develop a more comprehensive media strategy designed to promote the Great Barrier Reef and local projects dedicated to preserving it, and for enhancing overall resilience of tourism and communities in the region.
IMPROVING THE SEXUAL HEALTH NEEDS OF AGEING AUSTRALIANS

Dr Catherine O’Mullan, Professor Lynne Parkinson and Dr Joe Debattista (Queensland Health)

The rates of sexually transmitted infections (STIs) in middle-aged and older women are on the rise, and research is pointing towards the growing groups of online dating site users as a contributor to this increase.

Of concern, women in this age group are less likely to discuss STIs with new partners or insist on condom use – often due to the perception that pregnancy is unlikely to occur due to their age and time in life (menopausal). Furthermore, safe sex is frequently viewed as irrelevant, even when engaging in higher risk sexual activity. The risk of STI transmission is also compounded for middle-aged and older women as a result of post-menopausal physiological changes including thinning of vaginal tissues.

Therefore, while the internet has led to increased sexual opportunities, mid-life women engaged in online dating are often ill-prepared for the potential sexual risks.

In May 2016, Queensland Health released its first comprehensive sexual and reproductive health strategy: “Queensland Sexual Health Strategy 2016–2021” promoting the importance of positive sexual health across the lifespan. The Strategy recognised that while many older people remain sexually active, post-menopausal women were identified as a group particularly susceptible to STI infection and impaired sexual function.

In response to concerns around rising STIs in this group, a research team, led by CQUniversity’s Dr Catherine O’Mullan and Queensland Health’s Dr Joe Debattista, in collaboration with Professor Lynne Parkinson, was established and the research “I’m in Control: I’m Not Stumbling in the Dark Anymore”: Mid-life Women’s Experiences of Successfully Negotiating Safer Sex with New Partners was born.

“In contrast to previous generations, the accessibility and, most recently, the acceptability of online dating has opened up new possibilities for single, older women and the reality of increasing STIs amongst this cohort needs to be considered,” Dr O’Mullan says.

“We have examined ways to identify a range of successful strategies that could help women to develop and maintain safer sexual practices which will in turn help with informing sexual health planning.” Using a strengths-based approach, the objective of the qualitative study was to explore the factors and mechanisms that enable Australian women aged 45 to 64 years to successfully negotiate safer sex practices in new relationships.

“Despite rising rates of STIs among this group, and a call for more evidence-based sexual health promotion, little is known about the safer sex practices of this population,” Dr O’Mullan says.

“Understanding the factors influencing sexual risk behaviour is critical to the design of effective, age-appropriate interventions. As such, the research question was “How do mid-life women successfully negotiate safer sex with new partners?” Using Interpretive Phenomenological Analysis (IPA) as the research methodology to capture and explore the lived experience of those successfully negotiating safer sex, a small sample of women aged 45–64 years were recruited for the research.

“Women were interviewed using semi-structured interviews. The interview schedule comprised eight questions which focused on the women’s personal experiences of negotiating safer sex with a new sexual partner. Through an interpretative analysis, individual experiences were able to be situated within a social, cultural, and theoretical context,” Dr O’Mullan further explains.

The research provided recommendations to inform sexual health promotion initiatives.

“Our research revealed a complex interplay of individual, interpersonal and structural factors that have enabled the women to practice safer sex,” Dr O’Mullan says.

“As such, we have argued that sexual health promotion initiatives for mid-life women must consider the broader context and tackle the misconceptions, beliefs and attitudes that influence safer sex behaviours. Findings of the study have been distributed via conference presentations and have been recently published in the Journal of Women and Ageing.
“In Queensland, we are seeing increasing rates of STIs amongst peri-menopausal and postmenopausal women. Our work within communities demonstrates that peri-menopausal and post-menopausal women do not always consider STIs prevention in intimate relationships. Today mid-life and older women in Australia have access to digital cultures and online media, shifting the ways in which they engage in intimate relationships and health education. Recent rises in online intimacy, dating and relationships are improving older women’s bodily autonomy, agency and social empowerment. As a result, mid-life and older women are subsequently becoming more sexually active. This research presents much-needed evidence to support reproductive and sexual health outcomes for mid-life and older women. This evidence will be useful for health promotion professionals and reproductive and sexual health providers to develop services and programs that meet the needs of women in our communities.” – Bonney Corbin, Manager Education and Community Services - TRUE (Sexual and Reproductive Health Service, Qld)

DESCRIPTION
Past research on women’s sexual health has focused almost exclusively on the negotiation of safe sex in younger populations or within the context of HIV transmission. As safer sex practices can vary over time and cultural context, it is important to explore experiences within a mid-life context. This is particularly pertinent given the expanded opportunities for new relationships offered through online dating, and the rise in sexually transmitted infections (STIs) in midlife and older women. The “I’m in Control: I’m Not Stumbling in the Dark Anymore”: Mid-life Women’s Experiences of Successfully Negotiating Safer Sex with New Partners research project adopted a strengths-based approach to identify the factors and mechanisms that enable Australian women over 45 to successfully negotiate safer sex practices in new relationships. The findings revealed a complex interplay of individual, interpersonal and structural factors that have enabled the women to negotiate safer sex practices.

PARTNERS
Queensland Health (Sexual Health and HIV Service)

IMPACT
The “I’m in Control: I’m Not Stumbling in the Dark Anymore”: Mid-life Women’s Experiences of Successfully Negotiating Safer Sex with New Partners study identified a range of strategies aimed at helping mid-life women to successfully negotiate safer sex with a new partner. Study outcomes have shown that sexual health promotion initiatives for mid-life women must consider the broader context and tackle the misconceptions, beliefs and attitudes that influence safer sex behaviours.
HOMELESSNESS AND DISASTER THROUGH A NEW LENS

Dr Danielle Every

It’s the classic image of a social psychologist – clipboard armed, and madly scribbling responses to a long list of probing questions. However, for CQUniversity senior lecturer Dr Danielle Every, supplying her research subjects with cameras revealed so much more about how people experiencing homelessness face up to harsh natural environments – and how extreme conditions can cause further trauma for our community’s most vulnerable.

Since 2016, Dr Every has worked on a series of projects to understand homelessness, extreme weather and disasters. Working initially with the Australian Red Cross, Dr Every coordinated surveys, interviews and focus groups involving people with experience of homelessness, along with 163 Australian and New Zealand homeless services, and emergency services providers.

The research, funded by the Australian Attorney-General’s Department, found that almost one-third of people who have been homeless have suffered extra trauma because of extreme weather. Worse still, nearly one in five respondents cited examples of extreme weather causing homelessness in the first place.

“The stories we heard in that initial research were just incredible, and people were prepared to share some amazing personal experiences – but we wanted to get those stories out beyond our report,” explains Dr Every. With that goal in mind, in late 2016 Dr Every and her colleague Dr Scott Hanson-Easey at University of Adelaide submitted a proposal to the Vulnerable Community Network, an initiative run by the School of Public Health at UoA, and funded by the National Climate Change Adaptation Research Facility (NCCARF). Their creative idea was to establish a photography project with clients of Adelaide homelessness service Hutt St Centre.

“The project just took off – our participants were so inspired, and the images spoke to people in a way my initial report couldn’t, they really touched hearts.”
Across three separate mixed-method projects, CQU has worked with Australian and New Zealand community service providers and individuals experiencing homelessness to better understand the impact of extreme weather on vulnerable and homeless communities, and to improve resilience and preparedness for future shifts in climate.

PARTNERS
Australian Attorney-General’s Department, Australian Red Cross, Hutt St Centre, National Climate Change Adaptation Research Facility (NCCARF) and South Australian Government (Natural Disaster Resilience Program)

IMPACT
CQU’s homelessness and extreme weather projects have increased awareness and understanding of people experiencing homelessness and the trauma they can experience during extreme weather events. This has been achieved not only through interviews and surveys but also through an innovative project giving homeless people a platform to share their stories through photography. This work has culminated in a series of materials produced to support vulnerable people to prepare for extreme weather, and also highlighted the importance of secure shelter in preventing further trauma for people experiencing homelessness.

The resulting photography exhibition, Under the Weather: Images of Climate Change from the Streets, has since shown in Adelaide and twice at the MCG in Melbourne, wowing audiences and prompting new conversations about homelessness and vulnerability.

This year, Dr Every and her community partners are taking the work further, with a South Australian Government grant from the Natural Disaster Resilience Program.

The passionate researcher says she’s motivated not only to understand how people end up in vulnerable situations, but also to support them as they progress to a safer, more secure life.

“As a social psychologist, I’ve always worked with at-risk communities,” Dr Every explains. “Initially that was refugees and asylum seekers in anti-racism projects, then I had opportunities to explore vulnerable communities and natural disasters.

“When I started that project, there was hardly any existing information or knowledge out there – and that made me think, that’s where I should be working!”

Engaging with community-based service providers has been at the core of her work, which means a lot to Dr Every. “That’s what makes my job meaningful; that’s how I can begin to see patterns in findings – I’m not separated from the community, but I’m part of it!” she says.

Dr Every said the biggest eye-opener in her work with vulnerable communities has been the role that trauma plays as a pathway to homelessness. “There’s new research in Melbourne that found that 97 per cent of people experiencing homelessness have experienced trauma,” she explains.

“That’s huge, and it should drive a huge change in social attitudes to homeless people – we can’t keep blaming individual people, we need to look at the underlying structural causes.”
The quality of a city’s drinking water is determined by what is present in the raw water supply together with the quality of the water treatment process. Whether it be bacteria, fungi, chemicals or other pathogens, their presence provides increased challenges for water treatment authorities.

Blue-green algae, scientifically considered to be more like bacteria and hence also known as cyanobacteria, produce problematic contaminants and have been an almost 30-year focus for CQUniversity researcher Associate Professor Larelle Fabbro.

When she began her research back in 1990 there was little known about water quality and its related patterns in our river system and what was present in raw water sources that were then pumped to the potable water treatment plants in Central Queensland.

“There had been some very green algal blooms in the late 1980s which imparted very unpleasant tastes and odours to the tap water. It was thought that none of the local algae were toxin producing,” explains Associate Professor Fabbro. “However, at that time, many of the specialized chemical or cell culture protocols for testing were not in existence, nor were samples regularly sent for identification or testing via mouse bioassay.”

At the start of her project many industrial water treatment plants and those in smaller regional towns in Queensland were mainly a series of sand filters, whereas today there are sophisticated water treatment plants that use activated carbon to remove toxins along with sand filtration and disinfection.

The ACARP collaborative research project with BMA, Rio Tinto and Anglo Coal led to the discovery that a number of common, previously considered harmless, cyanobacteria were producing serious toxins. The research in relation to these algae is ongoing.

Associate Professor Fabbro was the first researcher to identify the cyanobacteria and water quality patterns of the Fitzroy River system and note that algal blooms in the tropics were not always at the surface and could occur at depth.
Most cyanobacterial species have a worldwide distribution and so this research undertaken in Central Queensland is not only making an impact locally, but nationally and internationally.

“A key objective has always been to reduce risks associated with water, especially drinking water. When the research began, there were no guides to the toxin producing algae of Australia and very little was known about cyanobacteria in the tropics, even though this country has a history of striking loss of animals, as well as a serious human poisoning event associated with these,” says Associate Professor Fabbro.

“Initially, the research was directed towards identifying the organisms present in water bodies (including those of the Fitzroy River system in Central Queensland) and more recently has been centred upon finding out if various common cyanobacteria in raw water storages have the potential to produce toxin.”

A number of postgraduate students have been a part of this lengthy and on-going project, investigating areas that current algal management plans do not cover. These include toxins preserved in the bottom layer of lakes or toxin-producing algae entering water treatment plants at times when bankside filtration is disturbed.

Historically, toxin-producing cyanobacteria have only been detected when people have been hospitalized or animals have died. The challenge for researchers has been to identify them and communicate the findings of that research so that they are less likely to produce harm to animals or people.

Associate Professor Fabbro uses a mix of field work, from banks and boats, and specific laboratory analyses as part of her research. Among the many tools of the trade is a Secchi Disc, a plate with black and white quadrants on a rope originally used by Father Pietro Angela Secchi in 1865 for determining the clarity of the water of the Mediterranean. It has been used ever since to provide a rapid measure of water clarity.

In the most temperate regions of the world, algal blooms produce bright green scums on the water surface. However, in tropical Australia that is not the case. “One challenge has been modifying pre-conceived ideas that cyanobacteria always produce a bright green scum. In tropical regions there can still be a large toxic bloom below the surface, often at the depth of water intakes, and blooms can also appear in many colours including rust and black.”

Today, Associate Professor Fabbro’s research has resulted in increased knowledge with respect to the identification, ecology and management of many species of blue-green algae, as well as their toxicity, helping facilitate optimal water management and drinking water treatment. “By producing guidebooks, we have been able to provide valuable information for the water industry and to those who need to use the information.”

Her work continues to make huge impacts on water quality worldwide.
ADVENTURES WITH DEMENTIA – ACCESSING SAFE TRAVEL OPTIONS

Dr Maria O’Reilly, Professor Carolyn Unsworth and Claudia Bielenberg

Australia has witnessed a paradigm shift in how we regard the neurological condition of dementia. We now know that people with dementia can and do continue to live engaged lives long after receiving their diagnosis. However, despite this realisation, communities have been slow to address accessibility issues for this population, making travel conditions far from ideal.

A CQUniversity research team have been working with a Queensland regional community to initiate a shift in understanding around accessibility issues and to determine strategies to improve travel for people with dementia. The project lead by Dr Maria O’Reilly is looking at how dementia friendly travel is in the city of Bundaberg. This study hopes to provide an insight into the accessibility of similar cities in Australia.

“While Australian communities have long recognised the need to ensure the accessibility for people with physical impairments, they’ve been slower to ensure accessibility and inclusiveness for people with ‘invisible disability’ like dementia,” explains Dr O’Reilly.

“We also know that more older people are travelling, including people living with dementia, and I believe that Bundaberg has great potential to be established as a ‘dementia friendly’ tourist destination.”

The research project titled “Adventures with dementia”: How dementia inclusive is Bundaberg as a tourist destination? is determining the dementia friendly status of Bundaberg transport hubs and services and identifying the facilitators and barriers to safe, comfortable travel to, from and within Bundaberg for people with dementia.

As part of this project, researchers have been working with Bundaberg airport and railway station personnel, as well as taxi and coach travel operators. Transport staff have taken part in an anonymous survey, while an environmental audit of the airport and railway stations have also been conducted, and a focus group of local people living with dementia and their care partners is planned.

“This is an extension of a project that was conducted in Brisbane which resulted in Brisbane airport being endorsed as Australia’s first ‘dementia-friendly’ airport,” says Dr O’Reilly. “We believe the Bundaberg study will also have positive outcomes for people with dementia.

“While we are still sifting through the local results, the site audits indicate that achieving dementia friendly status of local transport hubs should be manageable.

“Our findings should benefit people with dementia and their care partners, by enabling more positive travel experiences. It will also benefit transport services and their staff by minimising delays and difficulties with passengers.

“Finally, it should benefit the Bundaberg region by promoting it as a dementia-inclusive destination, thus attracting more travellers with dementia.”

Dr O’Reilly hopes in the long term this project will form the beginning of a network of dementia friendly travel destinations, enabling the ongoing engagement and inclusion of people with dementia in our country.
"Adventures with dementia": How dementia inclusive is Bundaberg as a tourist destination? is assessing the viability of the city of Bundaberg to be a tourist attraction for people with dementia. The study is looking at the current status and opportunities that exist at the city’s airport and railway station and for local taxi and coach travel operators.

**PARTNERS**
The CQUniversity research team is working with Jill Franz from the School of Design at QUT and Nicole Shepherd from the School of Medicine at University of Queensland and liaising with Bundaberg Regional Council, Bundaberg Airport, Bundaberg Railway Station, Bundaberg Cab Company, Bundaberg Coaches and the Gracie Dixon Centre.

**IMPACT**
The research findings should benefit people with dementia and their care partners, by enabling more positive travel experiences. It will also benefit transport services and their staff by minimising delays and difficulties with passengers and should benefit the Bundaberg region by promoting it as a dementia-inclusive destination.
MENTAL HEALTH IN FIFO WORKERS AND THEIR PARTNERS

Dr Amanda Rebar, Kristie-Lee Alfrey, Professor Corneel Vandelanotte and Dr Ben Gardner

There is no doubt that FIFO workers have to adapt to major lifestyle changes when they take on these roles, which can lead them and their partners down a road that affects their mental health. That’s why a team of CQUni researchers, in partnership with King’s College London, are investigating the mental health challenges both FIFO workers and their partners face and to develop intervention strategies to address these issues.

The research team consisting of CQUniversity’s Dr Amanda Rebar, lead researcher Kristie-Lee Alfrey, Professor Corneel Vandelanotte and Dr Ben Gardner from Kings College London have developed a world-first study that looks at understanding the context around both FIFO workers and their partners’ mental health and health behaviours during on-shift and off-shift periods.

Team leader Dr Rebar explains that she was approached by CQUniversity’s Kristie-Lee Alfrey with the project idea. Kriste-Lee felt that the wellbeing of the FIFO population was being overlooked and that they needed a voice.

“This is the first study to take on the perspective of FIFO partners in unison with the workers. FIFO is a unique type of shift work that has a unique set of challenges. We hope to identify these challenges and help develop intervention strategies to address them,” says Dr Rebar.

The FIFO Lifestyle Study is a mixed-method, daily diary study with a qualitative component that involves participants self-reporting their health behaviours and wellbeing at the end of the day for on-shift and off-shift days and to respond to a set of open-ended questions about the FIFO lifestyle and the impact it has on their lives.

According to Dr Rebar, workers generally commented that absence from their family created relationship strains beyond feelings of loneliness, including frustration at missing out on significant family events. They also struggled with fitting into their domestic lifestyles, stating that by the time they settled into their family’s routine, it was time to fly out again.

One research participant said, “When my partner comes home he feels like an outsider, as the kids and myself are in a routine that differs from him. He tries to change things into his way of doing, which creates havoc in the household”.

On the other hand, there were responses that ignited a discussion about the stigmas attached to getting help due to the ‘manly’ side of sucking it up and getting on with the job.

“The stigmas still surrounding mental health issues in mining prevent people accessing services on site. If this culture was to improve and mental health was promoted as a major health and safety topic in the workplace, where people are comfortable talking about it openly, this would be the main way to improve support for workers,” another participant said.

Despite the challenges FIFO families face, a change in occupation is not often seen as a solution.
Shifting from a FIFO role may improve lifestyle, however it comes with a huge cost. Workers face a large reduction in salary, which they have become reliant on and many workers and their partners feel that they are trapped with few alternatives.

“The golden handcuffs go on and as people earn more, they spend more, and take on larger debt burdens, causing them to be trapped in the mining FIFO work lifestyle,” expressed a FIFO worker.

This research has provided a much-needed outlet for an under-heard voice. Dr Rebar explains that most studies usually struggle to recruit sufficient sample sizes, however they were inundated with huge amounts of interest from FIFO workers and partners who wanted to be involved.

“We are hoping that this study will inform future intervention efforts for FIFO workers and their partners. Our findings point to simple solutions that FIFO organizations can easily implement to make a difference to the health and wellbeing of this important and prevalent subgroup of the Australian population.”

One research participant said, “When my partner comes home he feels like an outsider, as the kids and myself are in a routine that differs from him. He tries to change things into his way of doing, which creates havoc in the household”.

CASE STUDIES

DESCRIPTION
The CQUiversity research team is undertaking a first of its kind research project that looks at the mental health and behaviours of both FIFO workers and their partners in unison. The project also aims to inform intervention strategies.

PARTNERS
CQUiversity researchers have teamed up with Dr Ben Gardner from King’s College in London for this study. The study has sourced participants (FIFO workers and their partners) from across Australia. LIVIN Australia is a not-for-profit organisation who has funded the participant incentives.

IMPACT
This study has instigated much-needed discussion about the mental health and wellbeing of both FIFO workers and their partners. It has alerted employers and the wider community to the challenges they face. Looking into the future, it is hoped this study will inform intervention strategies for FIFO workers and their families.
Inspiring young Indigenous people to value and share their stories on stage can boost creativity – but a CQUniversity research partnership is aiming to support long-term benefits in employment options, leadership, and connection to culture, too.

JUTE Theatre Company in Cairns initiated the Dare to Dream project in 2016, creating new Indigenous theatre works, which then tour through North Queensland schools with strong Aboriginal and Torres Strait Islander representation. The tour includes week-long creativity workshops for the students in grades six to 10.

In 2017, they invited CQUniversity to partner with them to help build the research and learning outcomes from the project with Deputy Dean of Research Dr Susan Davis leading the impact and research arm of the work.

“In the short term, we’re seeing the project help Indigenous students feel valued and to see their cultures and stories represented on stage – the enthusiasm and engagement of the students is really evident, and feedback from participants is consistently positive,” says Dr Davis.

Both students and teachers have reported high levels of engagement, increased student confidence, and expanded notions of opportunities and life pathways. But it’s the significant longer-term impacts that Dr Davis wants to understand through the five-year project.

“We’ve seen recent evidence that one in 10 First Nations people in remote Australia earn income from the arts, but at the same time creative arts participation rates are actually declining in remote Northern Territory and Queensland;” she explains. “That’s concerning, given how important First Nations arts could be to cultural and economic sustainability, and community wellbeing.

“Through drama and performance, young people develop their abilities in storytelling, but they are also bearing witness, inventing and affirming new voices and identities, and discovering new career pathways and life roles.
“So far more than 4000 students and 300 teachers have seen the shows, and more than 600 students have participated in the workshop program – from that group there are clearly students who could end up pursuing a career in the arts and creative fields, but we are also interested in promoting wider aspirations as well, and for students to stay engaged in learning.”

In 2018, the new theatre work that has been developed is ‘Bukal’, named for Cairns Indigenous leader and CQUniversity academic Associate Professor Henrietta Marrie AM. ‘Bukal’ is also the word for the black lawyer vine which grows in the rainforest and is used for weaving and other purposes. The qualities of the plant, its ability to regenerate when cut down and find new pathways to climb higher, become a metaphor across the play.

A Traditional Owner whose great-grandfather was known as ‘King Ye-i-nie’ of the Yidinji, Associate Professor Marrie has been a tireless advocate for Aboriginal culture and heritage, and was the first Aboriginal Australian to work for the United Nations.

“Henrietta’s story is quite extraordinary – and her achievements have the potential to inspire and educate young people, particularly young Indigenous women,” explains Dr Davis. And nurturing Aboriginal and Torres Strait Islander stories in theatre could have flow on benefits for the whole of society.

“There are important stories to be told about how we can realise creative futures, where creative, technical and business skills combine, drawing upon the most ancient of traditions of First Nation peoples, like kinship and connections, and combining ancient stories and knowing with contemporary creative technologies and performance art to create new work and opportunities.”

The project will continue until 2020, with new theatre projects touring from Cairns annually.

“Being involved in Dare to Dream has been so inspiring – not only for understanding the power of story and voice for providing insight into the human experience, but also for enabling us to realise new visions and ‘New Dreamings’.”
Most adolescents from remote Indigenous communities access their secondary schooling through boarding schools. Attending boarding school involves multi-level complex transitions for these students. Managing transitions requires enormous psychosocial resilience on the part of students to navigate resources that sustain wellbeing.

Simultaneously, the capacity of their environments to provide these resources are imperative for students to flourish at school. CQUniversity researchers, in partnership with Education Queensland’s Transition Support Service, use a strengths-based approach to work with families, community members, schools and services to ensure that students’ needs are met while studying away from home.

According to Associate Professor Roxanne Bainbridge, students transitioning to boarding school experience high levels of stress as a result of having to leave their home communities. “They travel to boarding schools which are geographically, thousands of kilometres, and culturally, worlds apart. For various reasons, some students flourish, but many will exit early and return to their home communities where there are few options for further educational advancement.”

Assoc Prof Bainbridge believes “that working to develop student resilience in isolation of other factors and conditions would hold little value when their complicated social and environmental contexts include multiple systems of peers, families, communities, schools, health and education systems, policies and so forth”. “Key is strengthening student resilience and that of their environments”. Thus, CQUniversity researchers also work collaboratively with community services, schools, families and communities to assure smoother transitioning to boarding schools for students and greater capacity and preparedness of schools, communities and families to support these transitions. “It’s about strengthening the resilience of a student’s environment and also building their own psychosocial resilience.”

“Resilience is about our stories of strength through hardship. It is about how well we are able to negotiate with services, communities and our families, to get the things that we need to keep strong and healthy, in ways that are meaningful to us.”

CQUniversity’s researchers from the Centre for Indigenous Health Equity Research Associate Professors Bainbridge and Janya McCalman, takes an ecological perspective of resilience. “We use Michael Ungar’s definition of resilience, that in the context of exposure to adversity, resilience is the ability to navigate your way to...”
CQUniversity’s researchers in Indigenous health are exploring new ways for organisations to work together to support Indigenous students as they transition from remote communities into boarding school for secondary education. The project endorses the strategies of strengthening the resilience of a student’s environment and also building their own psychosocial resilience. It forms part of a five-year NHMRC project, focused on psycho-social resilience and suicide prevention strategies.

**PARTNERS**

Education Queensland’s Transition Support Service (EQTSS) and 17 boarding schools

**IMPACT**

The CQUniversity team say that in general, this particular cohort of some 300 Indigenous students have high levels of psychosocial resilience. They do, however, also experience high levels of psychological distress and report some latent risk factors for suicide. The project has supported schools to identify and implement strategies to better support the resilience of these students while they are at boarding school, including strengthening their linkages with home communities. The study will evaluate whether enhanced support improves student resilience and reduces the risk of student disengagement from secondary schooling.
With almost one million kilometres of roads across Australia, maintaining this vital infrastructure is a major challenge for local, state and federal governments. The condition of roads influence user safety and research has shown poor road quality is a major contributing factor to motor vehicle accidents and subsequent driver injuries and fatalities.

Currently, manual systems used for road maintenance and safety, not just in Australia, but around the world, are inefficient and prone to error. The main challenge in assessing road safety is being able to accurately detect, segment and classify all road objects and attributes, while also calculating distances between objects.

Researchers from CQUniversity’s Centre for Intelligent Systems (CIS) have been working with industry partners, including the Queensland Department of Transport and Main Roads (DTMR) and the Australian Road Research Board (ARRB), to develop a deep learning-based, automated system that analyses video data to assess road safety and conditions for the purpose of identifying safety issues and prioritising road safety maintenance.

The research involves the automated extraction of road attribute information from digital video recordings (DVR) that use advanced image analysis. This information is then cross-validated with other data sources. The method has allowed researchers to gather information on safety attributes (set out in the AusRAP and iRAP star rating).

The preliminary experiments have shown that gathering information using deep learning methods is both time efficient and cost effective and provides the ability to identify new or emerging hazards that could impact road safety conditions. The research and subsequent field-testing will also inform the development of a tool to estimate an overall road rating.

Professor Brijesh Verma, Director of the Centre for Intelligent Systems, says that by identifying road attributes and assessing these against national safety compliance recommendations, the research has the potential to inform the creation and maintenance of safer roads.
The preliminary experiments have shown that gathering information using deep learning methods is both time efficient and cost effective and provides the ability to identify new or emerging hazards that could impact road safety conditions.

“This research will develop novel tools for segmentation and classification of roadside objects/AusRAP attributes and classification of those objects and distances between them to identify overall road safety and conditions. We will also be able to develop a tool to estimate and assign overall road ratings.

“Experiments have so far shown that the automation of assessment is delivering positive outcomes and has a high accuracy in identifying AusRAP attributes,” says Professor Verma.

The CIS is continuing to work with ARRB and DTMR partners to refine the deep learning techniques being used for large data and further improve the detection and classification accuracy of roadside attributes, so that a fully automated system can be developed.

The projected long-term outcome of the proposed research work is an objective, automated method and software for analysing roadside objects and determining the road safety/rating.
CQUUniversity aims to foster and build its research capacity by supporting a number of its leading researchers to undertake full-time research under prestigious state and national fellowship funding programs. Funding agencies currently supporting CQUUniversity researchers include Australian Research Council (ARC), National Health & Medical Research Council (NHMRC), Heart Foundation, and the Queensland Government’s Advance Queensland programs.
PROFESSOR CORNEEL VANDELANOTTE

**FELLOWSHIP:** National Heart Foundation Future Leader Fellowship

**RESEARCH PROJECT/S:** Corneel heads up a number of projects, many involve the development, evaluation and dissemination of e- and mHealth interventions (web, app and tracker-based) to improve health behaviours (mostly physical activity, but also sitting, sleep, diet and weight).

**RESEARCH IMPACT:** Most significantly, the 10,000 Steps program is well on its way to registering its 400,000th participant. He has seen the involvement of thousands of Australian workplaces and has had about $4 million of investment by the Queensland Government since inception.

**CAREER HIGHLIGHTS:** There’s been a few, such as securing NHMRC grants and fellowships, but he gets the most satisfaction when the researchers he coaches and mentors score a big win.

**CAREER ASPIRATIONS:** Corneel would love to be involved with research management at CQUniversity, pursue further great research, and along the way secure some new grants and fellowships.

DR AMANDA REBAR

**FELLOWSHIP:** National Health and Medical Research Council Early Career Fellowship

**RESEARCH PROJECT/S:** Amanda investigates the automatic processes that influence health behaviours (habits, automatic biases, impulses, urges).

**RESEARCH IMPACT:** Amanda is the lead author on seminal publications on exercise motivation and habit formation, has presented 11 invited talks, published 81 peer-reviewed articles, and earned almost a million dollars in research grants to investigate healthy habits and automatic processes.

**CAREER HIGHLIGHTS:** Amanda’s favourite part of her job is getting the chance to know and work with colleagues who are wonderful scientists and great people.

**CAREER ASPIRATIONS:** Amanda aspires to be a wonderful scientist and helpful mentor to upcoming scientists and to be able to make a graph in ‘ggplot’ without getting frustrated.
**ASSOCIATE PROFESSOR DRAGANA (DANA) STANLEY**

**FELLOWSHIP:** ARC DECRA Fellowship

**RESEARCH PROJECT/S:** Dana is running a number of projects in the area of intestinal health in humans and agricultural animals. Her main projects are researching the alternative antibiotics and next generation probiotics. She is also a leader in manipulating intestinal bacterial profiles for health improvement and disease prevention.

**RESEARCH IMPACT:** Dana is a prolific publisher of very high quality manuscripts; with 58.8% of her manuscripts in the world’s top 10% best journals and 57.1% among top 10% most cited publications in the world. Dana has published in the world’s best journals like *Nature Communications*, *Nature Immunology* and *Nature Medicine*. Her research income exceeds $1 million and she runs a productive and successful research group.

**CAREER HIGHLIGHTS:** Dana was the first author of the manuscript published in *Nature Medicine* reporting a microbiota role in post stroke mortality. This manuscript is considered game changing in our understanding of stroke mortality and is having a major clinical impact. The manuscript received high media attention and was featured in leading Australian newspapers and radio interviews. Dana is an editor in one of the Nature Publishing journals – *Scientific Reports*, and a member of NHMRC panel. Dana’s idea on manipulation of gut microbiota is currently being converted into a commercial product by one of the world’s leading multinational biotechnology companies.

**CAREER ASPIRATIONS:** Dana’s current major research effort is finding a link between microbial products and prostate cancer. Dana leads a clinical trial that hopes to bring more light to this devastating disease.

**DR YUJUAN (JADY) LI**

**FELLOWSHIP:** Advance Queensland Research Fellow (Mid-Career)

**RESEARCH PROJECT/S:** Jady is undertaking a number of projects involving the control of root-knot nematodes that are affecting ginger and sweetpotato in the Bundaberg region. She is looking at the development of fungal biocontrol agents and other alternative and sustainable solutions to the problem. She has also researched the application of unmanned aerial vehicles for remote crop disease detection.

**RESEARCH IMPACT:** Jady is currently leading research and establishing a strong track record in horticulture crop protection through the integrated management of root-knot nematodes. She has 17 peer-reviewed publications and reported four new and five known species belonging to the superfamily Tylencholaimoidea.

**CAREER HIGHLIGHTS:** In 2017 Jady received the Advance Queensland Mid-Career Research Fellowship, the Bundaberg Regional Council Prize for Excellence in Research – Emerging Researchers, and in 2016 was named in the Science and Innovation Awards for Young People in Agriculture, Fisheries and Forestry.

**CAREER ASPIRATIONS:** Jady hopes her research will continue to improve horticultural systems for industry outcomes by developing integrated management of root-knot nematodes and other crop disease.
**DR CHENGYUAN (STEPHEN) XU**

**FELLOWSHIP:** Advance Queensland Research Fellow (Mid-career).

**RESEARCH PROJECT/S:** Stephen has been researching Early Detection of Crop Stresses in Tropical Protected Cropping Systems as well as Smart sensor and drone data integration for precision irrigation.

**RESEARCH IMPACT:** Stephen’s research has enabled digital tools to be developed based on a range of field trials. These tools have been deployed to help industry partners use and manage farm data.

**CAREER HIGHLIGHTS:** To see research outputs being deployed in industry to bring real changes has been a real highlight for Stephen.

**CAREER ASPIRATIONS:** Stephen would like to pursue further great research in agriculture, especially adopting new technologies to help farmers address crop issues.

**DR STEPHANIE SCHOEPPE**

**FELLOWSHIP:** National Health and Medical Research Council Early Career Fellowship & National Heart Foundation of Australia Postdoctoral Fellowship

**RESEARCH PROJECT/S:** Stephanie aims to increase physical activity and reduce sedentary time in children through a family-based intervention using smartphones and activity trackers. She further investigates how both mothers and fathers can support and model more physical activity and less sedentary time for their children.

**RESEARCH IMPACT:** Stephanie has published about 45 peer-reviewed articles, given 42 presentations and earned nearly $900,000 in research funding.

**CAREER HIGHLIGHTS:** Her favourite part of the job is researching new ideas and getting simple convincing messages across to families, researchers and funding organisations.

**CAREER ASPIRATIONS:** Stephanie aspires to become a leading physical activity researcher with a strong positive impact on child health and engagement with families in the community.

**ASSOCIATE PROFESSOR ROXANNE BAINBRIDGE**

**FELLOWSHIP:** National Health and Medical Research Council (NHMRC) Career Development Fellowship

**RESEARCH PROJECT/S:** Roxanne has led research across a number of projects in Aboriginal health and wellbeing, education, and conducted systematic literature reviews in various content areas for Indigenous populations.

**RESEARCH IMPACT:** Roxanne has worked as a researcher in Aboriginal health and education over the past seven years as Lead/Chief Investigator on a total of 41 grants, bringing in well over $27 million in funding since 2010. Of 82 publications, she has published 54 peer-reviewed articles in national/international peer-reviewed journals. She has contributed to policy directions and developed community health and educational resources. Her expertise in Indigenous health and capacity development is sought nationally and internationally.

**CAREER HIGHLIGHTS:** Roxanne recently collaborated with a New Zealand consultancy to undertake a national evaluation of Indigenous Primary Health Care. Her team was awarded $18 million by the Department of Health to complete the evaluation over four years.

**CAREER ASPIRATIONS:** Roxanne wants to leverage her research expertise to improve health and create societal change for Aboriginal people. She sees herself as a lifelong learner and is always looking to enhance her skills and invest time in learning new ones.
ASSOCIATE PROFESSOR ANJUM NAWEED

FELLOWSHIP: Australian Research Council Discovery Early Career Researcher Award Fellowship

RESEARCH PROJECT/S: Anjum is an applied cognitive scientist specialising in Human Factors – a subdiscipline of psychology concerned with understanding the interactions of people with other elements of a system, with the overall aim to optimise their well-being and overall system performance. The broad focus of Anjum’s fellowship is on improving rail safety through teamwork.

RESEARCH IMPACT: Anjum has co-developed new processes, materials, standards, toolkits and technologies, and used them to promote changes in practice.

In the case of Australian rail, a highly fractured industry, Anjum’s work has led to national unification and harmonisation in ways of working.

CAREER HIGHLIGHTS: Anjum has received awards in recognition of his work, but for him, pursuing science with impassioned like-minded collaborators and mentoring early career researchers is really what it is all about. Injecting creativity and the occasional pop-culture reference into his work comes a close second.

CAREER ASPIRATIONS: Anjum hopes to continue flexing and developing his research skills, and continue contributing to the growth in research capacity and excellence at his university.

DR JANYA MCCALMAN

FELLOWSHIP: National Health and Medical Research Council Early Career Fellowship

RESEARCH PROJECT/S: The focus of Janya’s fellowship is on service integration to improve the mental health of Indigenous adolescents. Among other projects, she also works on a related resilience research project to examine how boarding schools can better support the resilience of Indigenous students from remote communities.

RESEARCH IMPACT: Janya’s research responds to the priorities of Indigenous health and education organisations and contributes to improving services provided to Indigenous Australians. Key examples include the support for changes to the service model of Education Queensland’s Transition Support Service and the evaluation of the transition of primary healthcare to community control in Yarrabah.

CAREER HIGHLIGHTS: Ongoing engagement with Indigenous organisations.

CAREER ASPIRATIONS: Janya hopes to contribute to growth in CQUniversity’s Centre for Indigenous Health Equity Research.
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 or call +61 7 4970 7330.