The 2021 Queensland Disaster Management Research Forum

- *Presentation Abstracts*

Queensland
Government

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1. Looking Back

Oral histories of Yasi

Dr Deb Anderson

Qld State Library Fellow

Lecturer – Journalism

School of Media, Film and Journalism

Monash University

This video draws from three ongoing studies of cyclone experience in Australia's Wet Tropics, noting the distinct roles that local, regional and national media outlets can play in disaster preparedness, management and recovery. In 2014, oral history interviews commenced with a cross-section of members of Far North Queensland communities affected by recent cyclones including Cyclone Debbie (Cat. 4, 2017), Cyclone Yasi (Cat. 5, 2011) and Cyclone Larry (Cat 4, 2006). Early findings highlighted public concerns with the impact of sensationalist media coverage on community resilience -- a point investigated in a follow-up study. In 2015, interviews began with local and regional journalists who have reported on recent cyclones in FNQ, revealing a critical awareness of their ethical obligations to cyclone-affected communities -- and prompting a wider investigation of the topic. In 2019, a national study began with "fly-in" cyclone reporters from major Australian metropolitan media outlets, to encourage reflexive debate over disaster reporting ideals, practice and culture, the impact of national coverage on local communities, and the need for new ethical guidelines in Australian disaster reporting.

'It doesn't seem like it's real': Remembering the Night of Noah, Townsville's flood of 1998

Dr Rohan Lloyd

Adjunct lecturer

Humanities and Creative Arts

James Cook University

The city of Townsville in northern Queensland, and its history of flooding, offers a novel case study into the way flood memory is formed and reshaped in subsequent events. This presentation explores Townsville's wettest 24-hour period caused by Tropical Cyclone Sid on 10 January 1998. The initial reporting of this event, locally referred to as the 'Night of Noah', focused on its scale, its 'freakness' – its unforeseeable wetness. 'Noah' washed houses into oceans, caused landslides and resulted in the death a local man. However, the event is poorly remembered, and sits oddly within in the city's disaster memory. Subsequent remembering of the flood tends to focus on amusing anecdotes rather than viewing this event for the destruction it caused. While other events, especially cyclones, form a major part of the city's disaster memory and identity, this event, and flooding in general, were marginalised components of the city's history. The major flooding event in 2019, however, forced the city and its people to revaluate how to live with flood

The 2019 Flood in Townsville - Drought and Deluge in a Historical Perspective

Patrick White

PhD candidate

James Cook University in Townsville

This presentation explores Townsville's complex relationship with water. It notes that at the start of 2019, just before Townsville's worst recorded flood, the city was struggling with drought. This pattern of drought-breaking rains sometimes also bringing devastation has been repeated irregularly throughout the history of the urban settlement. This presentation argues that Townsville continues to face two water problems (drought and deluge) but is yet to find a way to manage both.

Brisbane 2011 – 10 years on

Dr Margaret Cook

Lecturer - History

University of the Sunshine Coast

What can history teach us about floods? Historian Margaret Cook discusses responses to 2011 floods in Brisbane to reveal insights into human behaviour and the effectiveness of flood warnings. She questions public understandings of river systems and the city's flood risk. How does life experience, memory and myths aid or erode flood awareness and resilience?

Unprecedented? Pandemic memory and responses to Covid-19 in Australia and New Zealand

Dr Claire Brennan

Lecturer – History

Humanities and Creative Arts

James Cook University

This presentation explores the presence (and absence) of collective memory of past pandemics, and the significance of that memory when dealing with pandemics in the present. It notes that at the start of 2020 the 1918-1920 influenza pandemic had slipped from public memory in Australia, although it was well known among medical and historical professionals. This presentation argues that knowledge about events of 1918-1920 have provided a context for Covid times, and that knowledge of past pandemics has prevented some errors being repeated. The contents of our libraries, archives, and museums are likely to prove useful in facing future challenges and must be protected.

Listening to the memories of survivors: What can oral history tell us about disasters?

Dr Scott McKinnon

Vice-Chancellor's Postdoctoral Research Fellow

School of Geography and Sustainable Communities

Australian Centre for Culture, Environment, Society and Space

University of Wollongong

This presentation explores the value of oral history for understanding the human impacts of disaster. Drawing on my experience interviewing survivors of fires, floods, and earthquakes, I argue that oral history interviews not only have value for historians, but also for emergency managers. I identify three key points I've learnt from listening to survivors: First, the challenge of understanding what it means to 'be prepared'; second, that a ruined home is still your home; and third, that disasters have long afterlives.

Looking back: what the geological record can tell us about earthquake hazard

Dr Dan Clark
Geoscience Australia

Within the stable continental regions (SCRs) of the world like Australia, the historical record of seismicity is relatively short compared to the recurrence time of large and potentially damaging earthquakes. As a consequence, it is likely that the largest possible earthquakes possible in most regions across Australia have not yet been observed. However, the geological record may be used to extend this historical record. Moderate to large-magnitude earthquakes can leave an enduring record in the landscape in the form of a fault scarp. Geoscience Australia has developed a "neotectonic feature" database, which comprises over 380 known, or suspected, fault scarps across the nation. However, this dataset is only as good as the datasets (mainly digital elevation models [DEMs]) used to identify the scarps. To this end, there are large areas of northern Australia that are under-explored where DEM quality, higher rates of erosion and vegetation cover either obscure the identification scarp, or do not preserve the scarps in the landscape. Irrespective, the scarps that are known can tell us about the earthquake potential for various regions of Australia. These data provide invaluable information that contribute to long-term seismic hazard forecasts.

2. Being Present

The Ecology of Recovery: How preparedness, response and recovery systems work together to create a comprehensive mental health safety system in response to drought, natural disasters and emergency incidents in Queensland

Dr Ben Norris
Manager, Drought and Disaster and Emergency Incidents
Queensland Health

The Queensland Health Mental Health Drought and Disaster Team has created a model program incorporating three systems, Preparedness through its Tackling Regional Adversity through Integrated Care (TRAIC) Program, its Response program through the Mental Health Deployee register and its Recovery Program through its DRFA Cat C funded Mental Health Disaster Recovery Teams. These 3 systems work together to create an agile and responsive system to natural and other disasters from cyclones, bushfires and floods to events like the Ravenshoe Café explosion, Dreamworld Accident, he Oakey water contamination issue and now the COVID 19 crisis. This presentation looks at the principles underpinning this complex system response and how programs are rapidly stood up in response to these disparate events.

An Innovative Resilient Hospitals Decision-Support Model

Dr Heba Mohtady Ali (author), A/Professor Cheryl Desha (co-author),
A/Professor Anne Roiko (co-author), Dr Jaime Ranse (co-author)
Cities Research Institute / School of Engineering and Built Environment, Griffith University

Background: Natural and human-caused disasters affect thousands of people, globally and annually. These disasters are unexpected, have the potential to cause widespread destruction of property, disruption of services, and loss of life. Hospital decision-makers have an obligation to minimise disaster risk by building resilience, and a hospital can be considered resilient when it endures, absorbs and accommodates shocks efficiently. It is crucial to identify the factors that contribute to this/such hospital resilience during disasters.

Aim: The aim of this study was to identify the factors that are critical to building resilience within hospital systems.

Method: A systematic literature review followed the PRISMA guidelines around the prevailing definitions to identify the factors contributing to hospital resilience and methods used to assess this resilience. This search included Web of Knowledge / Web of Science Core Collection, MEDLINE, and Google Scholar, for the terms "Resilience*" "Hospital*" and "Disaster*".

Results: Factors enhancing a hospital's resilience were classified into three key themes of: Approaches adopted in planning; Planning for infrastructure and utilities resilience; and, Assessment of resilience for further planning. These themes were explored in light of the resilience engineering approach to characterise how the current literature describes the construct of "hospital resilience's". The outcome is an innovative, Resilient Hospitals Decision-Support Model.

Conclusion: This study applied a critical lens to the scientific literature published about hospital resilience during disasters. The ensued model is ready to be adopted by hospital decision-makers guiding them to develop, communicate, implement and update their hospital disaster plans.

Human Rights and Disaster Management in Queensland

Professor Susan Harris-Rimmer
Director of the Griffith University Policy Innovation Hub
Griffith University

The new Queensland Human Rights Act commenced in January 2020 and had an immediate impact on the way the Queensland Parliament and Public Service responded to an ongoing health emergency. There has been considerable progress in thinking about human rights approaches to the management of natural disasters, including the role of first responders, the needs of particular groups such as children, elders, CALD communities and people living with a disability. How can we respect people's dignity whilst also responding to a crisis and what are some of the dilemmas posed by a human rights approach to disaster management?

Towards protective action: A seven-year research program investigating effective risk and warning communication during natural hazards to encourage community behaviour change

Associate Professor Dominique Greer
School of Advertising, Marketing & PR
Queensland University of Technology

Natural hazards provoke considerable uncertainty, but community members often "under-react" when confronted with messages warning them about imminent hazards. This presentation details a seven-year Queensland-based research project, conducted under the auspices of the Bushfire and Natural Hazard CRC, that aimed to encourage better protective action from community members faced with natural hazards.

The project team combined their interdisciplinary expertise in communication, consumer psychology, marketing, and emergency management to (a) develop evidence-based strategies that motivate appropriate protective action and support informed decision-making during the response and recovery phases across multiple natural hazards, and (b) work with end-users across Australia to share research findings and support integration into practice.

The early project (2013-2017) focused on the pre-decisional processes of community members, particularly their exposure to, attention to, and comprehension of emergency warning messages in the response and early recovery phase of multiple hazards. The advanced project (2017-2020) focused on how the inputs into the pre-decisional process—environmental cues, social cues, information sources, channel access and preference, warning messages and receiver characteristics—inform protective action during the response and early recovery phases of natural hazards.

Leading action research for person-centred emergency management

Ms Helen Styles - Mackay Regional Council
Associate Professor Michelle Villeneuve - University of Sydney

Emergency managers grapple with reducing risk for people who are vulnerable to disasters such as people with disability. Approaches such as 'vulnerability registers' have typically been emergency management-centred, removing agency and personal responsibility from individuals and placing often unrealistic expectations on emergency services. But emergency planning that is person-centred may unlock the latent capacities within communities to support the more at-risk groups during a disaster, potentially achieving true shared responsibility.

This paper describes how one regional city employed a capacity development approach using action research methods to build disaster resilience for people with disability and other high-risk groups such as seniors.

Mackay Regional Council partnered with The University of Sydney to introduce the Person-Centred Emergency Preparedness (P-CEP) toolkit to people with support needs and the people who help them every day such as healthcare professionals, disability service providers, aged care providers, and carers. Action research was employed to enable project leaders to continuously observe, reflect, and put into action learnings to support implementation of P-CEP. For example, throughout the project, learnings are extracted to provide practical tips to service providers distributed via an eBulletin.

Creating a plan with the person at its centre means that the plan: (a) is tailored to the person and their individual support needs; (b) maps the capabilities, resources, and social networks that can assist the person throughout an event; and (c) identifies the gaps that may require a systemic approach. The action research process enabled Council to take a leadership role in working together with their communities to identify, analyse and test potential solutions.

The result of action research was the development of resources, co-designed with people with disability, to enable local government to lead disability inclusive emergency planning. We will share these good practice examples and a Resource Package that other councils can use.

Understanding under and non-insurance amongst renters in Cairns

Dr Nick Osbaldiston
Senior Lecturer
College of Arts, Society & Education
James Cook University

Insurance is a hotly disputed topic presently in the Northern Australia region. In particular, and often dominating the airwaves of local media, the cost of insurance premiums for homeowners attracts substantial negative attention. However, amidst this interest, renters are often missed as one key population who are inadvertently affected by the cost of insurance. Using qualitative and quantitative data from research conducted in 2017 and 2020, this paper will demonstrate how renters negotiate, if at all, the costs of insuring their possessions (contents insurance) and why this is important to understand in disaster preparedness and recovery. The paper highlights how cost, along with other variables like trust, efficacy and bias, influence the decision for renters to assume at times all risks. In investigating this issue, the paper hopes to bring to light the potential long lasting impacts a large-scale disaster would have on some of Cairns' poorer neighbourhoods and people.

Improving resilience-based disaster risk management

Jonathan Raikes
PhD Candidate
University of the Sunshine Coast

Increasing disaster risks from extreme weather and climate events in Queensland communities has fostered a push towards resilience-based approaches to disaster risk management and risk reduction. Such an approach is herein defined as the ability of governments, communities, businesses, and individuals to prepare for, respond to, and manage potential hazards and disasters, thereby minimizing the impacts and rapidly recovering to emerge stronger and better able to cope with future disaster events. In many parts of the state and country, however, this is challenged by traditional structures for policymaking, planning, and implementation across space, time, and jurisdictional scales.

This presentation focuses on the research opportunities in disaster risk governance as it relates to extreme weather and climate events in Queensland and, more broadly, Australia. We discuss the current challenges associated with research and practice relating to resilience-based disaster risk governance, the role of international frameworks – such as the Sendai Framework for Disaster Risk Reduction and the 2030 Agenda for Sustainable Development – in local, regional, and state policy, planning, and implementation, and opportunities moving forward to develop a collaborative culture between research and practice in pursuit of such an approach here in Queensland. Understanding these challenges and opportunities, we argue for a more integrative approach between research and practice to better operationalize current and future approaches to disaster risk management and risk reduction.

Floodway behaviour during extreme flood events

Mr Isaac Greene

Centre for Future Materials

University of Southern Queensland

Floodways, due to being in a frequently submerged state are extremely sensitive to flood events with downstream components often sustaining damage. This research focuses on obtaining improvements to floodway structural design to lower asset damage after a flood event, thus directly increasing the accessibility and serviceability of rural communities. To derive these outcomes, a survey seeking floodway asset owners' practical experiences was conducted, an experimental laboratory program was investigated and computational numerical modelling and simulation was performed. A floodway design guideline was deduced and forms the practical outcome of this research. This design guideline will enable increased floodway structural resilience to be achieved through structural design charts and an associated design methodology for a range of watercourse applications.

A state-wide operational burned area mapping methodology

Thomas Franz

Queensland Government, Department of Environment and Science, Science and Technology Division

Millions of hectares of Queensland's landscape burn every year, presenting a significant challenge for fire planning and management and potentially contributing significantly to greenhouse gas emissions. Scientists in the Department of Environment and Science and Joint Remote Sensing Research Program have developed an automated method to detect fire scars using the European Space Agency's Sentinel-2 satellite imagery. This builds on previous work which mapped Queensland's fire history using Landsat satellite imagery.

Fire scars have been identified and mapped by detecting changes in the landscape over time in sequences of the Sentinel-2 satellite imagery. The Sentinel-2 mission acquires imagery every 5 days over Queensland. The method focuses on detecting changes in the amount of bare soil visible, as there is typically an increase in the amount of bare soil as fires consume vegetation. This change is detected using a fractional cover product, which shows the fraction of each pixel made up of bare soil, non-photosynthetic vegetation, and green or photosynthetic vegetation.

Fire scar mapping helps improve our understanding and management of fire, and its interactions with climate variability, vegetation, and land use over time. While this mapping program does not produce maps of active fires, the 5-day overpass frequency of the Sentinel-2 satellites means the regularity of the monitoring will be frequent enough to capture the majority of fires.

The data is expected to be delivered as monthly composites of fire scars via open data portals. These data may be used to assess fire hazard and risk, manage natural resources, understand the impacts of fire on grazing production and monitor the ecological impacts of fire. Longer term, they may play an important role in assessing variability in fire regimes, developing strategic and operational fire planning and management, and informing carbon abatement schemes.

Using fuel distribution to manage the flammable ecosystem of southeast Queensland: Technological advancements, current practices, key challenges and gaps

Dr Sanjeev Kumar Srivastava, Kim Penglase, Joshua Sos, Tom Lewis
University of the Sunshine Coast

Updated high-resolution fuel distribution and condition maps together with fire danger indices are the key for mitigating big fires during fire seasons. A good combination of information on fuel accumulation models based on vegetation types, time-since-last burn, fuel characteristics such as horizontal and vertical distribution, as well as moisture content, and weather parameters can play a significant role in creating a flammability map that can be updated on a frequent (e.g. daily or weekly) basis.

Most agencies (e.g. Queensland Fire and Emergency Services) use fuel accumulation models which are based on vegetation types and time since last burn. However, new technologies and data analytics to derive products from earth observation data can provide a better estimate of fuel distribution. These include archived multitemporal LiDAR point cloud, point cloud data collected with handheld LiDAR devices, satellite-based and drone-based photogrammetry, data products derived from hyperspectral and multitemporal multispectral images (e.g. perpendicular vegetation index), and field data on fuel for selected locations. With the current practice of fuel mapping, there is always a lack of detailed information about understorey fuel in the vegetation strata and fuel distribution in burned patches is often ignored. Incorporation of multiple information on fuel distribution into fire management practices will enable natural resource managers to be better prepared and minimise the negative effects of wildfires during the fire season and will enable to plan targeted prescribed burning.

3. Looking Forward

A system dynamics model for understanding poor mental health outcomes among regional Queenslanders affected by drought and disasters

Dr Craig Jacobson

Senior Researcher - Queensland Centre for Mental Health Research

University of Queensland

In recent years, substantial funding has been provided to boost the mental health of regional Queenslanders affected by drought and disasters. However, the evidence-base for which activities should be delivered where, and to whom, is lacking. A promising approach for studying the complex system of environmental change and mental health is that of systems modelling – a process used to help describe a complex set of interacting factors, which can be used to predict interactions and formulate interventions to achieve desired results.

A key strength of system dynamics modelling is the engagement of (diverse) relevant sectors, bringing together collective experiences and expertise to form a combined understanding on all aspects of the system. Using system dynamics modelling, we aim to elicit and understand the key drivers of poor mental health outcomes in rural Queenslanders exposed to drought and disasters and identify intervention points that may lie both inside and external to the health sector.

The system dynamics modelling used in this study will follow the five-step system dynamics modelling framework. This process consists of: (i) problem articulation, (ii) system conceptualisation, (iii) development of a simulation model, (iv) model testing and (v) scenario testing. These five steps are grouped into two phases of (1) causal loop modelling and (2) system dynamics modelling.

This study holds the potential to signal a major paradigm shift for mental health prevention and treatment in Queensland regions significantly impacted by drought and disasters.

Transmedia storytelling in disaster risk communication

Dr Jenny Hou
Senior Lecturer in Professional Communication
School of Communication
Queensland University of Technology

This paper conducted a case study of 'Resilient Queensland Stories' to explore the application of digital storytelling for resilience building and community empowerment in disaster preparedness and recovery. Drawing on Coombs and Holladay's (2018) Transmedia Storytelling Narrative Transportation (TNT) theory, this case study involved two-dimensional analysis: (1) how the leading state government agency Queensland Reconstruction Authority (QRA) employs multiple social media to tell a series of 'resilient stories' to community members; and (2) How audience and publics are 'transported' to the meta-narrative created by QRA and if they feel empowered to share their own stories to co-construct the meanings of disaster resilience. Empirical data were collected from narrative analysis of QRA's transmedia media (e.g., Facebook, LinkedIn, YouTube) storytelling featuring 'Resilient Queensland' since 2018 (the starting year of this initiative) as well as the audience comments, reaction and/or story sharing in online communities.

The findings indicate that efficient disaster risk communication entails a community-based, coordinated approach to transmedia storytelling, to not only deliver organisational (e.g., government) key messages but also mobilise audience agency in collaborative resilience building. As boundary spanners, government communicators/PR practitioners need to target niche audiences, institutional and political terrains, and combine both planned (e.g., organisation-led meta-narrative building) and emergent storytelling strategies (e.g., observing/absorbing story leads from the ground). Public relations plays an important role in informing citizens of necessary response plans, but also empowering them to be self-sufficient and resilient in disasters. To reduce compassion fatigue resulting from hearing 'sad stories', it is sensible to tell full stories in ways that balance the need of facilitating public understanding of disasters and the desire to foster community resilience.

Stories of resilience and recovery

Associate Professor Karine Dupre

School Engineering and Built Environment - Architecture and Design

Griffith University

The 2019-2020 bushfires were a never-seen-before event. In Queensland specifically, extensive portions of the Gondwana Rainforests World Heritage were burned, including 11 homes and the iconic Binna Burra Lodge.

The Griffith University Fire Memories research project that aims to build community resilience to disasters, by gathering and sharing first-hand experiences of the community responses to, and recovery from, the disaster.

This contributes to building collective learning. This presentation will offer insights to the findings and will propose new directions to build community engagement and resilience.

Leadership learning and development options for volunteer firefighters / emergency responders: An Australian Capability Gap

Haydn McComas
PhD Candidate – Business School
Griffith University / South Australia Country Fire Service

Reliance on volunteer fire fighters particularly, by the Australian community has been highlighted numerous times during our 'black summer' of 2019 / 20; with a range of factors suggesting that this reliance will only increase over time.

More than 195,000 Australians currently serve as volunteer firefighters. Yet, despite their importance, in January 2020 The Productivity Commission found that Australia's volunteer firefighting force declined 10% (about 16,000 volunteers) in the past decade. This decline has now been assessed as a major risk to disaster mitigation. Volunteer emergency services suffer significant volunteer turnover. Researchers have calculated that about half of all new recruits leave whichever service they join within the first two years; with poor leadership and in some cases, toxic cultures being cited as specific causative factor.

Our volunteer firefighters lead teams in a variety of high stress situations, inter-operating with partner agencies, and increasingly across state and international jurisdictions with both front-line and senior leadership roles often filled by those without any leadership qualifications. Yet, Australia has no nationally defined leadership development pathways for volunteer firefighters

Some short leadership learning opportunities do exist in various jurisdictions. However, these amount to little more than brief attendance only courses without assessment or any of the deeper reflective pedagogical learning approaches that are critical to successful leadership development.

This paper arises from a successful 2020 Winston Churchill Memorial Trust application to investigate learning and development options in leadership for volunteer firefighters in France, Denmark, Canada, NZ and the USA.

Building Resilience to Sea Level Rise and Coastal Flooding

Dr Aysin Dedekorkut-Howes
Senior Lecturer
School Engineering and Built Environment - Architecture and Design
Griffith University

Climate change poses significant challenges to coastal cities. Most of the strategies used to address sea level rise and coastal flooding are reactive, developed in an ad hoc manner following a specific event, but there is an increasing recognition of the need for more comprehensive and proactive approaches. However, our research found a major knowledge gap in comparative costs and benefits of alternative adaptation strategies. Coastal climate adaptation needs to be tailored to local characteristics and use a combination of different structural and non-structural measures to be effective.

Our research on responses to sea level rise and coastal flooding at the national and state/territory level in Australia indicates that adaptation responsibility has been largely left to local councils in Australia with mixed results. This leaves substantial parts of the population at risk where adaptation plans are lacking. Even worse, since the impacts of climate change do not respect jurisdictional boundaries, there is a spill-over risk where good adaptation planning by one council may be undermined by the lack of action in an adjacent council. These risks can be reduced if state and federal governments provide more consistent support and guidance. Careful planning and proactive action can help turn some of the risks into opportunities for re-imagining the future of cities and their resilience and sustainability.

What motivates, allows and sustains people to live in disaster prone regions following repeated natural disasters

Marie Fredriksen
Queensland University of Technology / Queensland Ambulance Service

A person's likelihood of being displaced by a natural disaster is now 60% higher than it was in 50 years ago. Natural disasters now displace more people than conflict and violence with storms or floods accounting for around 95% of all-natural disasters. Throughout 2019, nearly 23 million people were displaced because of natural disasters, 25,000 of these live in Australia.

This is an annual occurrence in many communities, and with the predictions for increased frequency and intensity of climate related disasters, more people are going to be faced with the decision to either rebuild or relocate.

While it has long been assumed that the bonds of home and community are strong, history and the limited literature suggest that there will be many who will forgo these connections for a new start.   People who have been directly impacted by multiple natural disasters in the same location are more likely to relocate, citing the increasing frequency and intensity of natural disasters as their reason. Age, birthplace, and sense of belonging, or sense of community appear to have little influence on a person's decision to rebuild or relocate.

To understand people's reasons, to date, I have interviewed 31 residents in the Whitsunday Local Government area who have endured successive natural disasters. These participants continue to rebuild their home and community in the same location despite the threat of more natural disasters in the future. Interviews will also be conducted in the Burdekin Shire throughout 2021.

Identifying how people physically and mentally prepare to live with the threat of frequent natural disasters will help us understand the physical wellbeing and psychosocial health of populations who have experienced multiple natural disasters. This will help us better understand populations who continue to live in disaster-prone locations despite the risks and assist them to build resilience and adaptive capacity.

Transformation and Climate Adaptation: Why, What and How

Dr Edward Morgan
Research Fellow - Cities Research Institute
Griffith University

The impacts of climate change are increasingly being felt globally and inadequate climate change mitigation increases risk of a more rapidly changing climate. Passing of tipping points is increasingly likely, with accompanying increases in the nature and severity of disasters. In response, policy and planning are increasingly focused on transformative changes to respond to these challenges, e.g. the Green New Deal and Just Transitions, recognising that conventional incremental change may not be enough. But what does 'transformation' mean in the context of adaptation to climate change? And, more importantly, how do we go about doing it?

This presentation will overview the results of a review of transformation in climate adaptation and planning across both theory and practice, with the aim of encouraging debate and knowledge sharing about transformation among and between academics and practitioners facing the challenge of climate change adaptation. Climate change will bring about changes in biophysical, social and economic systems, and our response to it may need transformations across all three. However, transformation in these areas, and across different sectors, means different things to different people, and can invoke different reactions and views. Transformations can be a problem and a solution, a goal and something to be avoided, and consequently they are politically challenging.

This presentation will seek to discuss what the different ideas of transformation are, what they mean, and most importantly begin a discussion amongst symposium participants on how these multiple understandings can help us bring about positive transformation and prevent negative transformation in response to climate change and disasters. We intend the presentation of the review to be a starting point for people from across sectors to identify and share opportunities and barriers, as well as hopes and fears, about transformations, whether they are ecological, social or economic.

Local food resilience and contingency plans in Queensland

Dr Kim Reis
Lecturer
School Engineering and Built Environment - Architecture and Design
Griffith University

Local food resilience is critical in a world of ongoing impacts from severe weather events and pandemic conditions. In light of these circumstances, having a Plan B and a Plan C to access food locally is prudent and practical. Smart technology enables vulnerable communities to kick-in with their own solutions and share responsibility for their own resilience. Our research reshapes the way local food is planned by communities, business and local governments in Queensland. This presentation reports on two (2) pilot studies for building local food resilience through smart technology, from partnerships with the Logan City Council and the Cairns Regional Council.

Logan is a major population growth corridor in South-East Queensland. Our work with the Logan City Council and Griffith University's Yunus Centre and the Regional Innovation Data Lab (RIDL) is developing a "Local Food Map" of the local food bowl to encourage a resilient, shorter food supply ecosystem. This project enhances more robust local food access options for Logan's most vulnerable community members and supports the vibrant and multiculturally diverse identity of this major growth corridor.

Cairns is the gateway to world heritage areas and tropical agriculture that are exposed to weather extremes such as monsoons and heatwaves in Far North Queensland. We are developing an online "Local Food Resilience and Contingency Hub" that aims to build a culture of life-long learning for resilience by supporting the most vulnerable community members to strategically access a range of local foods.

Our research activities and extensive connections with state and local governments, and local communities can be seen through the research website page: https://www.griffith.edu.au/cities-research-institute/research/digital-earth-and-resilient-infrastructure/food-contingency

Authors: Dr Kimberley Reis, Assoc Prof. Cheryl Desha, Dr Allison Rifai, Sioux Campbell

Codesigning educational facilities for disaster preparedness and response: Sharing the journey and insights into partnerships and collaboration

A/ Professor Cheryl Desha, Dr Savindi Caldera and Dr Nancy Spencer
Cities Research Institute / School of Engineering and Built Environment, Griffith University
Policy Innovation Hub, Griffith Business School, Griffith University

With Australia experiencing extreme weather events and covid19 related disruptions over the last two years, decision-makers have been in continued response mode. In contrast to previous disaster response regimes involving seasonality of pressure and opportunities for emergency responders to recover, Queensland communities have been facing the complexity of multiple disasters within short timeframes, sometimes in the same jurisdictions and sometimes at the same time. Through such extended periods of disruptions, experts and emergency services personnel have often related their frustrations in not being able to make decisions to enable others with the right information, at the right time - *"If only I could be everywhere, see everything – a clear line-of-sight to what is happening, would make such a difference".*

Within this context, this presentation will share the journey of a Queensland research team in providing a local facility for collaborative and agile disaster response within an academic system. The research agenda is built upon the Digital Earth context that everything is connected, and 'where' is critical in ensuring appropriate response and long-term resilience.

The presentation will introduce and explain Griffith University's Disaster and Resilience Management Facility (DRMF) in the newly constructed building on Nathan Campus (Brisbane), to highlight the potential for large-scale impact through local and remote action, regular capacity building and scenario development. Drawing on theory regarding connectivity, relatedness, innovation and behaviour change, the presentation will create and join dots in a transdisciplinary reflection on how to be in action in the face of disruption.

QFES Research Function

Dr Mike Carrol and Mr Matthew Dyer
QFES Futures Branch, Strategic Services Directorate
Queensland Fire and Emergency Services

QFES has implemented a strategic and consistent approach to the way the department manages or undertakes research. In early 2021 QFES identified its research priorities through consultation with subject matter experts across QFES. An initial set of research priorities was elicited; this larger set was further distilled into a final set of QFES research priorities by aligning priorities to recommendations from the Royal Commission into National Natural Disaster Arrangements for which QFES is likely to be the nominated Lead Agency (acknowledging that at this time the Royal Commission response has not been finalised). QFES research priorities enable QFES as an agency to take a forward leaning approach to drive research opportunity, capitalise on potential investment and where feasible minimise cost to QFES. The set of research priorities also lends influence and the opportunity to capitalise on research priorities that are being established by the new Commonwealth Cooperative Research Centre and AFAC.

Early Career Researchers

Building Tourism Organisational Resilience to Natural Disasters

Yawei Jiang
The University of Queensland

This research proposes that dynamic capabilities provide a mechanism that enables tourism organisations to respond to disruptive environmental changes through a process of routine transformation, resource allocation, and utilization. The theoretical framework takes a processual view to show how an organisation's existing operational routines transform into new ones that are resilient to disruptive events, enabled by dynamic capabilities and slack resources.

Reducing extreme heat health risks in the public realm – how can urban design policy play a greater role?

Ryan McNeilly Smith
University of the Sunshine Coast

Often referred to as a 'silent killer', heatwaves result in severe human health effects and are the deadliest natural disaster in Australia; their impacts are expected to increase due to climate change. This work explores urban design policy's role in mitigating these health risks, beyond guidance-based material, like QDesign.

Using a desktop policy analysis of local planning and design documents and interviews and surveys with built environmental professionals in South-East Queensland (SEQ), two aims are addressed: 1) what urban design methods can mitigate heat-health risks and 2) How can they be embedded into planning policy in SEQ. Town planners were found to have the lowest awareness of extreme heat and use of heat-mitigation techniques among built environment professionals surveyed.

Further, a growing frustration was identified among professionals on two matters, 1) tension between building codes and a local government's ability to implement heat mitigation techniques in their planning schemes and 2) a dissatisfaction among design-centric built environmental professionals at their ability to implement heat-mitigation techniques under the current framework. These findings show a disconnect between design-centric built environment professionals and planners; highlighting that greater awareness and planning system policy change is required to increase up-take of best practice heat mitigation urban design solutions in South-East Queensland.

What are the factors that make collaborative governance more effective for local-level climate and disaster resilient development?

Rebecca McNaught
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Collaboration and partnership are deemed as essential to addressing the growing complexity of disasters and climate change. For example, the words 'collaboration' and 'partnership' appear 36 times in the Queensland Climate Adaptation Strategy. Global Agreements and Frameworks such as the Sendai Framework, Paris Agreement, SDGs and the New Urban Agenda also place a major emphasis on collaborative, integrated and localised approaches to enable effective implementation of climate resilient development pathways. Yet, we still don't have an adequate understanding as to which factors in collaborative governance actually make it work across diverse contexts.

In order to move the practice of collaboration and partnerships forward, I undertook a systematic quantitative literature review of 37 case study papers from around the world. I extracted lessons on collaborative local governance for resilient development, including the conditions, design, processes, outcomes and system interactions of such initiatives.

In summary, I investigate the core factors that make collaborative governance more effective for climate and disaster resilient development. The study found that there is a small yet rapidly growing body of literature on this interface of topics, however, studies are overrepresented by European sites.

The research found that while significant benefits and even transformation can occur as a result of more collaborative forms of governance between civil society, private sector and public realms, the approach is not a panacea. Outcomes varied greatly across the case study locations, with trust building, knowledge sharing and facilitative leadership being key determining factors. Although the current body of literature presents useful lessons for the practice of local level collaboration, the results justify further research in a broader range of regions and cultural settings. There is also a need for greater consideration for the role of gender and culture in assessing power dynamics within collaborative governance arrangements. I conclude that investing in the 'soft skills' of collaboration and partnerships, including conflict resolution, is imperative for readying workforces for a changing climate.

Necessary integrated approaches for disaster risk reduction and climate change adaptation through effective community engagement

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Worldwide, disaster risk reduction (DRR) is being integrated with climate change adaptation (CCA), in sharing many similarities and complementing each other. This is also the case in the Philippines, one of the most disaster-prone countries, with well-established DRR plans and policies but less so with CCA. In bringing these concepts more together in the interests of the Philippines, the focus lay on a key problem area of both DRR and CCA: weak community engagement, particularly regarding coastal communities in being most vulnerable to disasters and climate change impacts, and also being very important as so many people live on the coast.

The study therefore investigated key aspects of effective community engagement approaches to better reduce disaster impacts and climate change vulnerability in the Philippines (with policy applicability to other countries as well). As such, an international literature review was first conducted, followed by interviews and focus group discussions with local experts and community representatives in two high disaster-prone research sites in the Philippines.

Literature review findings identified strong (inclusive and collaborative) community engagement approaches to DRR and CCA as much more effective than weak (passive and top-down) approaches. In the Philippines, fieldwork findings found a mixture of strong and weak DRR and CCA community engagement approaches through community, government, and non-government-based initiatives and actions. However, weak aspects were more prevalent. The features of strong approaches comprised local and expert knowledge, which informed community capacity building and decision-making input, alongside traditional Filipino community engagement practices. In contrast, weak approaches reflected lack of funding and participatory barriers of poverty, top-down decision-making approaches, and political affiliations and unequal power relations, which weakened community involvement and actions.

As such, to strengthen community engagement for DRR and CCA, the expert and community participants suggested four key conduits: community capacity building and local empowerment, socio-cultural community and local place-based contexts, leadership and good governance, and multi-stakeholder and sectoral partnerships and linkages.

Overall, the strong community engagement approach was found to be the best approach for the Philippines and its numerous coastal communities to build effective DRR and CCA around more robust disaster resilience and local adaptive capacity.

Interaction design technologies for children to learn safe behaviour in natural emergency situations

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This research will broaden the readers' view on how the effect of future natural hazards can be lessened by considering new skills and tools in the process of risk reduction practices for primary school children.

Interactive technology provides many facilities for both learners and teachers, new technologies have a positive result on learning in young people. In STEM subjects (science, technology, engineering, mathematics) for instance, researchers designed technology-based tools which help students to use their sensorimotor skills as cognitive inputs to solve problems. The expected result of education considering interactive technology in the teaching process is a better comprehension of abstract concepts. So, active learning and interactive technology can facilitate children's risk perception and appropriate reactions during emergency situations.

The Black Summer bushfires proved that the occurrence and the degree of disasters resulting from natural hazards have dramatically increased. Young Australians are more likely to experience more severe natural hazards and disaster situations such as storms, floods and bushfires in their lifetime than their parents' generation and there will be increasing numbers of people facing these events. So, there is a critical need to develop more effective disaster preparation strategies and tools for the community, especially for children, to be more prepared for future natural emergencies. Although many preparedness resources are available, the traditional preparation strategies and risk management are no longer practical for new circumstances. As Australia is going through flood and bushfire season, it will help disaster instructors and teachers to think about applying new approaches into their preparedness practices.

Philanthropic responses to disaster - an edited book to be published in 2022

Dr Alexandra Williamson
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'Philanthropy' – or the intentional use of private resources for public benefit – involves contributions by both individuals and philanthropic trusts and foundations. The issues and challenges in philanthropic responses to disasters involve mobilising these resources and using them effectively. In disaster philanthropy, many things are different from 'everyday' philanthropy work: there is greater need, anxiety and stress; increased time pressure; massive resources; greater need for collaboration; more scrutiny; and heightened potential for fraud. In addition, the growth of social media – with donor expectations of immediacy, greater public scrutiny and huge sums of money flowing rapidly through fundraising channels – means that such responses and challenges are becoming more complex.

Bushfire Resistant Lightweight Aggregate Masonry Blocks

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During bushfires, buildings are exposed to either direct flame or ember attack or radiation or a combination of all these three, resulting in significant building damage and massive recovery costs. Hence the external building envelope should be built with bushfire resistant building materials and components to withstand extreme fire conditions.

This research is aimed at developing bushfire resistant masonry units using two types of lightweight aggregates, Pumice and Expanded Perlite with enhanced fire resistance characteristics, for use in the external walls of houses, shelters, and other buildings in bushfire prone areas.

First, the physical properties of aggregates such as specific gravity and water absorption were determined. Then three mix designs, i.e., control cement-sand mix, cement-pumice mix, and cement-expanded perlite mix, were developed. The properties of fresh and hardened cement mixes; workability, density, compression strength and water absorption, were measured while the fire resistance of newly developed mixes was examined against the standard fire curve for three hours. Finally, the performance of a newly developed lightweight aggregate masonry block was compared with three types of commercially available block units, normal weight solid and hollow masonry and lightweight solid masonry block units, to highlight the benefits of using the developed lightweight masonry block in buildings in bushfire prone areas.

Building Safety in Bushfires: A Computational Fluid Dynamics Modelling Approach

Dr Anthony Ariyanayagam
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Australia witnessed one of the darkest chapters in its history during 2019/20 Black Summer fires, recording the highest number of property losses, which questioned the adequacy of existing practices in bushfire building design.

Although bushfires are regular occurrences in Australia, Bushfire Building Council report 2020 estimated that 90% of buildings in the bushfire prone areas are not built to survive bushfires. Devastating losses of property and lives seen in recent bushfires highlighted the shortcomings in evaluating the bushfire safety of building structures. Systematic studies on fire modelling are needed to generate productive bushfire risk information for use in bushfire related decision making.

This research focuses on investigating the impact of environmental conditions including temperature, wind and surrounding vegetation on the fire performance of external building envelopes under simulated bushfire conditions. Fire Dynamics Simulator (FDS), a Computational Fluid Dynamics tool used for fire modelling, was used to assess the heat transfer characteristics under a simulated environment. The effects of the environmental conditions were assessed using a simplified building model. The results highlight the potential of reducing building damages, based on which appropriate advice can be given to the community prior to bushfire events.

Full-scale Test of a Safe Room under Simulated Bushfire Conditions

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Bushfires, one of the major natural disasters in Australia, account for the majority of property damages from such events and can result in severe physiological and psychological impairment for humans. The loss of lives, valuables such as jewellery, certificates and physical objects with emotional attachment from devastating bushfires can lead to significant mental health problems.

Dynamic bushfire conditions due to changes in wind direction and speed, and mega-bushfires can make safe evacuation nearly impossible if not done early, while time associated with carrying valuables during evacuation further reduces the probability of safe escape. This highlights the need to have a safe room, at least as safe storage room for valuables when evacuating during bushfire events.

In this study, we used the ABCB performance standard for private bushfire shelters to design and build a full-scale safe room (compartment) using Light-gauge Steel Frame (LSF) wall system and Autoclaved Aerated Concrete (AAC) external claddings. The full-scale safe room was then exposed to simulated realistic bushfire conditions and parameters such as temperature (internal and external), heat flux and air quality were recorded during the test. This presentation will provide these results and important findings from this full-scale test.

Improving the safety of steel roof and wall claddings in bushfires

Lisa Pieper
Queensland University of Technology

Severe bushfire events such as the Black Summer bushfires 2019-20 have shown the urgent need for improving bushfire safety in Australia. Post-bushfire damage observations and numerical simulations showed that fire-wind interactions lead to increased wind velocities in the vicinity of a bushfire front, which may result in the premature loss of parts or the entire external cladding of buildings, leading to the destruction of the entire building.

The building envelope provides the main protection of a building against bushfire attacks and thus, improving the structural performance of the building envelope could save many buildings in bushfires. Commonly, the building envelope in bushfire prone areas consists of high-strength cold-formed steel (CFS) claddings because of their non-combustibility. However, under wind suction loading these claddings suffer a pull-through failure in which the cladding pulls over its screw fastener and detaches from the battens/purlins. The structural behaviour of these CFS claddings exposed to fire-enhanced wind loading arising during a bushfire has not been investigated yet.

Therefore, this study conducted experimental and numerical investigations on the structural behaviour of high-strength CFS claddings exposed to fire-enhanced wind loading and elevated temperatures. By understanding and improving the structural behaviour of these CFS claddings in a bushfire event, severe damage to our buildings could be prevented.

Understanding disaster preparedness and preparedness behaviours among pharmacists: A multi-phase study in Australia

Dr Elizabeth McCourt
Queensland Health

Introduction: In a disaster aftermath pharmacist provide essential health services and contribute to the maintenance of the health and wellbeing of their community. Despite their importance in the healthcare system, little is known about the factors that affect pharmacists' disaster preparedness and associated behaviours.
Aim: To determine the factors that influence disaster preparedness behaviours and disaster preparedness of Australian pharmacists.

Methods: A survey was developed based on outcomes from a systematic literature review and semi-structured interviews. The survey was released online, and registered Australian pharmacists were invited to participate. Multiple linear regression was used to determine the factors that influenced preparedness and preparedness behaviours among pharmacists.

Results: The survey demonstrated that the preparedness of pharmacists was low-moderate, and preparedness behaviours were low with less than 20% of participants reporting being previously involved in disaster education, training, or drills. From the survey, a model of disaster preparedness for pharmacists was developed. The final model of indicated that 86% of variation in preparedness of pharmacists was explained by disaster experience, perceived knowledge and skills, colleague preparedness, perceived self-efficacy, previous preparedness behaviours, perceived potential disaster severity, and trust of external information sources. The final model of preparedness behaviours indicated that 71.1% of variation in previous preparedness behaviours can be explained by disaster experience, perceived institution responsibility, colleague preparedness, perceived likelihood of disaster, perceived professional responsibility, and years of practice as a pharmacist.

Conclusion: This research is the first to explore the significant factors affecting preparedness behaviours and preparedness of Australian pharmacists for disasters. It begins to provide insight into potential critical gaps in current disaster preparedness among the pharmacy workforce.

Building business resilience to external shocks: The role of social networks to small tourism and hospitality businesses

Wendy Pham

University of Queensland

Queensland's tourism is a $28 billion industry for the state, which provides jobs for 1 in 11 of all people employed in Queensland. However, the tourism industry has witnessed an increasing number of disasters and crises in the last decades, causing significant disruptions and economic losses. Facing such a turbulent environment, it is critical that Queensland tourism and hospitality businesses focus on building preparedness and resilience to disasters and crises; because their vitality will have a significant impact on the state's economic development.

My current research looks at the role of social networks in building business resilience to disasters. It is proposed that social networks, in the form of interdependent relationships between the business and other stakeholders, can provide greater access to multiple critical resources that can assist with the survival and recovery of businesses. This is especially important for micro-small tourism and hospitality businesses, who are more vulnerable to the negative impacts of disasters while having limited internal resources to rely on.

It is expected that my research can lead to useful implications for future practices of disaster management, not only within the tourism industry but also applicable to other industries and sectors. Particularly, findings of my research can help identify the crucial networks that are beneficial for disaster response and recovery, so that businesses can focus their effort on nurturing those networks. My research also advocates for the importance of cross-industry cooperation between stakeholders of various fields in preparing for and responding to disasters, including businesses, government bodies and emergency agencies.

Collective continuity, community cohesion and the threat of catastrophic bushfires

Michael Dare

University of Queensland

The threat of climate change presents a challenge to the ongoing viability and identity of some vulnerable communities, and this may undermine social resources that are important to their well-being. This study set out to investigate the role of social factors in helping or hindering these communities. An online survey of 364 people from communities impacted by the 2019/2020 bushfires found that social factors such as identification were indeed strong predictors of community well-being outcomes, but that this was significantly influenced by relationships between subgroups within the community. These findings suggest that social capital factors may be critical in helping communities navigate change as a result of disaster events, but also that failure to recognise other stakeholders could undermine this.

Storm Tide assessment - A case study: Tropical Cyclone Debbie

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In 2014, Griffith Centre for Coastal Management has developed an integrated decision support tool, QSurge. In 2016, this tool was further developed and became Surge Impact. It is a web-based Storm Tide Hazard Assessment Tool for Queensland Local Government Disasters Managers. This tool has been developed to inform the timing and location of areas subject to evacuation notices during Tropical Cyclones for coastal areas of Queensland. This tool was used during Tropical cyclone Debbie in 2017 and the surge predicted with the hydrodynamic model from the tool was validated data collected like debris lines and storm tide recorded.

Framework for probabilistic downburst risk assessment of distributed power systems

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Supervised by Dr Matthew Mason & Dr David Lange

Transmission towers and lines are the cornerstone of electrical power networks and distribution systems. Their role is to act as the intermediate link for transporting and distributing electric power. Regrettably, High intensity wind events such as downbursts are a significant challenge for the transmission line industry, as they regularly lead to line failures and disruption to power supply. In this research, the risk downbursts pose to power transmission lines has been investigated and an idealized probabilistic risk assessment framework developed.

Two key components of this framework are the wind field models used to represent the downburst wind events, and the transmission tower-line system fragility models. Both these are explored in this project, with observational analysis, analytical and empirical modelling techniques all utilised. Firstly, to assess existing approaches to modelling downburst wind fields, existing wind field models were coded in MATLAB and tested against observational event data from four different weather station archives. Validation testing explored the use of different optimization and fitting techniques to determine the most appropriate downburst model. This analysis found that different models performed better for different downburst events but that no single model worked well for all observed downburst events. This is largely due to the variability in event characteristics found in the observational records, which was unable to be captured by the simplified empirical or analytical models currently in use. Despite this, the best performing wind field model was identified for coupling into the risk assessment framework.

In the second stage of this research, actual transmission tower design drawings have been acquired and are currently being used to construct a 3D finite element model (FEM) of these structures. The vulnerability of these structures to downburst winds will be evaluated using fragility analysis. During fragility analysis, both structural and downburst load uncertainties will be considered. The capacity of the structure will be computed based on both nonlinear static and dynamic analysis considering various downburst loading velocity profiles. The final objective of this task will be to generate a unified downburst fragility functions for transmission tower structure.

To conclude the research, a framework for probabilistic downburst risk assessment for power transmission networks will be proposed. A Monte Carlo Simulation (MCS) based risk model will be developed, which will be integrated with the downburst wind hazard and structural vulnerability models.

Food contingency planning for vulnerable communities within Disaster Management: An assessment of the Cairns Region's vulnerable communities

Prudence Liddy

This research discusses how vulnerable community members can be supported through local government-led food contingency planning. Utilising social learning theory, the research looks at how adaptive capacities of local governments and communities can create resilience. It has been identified that disaster events can exacerbate vulnerabilities. Planning food contingencies around vulnerable community member needs creates a comprehensive food contingency plan. Food security and vulnerability have been identified as intertwined aspects. The threat of food security increases the number of vulnerable community members, and vulnerable community members are at a higher risk of food security. Therefore, this is a need to reduce food security and create methods to support vulnerable community members.

A literature review has been conducted to outline the key concepts relating to disaster events, food security, contingency planning, and supporting vulnerable communities. It is clear that many factors could impact food security, most significantly climate change, and disaster events. Each of these factors threatens food supply chains, food access, and availability; therefore, there is a need to plan food contingency arrangements.

The Cairns region was selected as the case study. Organisations that support vulnerable community members were engaged through an online survey to understand vulnerable communities' wants and needs. A lack of knowledge within the community about how to access food access options and disaster event information was seen from the survey. There was a significant want for more food access options that would enable more community members to access food within disaster events, prepare for disaster events, and create community reliance.

Recommendations are posed, highlighting the need for well-planned food contingencies tailored to community wants and needs. The most prominent recommendations include developing a food contingency plan within the Cairns disaster management framework, creating an advertising campaign, and establish a sub-committee within the Cairns Local Disaster Management Group.