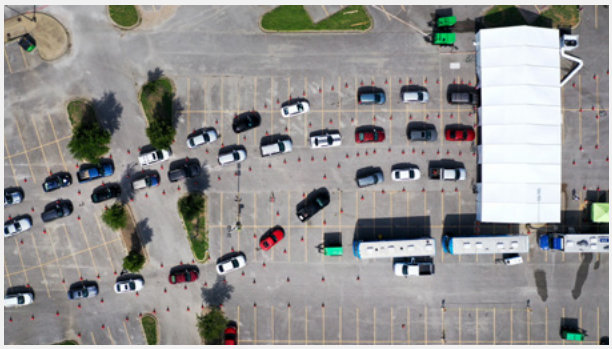
Griffith UNIVERSITY
Queensland, Australia

Disaster Management

Resilience research at Griffith University



About

Griffith University's interdisciplinary and applied research experts work to achieve sustainable, resilient Australian communities of the the future, ready to **prevent**, **prepare**, **respond** and **recover (PPRR)** in a crisis.

Working closely with frontline responders, local practitioners, industry and leaders, the University brings together more than 50 academics with expertise in business, engineering, communications, economics, climate, environmental science, sustainability, tourism and health.

Griffith university's applied interdisciplinary research has tackled some of the world's most pressing challenges, delivering tailored decision-support solutions to help communities successfully manage threats from bushfires, extreme weather events including floods and heatwaves, water security and the COVID-19 pandemic.

The University's campuses have state-of-the-art facilities designed to enable improved disaster management and resilience decision support. These are used for research and scenario planning, as well as activation training for disaster response and recovery.

Griffith University has the capacity to develop resilient strategies and solutions for the interconnected priorities of PPRR and engages in research that delivers actionable outcomes for disaster management locally, nationally and globally.

Work with Griffith University to enable communities to build disaster resilience through research that leads to practical solutions.

E: disastermanagementresearch@griffith.edu.au

PREVENTION

Working to minimise exposure to disasters, through understanding and predicting the severity of all hazards and consequences for people and infrastructure.

Coastal and Marine Research Centre (CMRC)

For more than 20 years, Griffith researchers at the CMRC have developed targeted research to assist with the management of the Gold Coast environment including, its beaches and waterways. In partnership with local Gold Coast Waterways Authority, researchers focus on water quality, beach erosion, economic solutions and governance. This forms a core part of protecting the 'backbone' of Australian coastal cities, through the Cities Research Institute.

Expertise: coastal engineering, urban catchment, floodplain and water resource management and analysis of coastal processes and the impacts of climate change on coastlines.

Research activities:

- Estuarine modelling
- Coastal ocean dynamics
- Climate change impact and adaptation
- Catchments and waterways

A joint Griffith research initiative has uncovered the cyclic processes that drive the movement of sand around coastal headlands and prevent beach erosion.

"Understanding the link between the headland bypassing rates at Fingal Head and large-scale climate drivers is crucially important to be able to forecast and manage the processes in the future."
PhD Candidate, Ana Da Silva from the Coastal and Marine Research Centre at Griffith University.
This research informs Gold Coast City Council's coastal management programs and enables planning for remediation following storm surge and cyclone damage.

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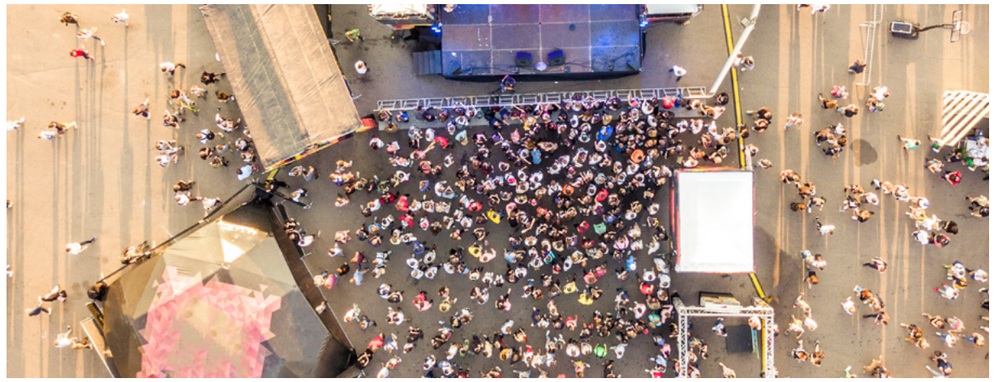
Drones and RPAS: Data collection and supply chain augmentation (Aviation and technology)

Drones and associated Remotely Piloted Aircraft System (RPAS) are important enablers of improved decision-support for disaster preparedness, response, and recovery. They provide effective and safe monitoring of disaster sites, enabling detailed and expansive viewpoints, with additional capabilities in heat mapping and environmental conditions. Griffith's experiences in operating and managing the licences for appropriately using these assets have enabled coordinated and connected planning across government and the private sector.

Expertise: RPAS flight license applications, legal contexts for appropriate RPAS use, RPAS piloting, and digital twin image capture.

"I oversee all RPAS missions across the University, and there is a lot of research being done through their deployment. GU has embraced the use of RPAS for a variety of built environment decision-support contexts. We are looking forward to translating this expertise into supporting disaster management arrangements."
Steven O'Keefe, Griffith University Chief Drone Pilot



Menzies Health Institute

Griffith's largest research institute translates innovative health research into better health outcomes, including planning for resilient healthcare and public spaces infrastructure, and inclusive disaster management planning for people with disabilities. Its researchers are focusing on the most vulnerable people and innovative ways in which systems can better respond to their needs. The Institute also provides strategic advice to state and federal government regarding population health and wellbeing, including for large sporting and cultural events.

Expertise: infectious diseases, infection prevention and control, emergency healthcare, inclusive futures research, applied health economics.

"Griffith founded the Mass Gathering Collaboration in 2019. Together with the Queensland Tourism Industry Council and the Queensland Government, we developed a framework and recommendations for the safe return to events in the context of COVID-19. By implementing the principles of safe operations in each event, we can keep customers and staff safe, ensuring a speedy recovery of our industry and our economy."
Dr Jamie Ranse, Menzies Health Institute, Griffith University.

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Griffith University is ranked second for marine/ocean engineering in Australia and 19th in global rankings.

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Cities Research Institute (CRI)

CRI is Australia's largest research facility that spans on all aspects of cities and urbanisation. Its research addresses the complexity of issues that cities face in Australasia, in close collaboration with government, industry and the community. In the context of protecting the 'backbone' of and critical infrastructure connecting cities and towns, CRI research priorities include condition assessment, performance sustainability, resilience enhancement, digital transformation, and future proofing. Applied outcomes are enabling infrastructure assets and utilities to cope with, and adapt to, evolving mix of hazards, risks and threats.

Expertise: resilient engineering and design, architecture and planning, sustainable business practice, and environmental and social scientists.

Research activities:

- Public transport infrastructure through transport activated corridors
- Resilient community housing choices through tiny homes
- Natural disaster resilient land use planning and green infrastructure
- Construction innovation and circular economy practices for sustainable recovery
- Infrastructure and utility digital twins for remote monitoring and management"

"Digital engineering and asset management have emerged as targeted approaches to provide evidence-based decision making, towards deriving better business and project outcomes. Working with government and industry partners including the Sustainable Built Environment National Research Centre (SBEnrc), our research includes integrating 'big data' metering and monitoring technologies and associated expert systems into infrastructure, to better manage these critical resources and better integrate contemporary solutions such as renewable energy and decentralised water supply."
Professor Rodney Stewart, Cities Research Institute

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PREPAREDNESS

Working with government, industry and communities to identify risks, and to manage the impact and consequences of potential disasters through codesign, learning from the past, projecting scenarios, and predictive analytics.

Climate Action Beacon (CAB)

The CAB is a multi-million-dollar research program building on the University's long history in climate adaptation research. It is committed to accelerating the transition to a net zero emissions economy and building capacity for a climate resilient future, bringing together a team of experts and partners across disciplinary boundaries.

Expertise: climate change adaptation and mitigation, conservation and sustainable development, coastal and marine resource management, environmental communication, economics, public policy, law, human rights, ecology, riverine and wetland ecosystems, big data and analytics.

CAB research goals:

- Motivating climate action—enabling climate action among individuals, communities, organisations and government.
- Future climate transitions—supporting progress towards climate resilient development and net zero carbon emissions.
- Climate justice—ensuring climate actions are fair, equitable and just.

The Bushfire Recovery Project, a joint initiative with Griffith University, the Australian National University and the Great Eastern Ranges Initiative, analysed satellite data to map the 2019-2020 Black Summer bushfire footprint, including the fire intensity to help inform post-fire forest management.

"Targeted burning within one km of houses and towns can help to protect them from bushfire, but it must be done every three years. The evidence shows fuel reduction burning was once much more effective than it is now"
Griffith Climate Action Beacon Director Professor Brendan Mackey.

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Institute for Integrated and Intelligent Systems

What people say through social media, discussion groups, blogs and review websites, can really help to prioritise disaster management efforts. The Big Data and Smart Analytics lab is enabling adaptive planning in disaster response and recovery, supporting community-led recovery. This includes translating tweets to track emergency incidents and monitor disaster recovery processes. It also includes using social media sentiment analysis to understand community temperament and reactions to events, and to monitor citizen appreciation of event risk and personal responsibilities.

Expertise: big data analytics, machine and deep learning, real time integration of publicly available data.

Research priorities:

- To further improve predictive power of Big Data Analytics
- To create smarter and faster algorithms to perform deep learning on large volumes of data in real time
- Social media sentiment analysis for disaster response and recovery priorities

"We have been working with the Queensland Inspector General Emergency Management to explore societal readiness and in pandemics, in addition to community voice on diverse topics including the Fraser Island bushfires. Over the last couple of years through Covid19 we have been involved in QLD,NSW and federal level projects to provide decision support during the pandemic and related issues."
Bela Stantic, Professor in Computer Science and founder and Director of the Big Data and Smart Analytics Lab at Griffith University.

Australian Rivers Institute (ARI)

The ARI is a global leader in research and education on rivers, coasts and catchments. It provides a creative and collaborative environment that fosters the next generation of ecosystem scientists, supports sustainability and promotes conservation of the world's natural resources.

Expertise: sustainable management of aquatic ecosystems, preservation and management of catchment, river, estuarine and coastal ecosystems.

Research activities:

- Balancing water needs for humans and nature
- Arresting aquatic biodiversity decline
- Tackling land-based waterways pollution
- Making catchments more resilient to climate change

A $1m donation from the Ian Potter Foundation has advanced Australian Rivers Institute (ARI) research efforts to protect catchments and river systems from the impact of extreme weather events.

"The 'Catchment Resilience' project aims to showcase how to tackle the problems at their source in the upper catchment where the greatest impacts can be achieved. These benefits can extend to protection of public assets and can even save lives."
ARI Director Professor Stuart Bunn.

Griffith University's ARI is the number one global water security think tank in the 2020 Global Go To Think Tank Index Report

Centre for Environment and Population Health (CEPH)

The CEPH works with the international health sector on disaster risk reduction and climate change adaptation. The centre provides training and strategic planning for the science of disaster risk management, focusing on public health. This includes risk and crisis visualisation and communication, and training of leaders through to frontline workers.

CEPH also creates interventions for protecting health and safety workers in emergency response environments and dealing with the impact of climate change on vector-borne diseases, such as mosquitos living in higher altitudes, through early warning detection of public health problems.

Expertise: International health risk advice, sub-populations vulnerable to disasters, disaster stakeholder engagement, policy development for climate change adaptation, future-proofing to reduce risks.

Long term international collaborators include: Department of Foreign Affairs and Trade (AusAid), World Health Organisation (WHO), Red Cross, Tzu Chi Buddhist Foundation, Healthcare without Harm, China Centre for Disease Control.

The CEPH uses projections to future-proof the health-care sector. It conducted a scoping review for the WHO Geneva knowledge sharing hub, investigating the capacity of China, Indonesia and Vietnam to respond to climate change disasters and vulnerable populations, while also providing strategies to address issues.
CEPH were commissioned to lead one of the four global themes on health emergency and risk management (Health-EDRM – Area 3), addressing sub-population needs regarding specific disasters related to climate, which informed WHO funding for the next round of research.

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RESPONSE

Working with political and community leaders to efficiently and effectively build and activate emergency management capabilities. These initiatives are in partnership with emergency responders, not-for-profit organisations and communities.

Griffith Criminology Institute (GCI)

The GCI has one of the largest, most vibrant and high-performing criminology communities in the world. Researchers analyse and develop frameworks for effective communication across various phases of disasters. In 2020 researchers from GCI examined the factors that motivated public attitudes towards compliance with restrictions during the pandemic. While fear of punishment played little role in motivating compliance, the team recommended developing strategies to persuade citizens of their moral responsibility to follow the rules.

Expertise: first responder decision-making; the impact of extreme weather events and cyberattacks on critical infrastructure; impacts and responses to climate events and cyber-attacks.

A GCI researcher is leading the Art of Resilience project, funded by the Canadian Government's Social Science and Humanities Research Council, with a colleague from the School of Criminology at the University of Montreal. The project explores how security professionals are responding to climate and cyber harm scapes.

Case studies, completed and ongoing, include studies of international banking, international shipping, large municipalities response to droughts, flooding and hurricanes (Cape Town and Houston), infrastructure within Queensland (with the Queensland Department of Transportation and Main Roads), agriculture (New South Wales) and regional municipalities (New South Wales).

The project has generated journal articles and policy reports providing immediate access of best practice information to government and private sector decision-makers.

Griffith Disaster and Resilience Management Facility (DRMF)

Working closely with state government and emergency responders, Griffith University has co-designed a teaching and learning building on its Nathan campus known as N79, to emulate the design and functionality of Queensland's State Disaster Coordination Centre in Kedron (Brisbane).

The Nathan campus building is available for hire, for testing scenarios, planning and training events, and activation exercises. The building is also adjacent to bushland and outdoor scenario simulation spaces.

Building facilities include:

- double-lectern media broadcasting room with connected decision-support spaces
- digital learning studio and prototyping 'makers space'
- augmented and virtually reality simulation spaces
- large flat-floor laboratory and studio spaces for scenario planning and enactment
- cyber-security testing facilities

"Our location on a hill, just 12km south of the city and surrounded by bushland, gives Griffith University's Nathan campus an unprecedented opportunity to support the disaster management agenda. Through N79 and the surrounding precinct, we are providing versatile spaces for training, capacity building and scenario planning. From one corner of the building, to one level, to full occupation, N79 provides multiple configurations for events and emergency response."
Professor Cheryl Desha, Theme Leader 'Digital Earth and Resilient Infrastructure', Cities Research Institute.

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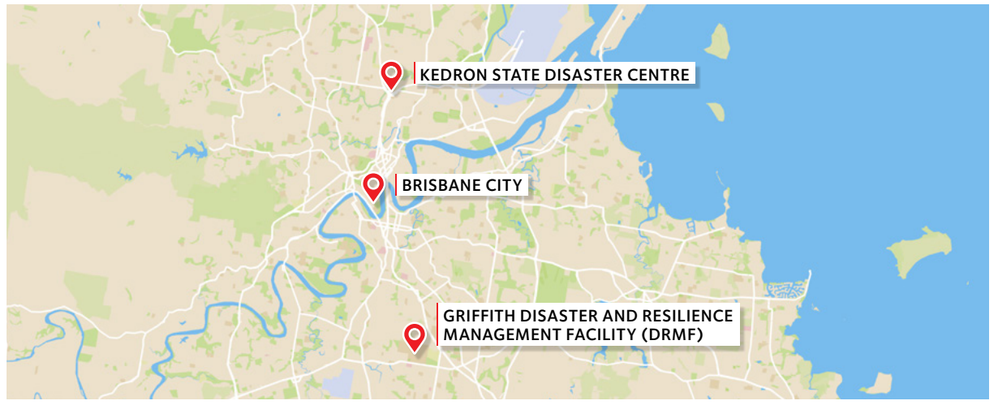

RECOVERY

Working towards better futures through enabling resilient community outcomes from recovery efforts, spanning 'build back better' infrastructure solutions, environmental stewardship, and mental and social wellbeing.

Resilient infrastructure

The International Water Centre (IWC) uses digital infrastructure such as sensors and models, and satellite data to provide early warning data and support decision-making in diverse environments. This includes catchment and flood modelling and visualisation, fire risk forward-predictive modelling, and utilities vulnerability assessments.

It has hosted, for the past nine years, a Flood Community of Practice in partnership with state government agencies and the private and not-for-profit sectors. This long-standing initiative brings together multi-disciplinary researchers and practitioners across all sectors to plan for and manage flood events.

The Yunus Centre has also been working with local businesses and communities to create resilient local economies and capabilities. This place-based approach supports and enhances recovery efforts, immediately following disasters and in the longer term.

"Griffith University's International Water Centre worked with the Asian Development Bank and other partners to develop a National Water Security Index that includes a national level index for resilience to water related disasters and hazards. This work has also informed the development of a risk framework for evaluation of COVID-19 Water Security Risk for the Department of Foreign Affairs and Trade."
Professor Mark Pascoe, Griffith University Professor of Practice in Integrated Water Management.

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Our 'local food resilience' action research agenda is in partnership with Logan City Council and the state government. Schools and community groups are creating and managing local food production and sales, supporting access to fresh food by all. It is exciting to be part of this journey and documenting it to build capacity for similar initiatives elsewhere."
Dr Kimberley Ries, Digital Earth and Resilient Infrastructure Research Theme, Cities Research Institute

Disrupting Violence Beacon (DVB)

Violence, particularly against women and children, can escalate during and following disasters, which has implications for the community. Community mental health is also a key factor in community recovery and resilience.

Research on building community-based responses during and after disasters offers important insights into sustainable violence prevention and responses to trauma. This includes the role of bystanders, appropriate professional services, along with the use of social media and technology for improving safety and prevention of those impacted by disasters.

The DVB conducts research to understand and respond to community mental health and violence and translates knowledge into effective prevention and intervention. Disaster trauma can be a trigger for mental wellbeing challenges and violence in the community with research needed to help prevent violence and build personal resilience to trauma

Expertise: human services and social work, health, criminology, law, education, intersectionality, social cohesion and public safety, creating safe, well-governed and equitable societies, understanding issues confronting contemporary society and accelerating transition to a regenerative and distributive economy, training for first responders.

DVB research themes:

- Understanding violence
- Translation and innovation
- Access to justice
- Advancing Regional-Innovation Program
- Mobilities, communities and in/securities
- Breaking cycles of crime and inequality

"The DVB and MATE bystander project – which is about personal leadership in preventing violence and problematic behaviour – is working with Telstra and the Queensland Government to develop a mobile phone app to support bystanders respond when they witness or become aware of violence and abuse, supporting community leadership in creating safe spaces for everyone"
DVB Co-Directors Professor Patrick O'Leary and Professor Elena Marchetti

Supply chain logistics

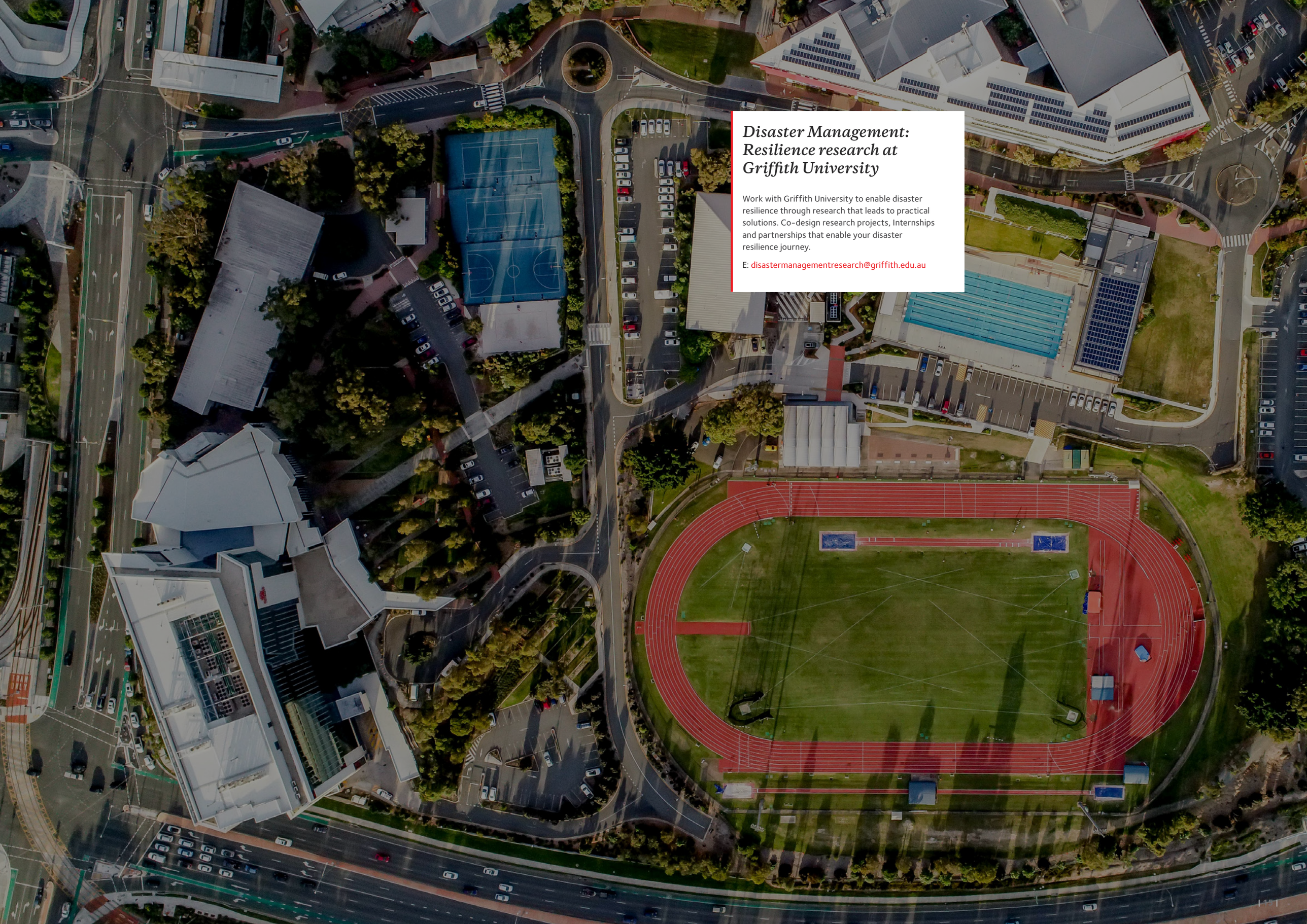
The devastation caused by disasters is not only a test of strength of infrastructure and resilience of the communities affected, but also has far-reaching consequences beyond the immediate disaster area. Supply chain and logistics play a pivotal role prior to, during, and in the aftermath of disasters. This spans essential services such as power, water, internet, fresh food, medical supplies and household goods.

Expertise: supply chain preparedness, modelling and visualising; logistics management, planning and scheduling, supply chain optimisation, artificial intelligence, digital innovation.

Research activities:

- Planning and scheduling of disaster-responding logistics activities
- Strategic positioning of disaster response resources
- Local food contingency: Building a community of practice
- Dashboard and application enabled monitoring and management
- Fostering resilient infrastructure through biomimetic design and engineering
- Closing the loop on organics in cities: At-scale food-waste composting
- Supply chain traceability

"We are connecting our deep understanding from practice and research on the global pandemic and emerging geopolitical situations that are largely affecting the way businesses are moving forward with their plans for the end-to-end process of fulfilling consumer's needs. This includes ethical and responsible practice of sourcing of materials, manufacturing and production, and accountability for circular economy to reduce wastage and ensure provenance."
Professor Dian Tjondronegoro, Business Strategy and Innovation, Griffith University.



Disaster Management: Resilience research at Griffith University

Work with Griffith University to enable disaster resilience through research that leads to practical solutions. Co-design research projects, Internships and partnerships that enable your disaster resilience journey.

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