

Australian Journal of Emergency Management

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► NEWS AND VIEWS

Professionalisation of
Disaster Management for
Queensland

► REPORT

Task Force
Flood Assist

► RESEARCH

Understanding lost
person behaviour in the
Australian wilderness

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The *Australian Journal of Emergency Management* is Australia's premier journal in emergency management. Its format and content are developed with reference to peak emergency management organisations and the emergency management sectors—nationally and internationally. The journal focuses on both the academic and practitioner reader. Its aim is to strengthen capabilities in the sector by documenting, growing and disseminating an emergency management body of knowledge. The journal strongly supports the role of the Australian Institute for Disaster Resilience as a national centre of excellence for knowledge and skills development in the emergency management sector. Papers are published in all areas of emergency management. The journal encourages empirical reports but may include specialised theoretical, methodological, case study and review papers and opinion pieces. The views in the journal are not necessarily the views of the Australian Government, Australian Institute for Disaster Resilience or its partners.

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Contributions in the Research section of the *Australian Journal of Emergency Management* are peer reviewed to appropriate academic standards by independent, qualified reviewers.

Foreword



Dr Margaret Moreton

Executive Director,
Australian Institute for
Disaster Resilience

AIDR supports, collects and shares evidence and research that contributes to a strong research base and to the translation of evidence and research into effective practice. This contributes to an increasingly disaster-resilient nation.

We do this through all of our work and, in particular, through the curation and publication of the *Australian Journal of Emergency Management* (AJEM).

Since 1986, AJEM has provided researchers and others working in disaster resilience a pathway to build on existing research, to learn from the experience of others and to strengthen capabilities. Through all of our products and services, AIDR collaborates with and includes researchers and research focused organisations, including Natural Hazards Research Australia and other institutions with an interest and focus on disaster resilience.

To continue to strengthen disaster resilience practice across Australia, we must encourage, gather and publish leading research to inform that practice. AJEM is an important journal that provides analysis, considered views, lessons learnt and insights into current and future issues from both researchers and practitioners from all levels of emergency management. AJEM is, for many practitioners, their primary 'go to' journal; one they access to ensure that they remain current and evidence-based in their approaches to building disaster resilience.

Since joining AIDR in late 2022, I have been leading the editorial team to plan how best to strengthen and consolidate AJEM's long and strong history. Many researchers and practitioners contributed to a survey that AIDR conducted to inform a refresh of AJEM. This survey closed at the end of March and we will be considering the feedback it provided. Some survey respondents were the journal's peer reviewers whose contribution to the assessment of research papers maintains AJEM's high academic standard. Some respondents have published in AJEM, others have not. All perspectives are valuable as we consider the journal's future contribution. This process reflects my desire to understand how we enhance AJEM and reinforce it as a desirable journal in which researchers strive to publish.

AJEM provides ready access to relevant and informed disaster resilience and risk reduction

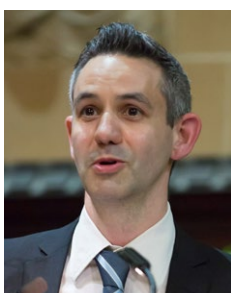
research. I want to ensure that we are providing the evidence and knowledge that will make a difference to practice and to outcomes in Australia, for our regional neighbours and for other areas of the world. To achieve this, we must ensure that AJEM is a valued and attractive publication for researchers and to its global readership.


Following an internal review process that the AJEM editorial team is embarking on through 2023, it is my hope that we will expand the focus of the journal and the communities it seeks to be in service to. We will encourage contributions that reflect the full range of disaster resilience, including economic resilience; resilience of the natural and built environments; health and wellbeing as it is influenced by hazards and emergency events; community and social capital and cultural and indigenous knowledge and practices. Expanding the scope of AJEM to include research in these broader topics will improve our understanding of each of these important areas of knowledge and the intersections between them.

As practitioners are aware, building and fostering disaster resilience involves engagement with diverse groups. This includes indigenous communities and organisations, primary producers, health practitioners, spiritual leaders, community groups and organisations, community members, business owners, insurance and banking providers, emergency services organisations, philanthropists, corporate business and many others. I would like AJEM to include research and practice of relevance to these many perspectives.

We are at an important moment in the evolution of AJEM's contribution to emergency and disaster resilience both nationally and internationally. We have an exciting opportunity to contribute more to the emergency and disaster sectors through the publication of research, thought leadership, and through the sharing of experience of practitioners in the field.

Who or what is the 'fit-for-purpose' emergency management practitioner of the 21st century?



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Australia is regularly affected by high-risk hazards and disasters of various types, each having myriad consequences for people, homes, places, businesses, communities and environments. As elsewhere, 80% of 'declared disasters' are hydrometeorological, that is, weather and climate related. To prepare for a more dynamic climate as well as other societal risks will demand more from people tasked with the responsibility of emergency management, including preparedness and response.

Disasters remind us of the importance of emergency management as a *process* and the practitioner as a *professional* who sits at a critical intersection of the people, governments, the private sector, the emergency management sector as well as a variety of stakeholders. A great deal is asked of emergency management practitioners and those demands will increase, colliding with a more complex world, dwindling paid and volunteer workforces as well as increasingly resource-constrained settings.

Others have said, and I repeat, that it is important to examine who or what will the emergency management practitioner of the future be? What qualifications, training, skills, competences, knowledge and other abilities would we expect of a contemporary emergency management practitioner, be they paid, volunteer, full or part time, in an official emergency response agency or as a member of a corporation, business or organisation of any other type?

My opinion is that, too often after disaster occurs, discussion flares up in the media, within affected communities, on social media and on platforms such as LinkedIn, after the disaster and following the release of public enquiry and commission reports. Repeatedly, misinformed, unprofessional and perhaps even insulting discussion is aired on various media platforms – something I feel is unhelpful. However, the underlying questions are good ones and worthy of debate.

To contribute, bring some structure and order and to act as a call to action for others to contribute to this debate, I have summarised my thinking on some of the key questions that should be explored, researched and examined further. This is a starting, not a finishing point.

The question of 'who or what is the fit-for-purpose emergency management practitioner' repeatedly emerges and the recurrence of this question belies its clear importance. We cannot hide from exploring, articulating, and demanding the skills and abilities of emergency management practitioners if we are to mitigate future disaster risks. It also shows that many stakeholders think we do not presently have the right balance.

In Australia, I accept that the emergency management sector (as broadly conceived within the 'Profiling Australia's Vulnerability: the interconnected causes and cascading effects of systemic disaster'¹ report) defines who or what an emergency management practitioner is – not me. An emergency management practitioner may be a local government official; a paid employee of a corporation or utility; a business continuity manager; an employee of a private sector company; a command officer of a local, regional, or state level emergency management agency; a volunteer in any organisation (e.g. the NSW Rural Fire Service, a non-government organisation, a community support network) and so forth. They

may be employed full-time, part-time or be volunteer. They may or may not concurrently hold another paid role such as town planner and emergency management practitioner, or they may be as already said, a volunteer in any sort of organisation aimed at the wider process of disaster risk reduction. I resist a specific definition because different sectors, organisations, agencies, communities and places need flexible ways of defining and running 'emergency management' (and thus, determining who or what an 'emergency management practitioner' is) and they are best placed to that. Therein is the first question to address – who or what do we consider an emergency management practitioner to be and who gets to decide?

I think there are basic questions that serve as a useful starting point for society to ask and address, to ensure we have a fit-for-purpose emergency management practitioner for the challenges ahead:

- What initial qualifications, training, skills and competencies and experiences should an emergency management practitioner have?
- What ongoing professional development training activities should they engage in, how often, for what purpose, should they be and certified and if so, by whom?
- Is there, or should there be, a clear role and career progression structure – a ladder of emergency management practitioner development so to speak, that individuals may climb to gain more skills, training and experience as they need and desire?
- Should there be a national accreditation agency with appropriate, regularly reviewed benchmarks and standards (and if so, by whom)? Related to this, should there be a consistent national qualifications framework that scaffolds from simple, on-the-ground response functions up to strategic, national command and coordination capabilities – recognised and transferable between sectors (e.g. the official, governmental emergency management sector, the private sector)?
- What do the position descriptions of advertised jobs for emergency management practitioners say the incumbent ought to be like in terms of qualifications, training, skills, experience, and competence and how should these mirror the requirements of 'places and sectors' where those emergency management practitioners will work?
- How should we determine whether the role requirements meet the specific disaster risk reduction requirements for a place, sector, organisation or business?
- How do we build a flexible national emergency management workforce that is capable of deployment from one emergency context/event to another and between states and territories to build common skills and knowledge rather than to support separate fire, storm, flood agencies in each state and territory (towards a nationally flexible, economy-of-scale workforce)? Related to this, how do we ask more of emergency management practitioners with less in financially constrained environments?
- How should we support emergency management practitioners, equip and fund them to do their valuable work?

I am not the first person to ask these questions. Extremely helpful information that serves as a starting point to address these questions (and others) can be found in the work of Dippy (2022)², Ellis (2020)³, Mciver (2022)⁴, NSW Government (2020)⁵, Parsons (2020)⁶, Woodman, Bearman and Hayes (2021)⁷, Young and Jones (2019)⁸ and Zsombok (2019)⁹.

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Professionalisation of Disaster Management for Queensland

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Disaster management is a relatively new occupation. With the disaster risk landscape challenged by changes to the frequency, intensity, distribution and duration of acute events, major disasters and long-term climate-related stresses, the changing hazard landscape warrants professionalisation.

In Queensland in 2022, the position of Disaster Management Officer (DMO) exceeded 100 members appointed in 55 councils and one town authority. DMOs are appointed by local governments and are expected to have a working knowledge and understanding of the *Queensland Disaster Management Act 2003*¹ and the *Disaster Management Regulations 2014*.² DMOs are expected to demonstrate a thorough working knowledge of the *Queensland Disaster Management Arrangements*³ and its application through the 4 phases of prevention, preparedness, response and recovery.

Queensland, is a disaster-prone state and is most affected financially by disasters.⁴ Despite this, there is no requirement for DMOs to comply with a professional association or a mandatory certification program. If we look back to chart our way forward, we need to ask, 'how can we create a standard for disaster management practitioners where professionalisation is supported by certification and uniform vocational training?'

This paper provides a case study from South Africa highlighting their success in standardising certification for DMOs and disaster management managers as part of ongoing professionalisation. Lessons from South Africa illustrate that, in Queensland, professionalisation should be supported by the minimum certification needs of disaster management and by standardising position descriptions.

What is professionalisation?

The Australian Council of Professions defines a profession as:

a disciplined group of individuals who adhere to ethical standards and who hold themselves

*out as and are accepted by the public as possessing special knowledge and skills in a widely recognised body of learning derived from research, education and training at a high level, and who are prepared to apply this knowledge and exercise these skills in the interest of others. It is inherent in the definition of a Profession that a code of ethics governs the activities of each Profession. Further, these codes are enforced by the Profession and are acknowledged and accepted by the community.*⁵

Certification is generally an accepted form to support the recognition of a profession. Dippy (2022)⁶ explains that certification is evidence that the various steps within the professionalisation process have been undertaken and collated. This allows individuals to seek recognition of a defined set of qualifications (including competencies), knowledge, skills, abilities and experience to be recognised as a professional. The Australian Standards regime can be used to determine conformity of a certification scheme.

Disaster management in Queensland

In Queensland, there is a myriad of regulatory and legal requirements to comply with in emergency and disaster management, but no statewide standard professional body nor certification process. Though disaster management practitioners are accountable for safety and fulfil an important role, they are not as noticeable to the public. For example, the annual Queensland Get Ready program⁷ typically includes the Queensland Get Ready ambassador, a State Emergency Services volunteer, a Lifeline

Queensland representative and a Rural Fire Service volunteer, but not a DMO. Campaigns like this drive change, but by excluding disaster management practitioners, it leads to the position being undervalued in the realm of public knowledge and building trust.

A Disaster Management Officer Workshop is hosted every 2 years. The Office of the Inspector-General Emergency Management (IGEM) co-designed the Disaster Management Officer's Network in collaboration with DMOs (see Dean, Dwyer & Moore 2019⁸). At the June 2021 workshop, the topic of 'Professionalisation of Disaster Management in Queensland' was introduced informed by a questionnaire of 3 questions that was distributed via email to the DMO forum participants. The survey received 23 responses, which while not an accurate reflection of all emergency and disaster practitioners across Queensland, is valuable to consider

Disaster management-related qualifications

The first question looked to determine the types of formal disaster management-related qualification. Of the survey responses:

- 48% indicated that they had a certificate and/or advanced diploma in emergency management
- 22% indicated that they had no formal disaster management qualifications
- 17% indicated that they had a tertiary degree in disaster management, including Bachelor to Master degrees
- 13% indicated that they had completed Queensland's Disaster Management Arrangement training via the Queensland Fire and Emergency Services Learning Management System.

Career pathway

The second question revealed that the respondents could not identify a standard career pathway into emergency and disaster management. The majority had entered the sector as volunteers with the State Emergency Services or from the Queensland Police Service. There appeared a reasonable progression from volunteering into the emergency and disaster management workforce. Community engagement activities, conducting administration (either in a senior role or for an Incident Management Team or participating in disaster recovery projects) was another segue to enter the sector.

Respondents indicated that creating a targeted and mandatory disaster management certification program in Queensland will assist in developing skills and knowledge. Certification may recognise an individual's competencies as well as strengthen the reputation of the emergency and disaster management sector and leverage trust within the sector, amongst peers and with the public.

Perceived barriers to professional development

The final question identified any barriers perceived to exist in pursuing professional development. The financial cost of courses and study options, which, according to respondents, are generally not offered during office hours, was highlighted as the biggest stumbling block. Accessible and online delivery methods was identified as another obstacle.

Professionalisation options in the Asia-Pacific

Professionalisation has multiple goals and occurs through multiple mechanisms. In the Asia-Pacific region, several schemes exist for emergency management practitioners. Dippy (2020)⁹ identified 4 emergency management certification schemes: The Australasian Fire and Emergency Service Authorities Council (AFAC) Emergency Management Professionalisation Scheme, the Emergency Management Accreditation Program from an independent American organisation, the International Association of Emergency Managers and their 2 programs of Certified Emergency Manager or Associate Emergency Manager and the International Emergency Management Society (TIEMS) TIEMS Qualifications Certification.

Despite the appeal of existing certification schemes that set the standards for education, training, research and ethical conduct and a rigorous certification process, the majority of DMOs in Queensland have not adopted nor applied for professionalisation through these existing certification schemes. According to Dippy (2020), it would seem the vocational and tertiary qualifications in Australia have been developed and are constantly reviewed and refined. The missing link is a national standard of position descriptions and an agreement as to what qualifications each role within the sector should play.

The 2021 DMO Network Forum groupwork considered 3 key questions to help inform professionalisation for Queensland:

- How can we, as a cohort, establish influence at a state-level?
- Who should be the agents of change that endorse a cohort-supported resolution, or is there another avenue to pursue?
- Which councils will nominate to form part of this cohort?

Unanimously, the forum participants supported a cohort to drive change to improve both quality and practice. This cohort should be representative of local governments, the Local Government Association of Queensland, the Queensland Reconstruction Authority, Queensland Fire and Emergency Services and the Queensland Office of the Inspector General of Emergency Management. This cohort should actively pursue a resolution, endorsed by council mayors, to support a solution-driven certification process to professionalise emergency and disaster management practice, certifying existing capabilities and subsidising studies that align with sector requirements.

South Africa case study

To certify disaster management in South Africa, several approaches have been initiated and are in various stages of completion spearheaded by the Disaster Management Institute of South Africa (DMISA). This has taken several years but the motive to professionalise was the need to establish minimum standards in the sector.

The 6 steps of the implementation

1. DMISA to submit application to join the South African Qualification Authority approved professional body for DMISA.

2. Establishing 4 fit-for-purpose designations that allowed access to all applications: Disaster Management Professional, Disaster Management Practitioner, Disaster Management Associate and Disaster Management Technician. This included recognising prior learning and experience.
3. Appointing membership coaches in each province in South Africa (this process was pursued on a national scale).
4. Standardising an online application form.
5. Appointing 2 independent assessors for verification of applications.
6. DMISA, through its nationals committee, aims to represent the demographics of South Africa and should appoint diverse members to its national committee who are active in terms of experience, gender and background to assist in contributing to the vision of a professional disaster management sector.

To support and ensure continuous professional development, registrants must maintain their currency in the discipline through earning a minimum continuing professional development points every 2 years. This is achieved through training that includes modular courses, short courses, workshops, conferences, seminars, mentorships and in-service training. It also involves the Local Government Sector Education and Training Authority, appointed by the Quality Council for trades and Occupations as a Development Quality Partner, to develop occupational qualifications to address skills related to disaster management that are scarce at the local government level. The South African National Department of Labour defines scarcity of skills as ‘the inability to find suitably qualified and experienced people to fill occupational vacancies either at an absolute level of scarcity or at a relative level of scarcity’.¹⁰

The contexts where scarcity might arise include:

- a new or emerging occupation where there are few people with the requisite skills
- firms, sectors and even the national economy are unable to implement planned growth strategies because productivity, service delivery and quality problems are directly attributable to a lack of skilled people
- replacement demand would reflect an absolute scarcity where there are no people enrolled or engaged in the process of acquiring skills.

In South Africa, according to the Local Government Sector Education and Training Authority, 2 occupational levels in disaster management, namely the DMO and Disaster Management Manager (DMM) have been identified as relative scarce skills. This means that suitably skilled people are available in the labour market, but they do not exhibit other employment criteria, including:

- high-level work experience
- geographical location (e.g. individuals unwilling to work outside of urban areas)
- equity considerations (e.g. few, if any, candidates with the requisite skills from specific groups available to meet the skills requirements of firms and enterprises).

An occupational qualification is a qualification associated with a trade, occupation or profession resulting from work-based learning and consisting of knowledge, practical and work experience. The occupational qualification curriculum comprises 20% knowledge/theory (minimum), 20% practical (minimum) and 20% experience (minimum). As such, the development of 2 occupational qualifications were created for both the DMO and DMM.

Occupational qualifications	
Disaster Management Officer	Disaster Management Manager
<p>The profile of the DMO includes a professional with the ability to coordinate procedural applications, interventions and provisioning activities and administrative reporting related to disaster risk management.</p> <p>A DMO conducts risk assessments to determine vulnerability of local areas to hazards, including health, safety and environmental requirements in order to effectively implement a management plan.</p>	<p>The profile of the DMM is a professional with the ability to manage the implementation of legislative frameworks for disaster risk management.</p> <p>A DMM is someone who leads and manages a team of DMOs responsible for the implementation of risk reduction, preparedness, response and recovery programs in an integrated and multi-sectoral manner.</p> <p>A DMM plans, directs and implements departmental, service or program overall goals and objectives.</p>

It is worth noting that the South African National Disaster Management Centre (NDMC), in collaboration with the University of Venda, is developing a public undergraduate degree in disaster risk management. To date, the only opportunities for practitioners to further their skills and specialisations via public institutions has been through post-graduate routes or accredited modular training offered by universities and other service providers. In addition, the NDMC receives an allocation of ZAR2 million for a disaster risk management bursaries program. The bursary award covers registration fees, tuition fees and a resources allowance.

Developing disaster management-related occupational guidelines

The process for developing disaster management-related occupation guidelines for the South African sector is shown in Figure 1.

The challenges

There were challenges experienced throughout the process to develop disaster risk management occupational qualifications.

Attendance and participation

A range of subject-matter experts including local, provincial and national governments, state-owned enterprises, civil society organisations, the private sector and institutes of higher education were invited to participate. Participation involved the



Figure 1: Developing emergency and disaster management guidelines.

stakeholders of the DMS NPC (non-profit disaster risk management organisation), the National Disaster Management Centre, the South African Local Government Agency, JB Marks Local Municipality (disaster management practitioner), Capricorn District Municipality (disaster management manager), Cape Winelands District Municipality (Head of Disaster Management Centre), Buffalo City Municipality (Head of Disaster Management Centre), City of Ekurhuleni (Head of Disaster Management Centre), City of Cape Town (Head of Disaster Management Centre) and DMISA.

Consistency of attendance among role-players was a challenge given the demands experienced in the represented sectors, coupled with limited resources at all levels.

Terminology

Terminology within disaster risk management contexts varies significantly across sectors and even between municipalities and provinces. As such, considerable time was spent addressing these differences to ensure a common and uniform application of disaster risk management-related terminology to accommodate disaster risk management in all contexts.

Knowledge and skills

Given the considerable knowledge and skill requisites of disaster risk management practitioners in line with requirements of disaster risk management legislation, it was difficult to reach a consensus on the knowledge and skills to be assessed by the 2 occupational qualifications. To address this, it was recommended that:

- an entry-level occupational qualification for disaster risk management be introduced to address all the foundational

elements required prior to embarking on DMO and DMM occupational qualifications

- a Head of Centre occupational qualification for disaster risk management be introduced to address this role in accordance with disaster management legislation.

Alignment

Following the completion of the occupational qualifications, work will continue to ensure alignment between the occupational qualifications. The DMISA’s professionalisation process and the NDMC continues to support the professionalisation of disaster risk management in South Africa.

Professionalisation for DMOs in Queensland

The case study from South Africa clarifies that it becomes incumbent for the disaster management sector to establish certification with minimum requirements as part of ongoing professionalisation. As Queensland strives to be a resilient state, there is an opportunity to identify effective ways to add value and enhance training, certification and professionalisation of disaster management.

Options for professionalisation and the certification of disaster management in Queensland cover:

- doing nothing and accepting the status quo
- pursuing existing national and international emergency management associations as an interim option to use available professionalisation associations to avoid restricting supply in the short-term, while in the long-term, establishing a state-based professional association
- establishing a collaborative cohort. From the case study of South Africa, there is merit in Queensland for the Inspectorate General of Emergency Management (IGEM) to improve the current approach and take ownership of a process to standardise position descriptions and establish a framework of certification options for emergency and disaster management personnel. This will require IGEM working with the Australian Skills Quality Authority to ensure courses are accredited and nationally recognised, therefore benefiting cross-border professionalisation.

Conclusion





Existing and recognised professional associations such the Disaster Management Institute of South Africa is evidence that professionalisation, supported by certification, can work and that different entry levels of expertise should be recognised. As seen from the case study, establishing professionalisation of emergency and disaster management practitioners will lead to increased certainty and acknowledgment of worker capabilities, that will drive recruitment and increase awareness of the occupation. Standardisation, created by a certification process, will assist to funnel broad versus niche needs to stimulate relevance and assist to recruit experienced practitioners to work in Queensland.

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The benefits of understanding nonlinear change: an example using flood mortality

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Change in natural and human systems are almost invariably measured using trends. Cause and effect are known to take other forms but these are rarely investigated and, if they are, the burden of proof tends to be greater. When dealing with complex systems, analysts (and their critics) need to be more discriminating.

Flood deaths in Australia 1900–2015 were investigated by Haynes *et al.* (2017)¹ using the PerilAUS database constructed by Risk Frontiers² using a methodology also applied to bushfire fatalities (Haynes *et al.* 2010).³ This was combined with coronial information to determine causes of death and develop potential policy interventions. A total of 1,859 flood deaths occurred during 1900–2015. About two-thirds of these deaths involved 2 or fewer people and most were due to drowning or suspected drowning. People of indigenous heritage are likely to be underrepresented in the data, especially earlier in the 20th Century (Haynes *et al.* 2010).

Between 1900 and 1960, the rate of deaths due to floods declined by 0.55 persons per 100,000 population per year, but a step change occurred around 1960 to lower mortality levels that have since remained stable. Numbers declined from 219 deaths per decade before 1960 to 99 per decade afterwards. Work by Haynes *et al.* (2017) determined a reason for this rapid decline, speculating that it may have been due to flood mitigation works, technology advancements, better warnings and the postwar expansion of emergency services response (i.e. the growth of the SES). However, records of state-based SES show staggered starts, with Queensland, the state with the most deaths, having no specific emergency response function until the early 1970s.

In 1957, the Australian Government directed the Bureau of Meteorology to set up a hydrology branch that subsequently operated in Queensland, New South Wales and Victoria (Pagano *et al.* 2016)⁴,

the states where most deaths had occurred during recent major floods in Australia's east coast. The early warning system used provided forecasts of river heights and their timing to local newspapers and radio. This advance information cut the fatality rate by over half. Such a dramatic effect—halving the death rate—demonstrated the economic value of early warning systems. No other innovation before or since has had a similar result.

Haynes *et al.* (2017) suggested that vehicle-related mortality (driver or passenger in a motorised vehicle) showed an increasing trend to 1960, after which it declined, but the data show an increasing trend until 1979 (52 deaths in 1970–1979). Since then, mortality has been between 15–18 people per decade to 2010. The peak mortality in the large floods that occurred in the mid-1970s may have prompted subsequent public warnings that were heeded. Between 1980 and 2010, death rates remained constant, perhaps related to increases in car ownership and population. Following a decade of drought, widespread and flash flooding in the eastern states saw mortality during flood rise again during 2010–2011.

Coates (2022)⁵ updated flood mortalities for the year to April 2022, comparing them to the previous decade. Forty-one deaths were registered, compared to 48 during 2010–2011. Of the top 10 years with the most fatalities, the only other post-1957 date was 42 deaths during 1973–1974. Despite improvements in early warning systems and targeted communications, mortality rates in the 2021–22 floods were also accompanied by widespread injury and property damage and loss.



Australia's early warning system provided forecasts of river heights and their timing to help residents prepare.

Image: NSW Rural Fire Service

The identification and establishment of the Bureau of Meteorology Hydrology Branch contributed to a reduction in deaths due to floods and is an example of the value in undertaking nonlinear hazard analysis. Regime shifts (the rapid change from one steady state to another) can occur in both natural and human systems. The introduction of early warning is an example of the latter. Looking at natural systems, rainfall in Australia underwent a regime shift in 1972 increasing by 12% at $p < 0.01$, mainly driven by a regime shift in the northern Australian summer rainfall of 16% at $p < 0.01$. This was closely followed by a shift of 0.32°C in average annual sea surface temperature Australia wide that extended upwards into the western Pacific Ocean warm pool. Warmer oceans allow airmasses to hold more moisture. The 3 most recent flood-mortality events in 1974, 2011 and 2022 occurred during La Niña events, carrying water of tropical origin, fuelled by a warmer climate.

These external drivers of flood risk may be combining with historical legacies, such as settlement patterns and floodplain modification to overwhelm warning and response systems, creating long-term legacies for recovery. Such changes are generally not amenable to trend analysis, as they only tend to emerge above statistical 'noise' at some time after the change has occurred. This increases the risk of failing to anticipate change and locking in future losses. These types of changes need to be assessed and, if present, factored into the relevant areas of strategic natural hazard risk management.

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Black Summer research report increases understanding of bushfires

Nathan Maddock

Natural Hazards Research
Australia

Science is shaping how Australia can better prepare for bushfire seasons with the release of comprehensive research based on the major issues of the 2019–20 summer fire season.

The wide-ranging research program was undertaken by Natural Hazards Research Australia and the Bushfire and Natural Hazards Cooperative Research Centre in the years since the 2019–20 fire season. The program drew on the expertise of Australia’s fire and climate scientists, human geographers, land managers and public health and recovery experts from 28 research institutions, indigenous organisations and fire and land management agencies.

The report, *Understanding the Black Summer bushfires through research*, summarises the research findings from 23 projects. The report presents an integrated view of the way forward from the fires, including exploring why the 2019–20 fire season was so devastating, what new capabilities can be implemented and how Australia can best learn from its worst fire season on record. Some projects focused on what could be learnt at a national level, while others analysed specific fire behaviour or technology in Queensland, New South Wales, Victoria, South Australia and Western Australia.

Insights from the research provide Natural Hazards Research Australia partners in government, fire and emergency management agencies and community organisations with an up-to-date scientific basis for decisions on how best to allocate resources, manage the environment and help communities prepare, respond and recover.

CEO of Natural Hazards Research Australia, Andrew Gissing, said the research was based on the issues of the 2019–20 fire season, but the findings can be applied to bushfire management, safety and community resilience for all natural hazards around Australia.

‘This is vital new Australian science about how to keep our landscapes and people safe from bushfire. Our fire seasons are getting longer, and dangerous bushfire days are becoming more frequent. We need to be smarter and use this new scientific knowledge and research to improve the ways we live with fire.

‘The 2019–20 bushfires were long and challenging. This research has improved our understanding of how the extremely dry conditions and record-breaking temperatures impacted our weather in ways that previously were not as well-understood.

‘This research will guide how bushfire risk can be managed through better science, policy and practices. The strength of the science is its multi-disciplinary approach that will lead to action through better bushfire modelling, better warnings, better land management including enabling cultural fire and better recovery after a disaster for those affected will come from this research,’ he said.

Findings within the report were shared in a webinar series featuring research leaders from the program.

The research from *Understanding the Black Summer bushfires through research* and webinar recordings are available at www.naturalhazards.com.au/black-summer.

Rising to the challenge of post-disaster buybacks and rebuilding

Bethany Patch

Natural Hazards Research
Australia

After a disaster, there are significant opportunities to improve resilience by building back in ways that better adapts to hazard risk.

Using best adaptive practice can enhance resilience, however, hazard mitigation techniques can also perpetuate a community's vulnerability. This can be improved through pre-disaster planning, simplified government processes and understanding that climate change is making resilience harder to achieve.

In a webinar hosted by Natural Hazards Research Australia, Professor Gavin Smith of North Carolina State University presented the challenges, insights and lessons from his hands-on experience and research into hazard mitigation in the United States and New Zealand. As a leading expert, Professor Smith unpacked the main issues and challenges related to house buyouts, rebuilds and elevations.

'Building back houses to their previous outdated standards perpetuates vulnerability,' Professor Smith said.

Natural Hazards Research Australia CEO, Andrew Gissing, noted that while measures to reduce damage such as retrofitting, house raising and buyouts were not new, the scale and frequency of their adoption was increasing both in Australia and internationally.

'In a warming climate, the pressure to adopt such measures is likely to increase as extreme weather events worsen, placing greater pressures on communities. We have an opportunity to evaluate the implementation of resilience programs here and overseas to best apply investments to Australian community needs,' he said.

Buyouts, buybacks and elevations

Buybacks or voluntary purchase schemes are government-funded programs that purchase homes in areas that are or could be affected by disasters. Programs usually include rebuilding homes in a safer area. In the United States, buyout programs are voluntary and provide homeowners

with the pre-disaster market value for their home, often prioritising low-income residents and vulnerable communities. Once a home is bought back, the land must be maintained as public open land (e.g. parks).

Professor Smith said, 'It's one of the most effective risk reduction techniques. In the US, over 65,000 homes have been acquired since the 1990s.'

House-raising programs or elevations are also used to lift the habitable floor space of a dwelling to a level above frequent flooding and in-line with local floodplain management standards. An example of these mitigation techniques was used in the Queensland Reconstruction Authority Resilient Homes Fund, which encouraged homeowners to either retrofit, raise their home or enter into voluntary buyback. This program is being rolled out in towns including Ipswich in Queensland where, to date, more than 60 homeowners accepted offers for government to buy back their property after the 2022 floods.

Challenges

Professor Smith highlighted that the buyout funding programs in the United States are highly complex, bureaucratic and rigid and are often being micromanaged by federal or state governments without much local government involvement. Communities have difficulty navigating the programs, where success is impeded by a lack of government flexibility.

'One of the biggest challenges we face is that local state and federal capacity and commitment can be lacking,' he said.

It is also common practice that buyout funding is initiated after a disaster. This can be a lengthy and stressful process for community members who are still recovering, which hampers public participation. Effective pre-planning investment



Buybacks and elevations can be used to mitigate the effects of floods in hazard-prone areas.

Image: Victoria State Emergency Service

could ensure that community members can relocate either before or very shortly after a disaster.

‘We are still not adequately planning for these issues, nor are we building the capacity needed to assist local government to engage in these complex programs,’ Professor Smith said.

He also touched on ‘place attachment’ experienced by communities when relocating or buying out homes when people don’t want to leave. There are challenges in sensitively navigating this within government bureaucracies.

‘Moving from your community to a new location is very unsettling. People often come back to their original communities at the anniversary of the storm to reconnect, which tells you something about the social bonds that are torn apart by buyouts. We don’t spend enough time linking land-use planning to public health and psychological wellbeing of individuals,’ he said.

Professor Smith discussed other challenges with buyouts, including use of land after buyouts, rebuilding affordability, uneven levels of participation, length of time to implement, lack of global lesson-sharing and loss of local tax base. To improve the thoughtful use of open spaces left behind once homes are bought, Professor Smith co-authored the Open Space Management Guide¹ for better planning.

Learning from case studies

Professor Smith outlined the results of case studies that compared buyout techniques used in the United States with buyback methods in New Zealand and presented several lessons that might be applied to other contexts such as in Australia.

Broader goals and close community connections

A case study in Charlotte/Mecklenburg, North Carolina, illustrated the importance of broader community goals within buyout programs that extend beyond relocation.

‘Given the prescriptive nature of federal programs, this community developed its own buyout program. This is really important because it shows that buyouts are not only a recreational opportunity but are linked to broader activities and higher goals like water quality, economic development and future floodplain mapping,’ he said.

Another case study in Princeville, North Carolina, in the wake of Hurricane Matthew in 2016, saw community members adopting alternative ways to maintain their pre-disaster community bonds once their houses were moved uphill. Professor Smith’s team hosted a community design workshop that brought together land-use planners, engineers, architects, town officials,

designers, students and residents to work with local, state and federal officials to develop options for new resilient homes, affordable housing and new community structures.

‘Working closely and directly with communities to rebuild is essential. Community members are often considering how to maintain their community,’ Prof Smith said.

Informed pre-disaster planning

Professor Smith reiterated the importance of improved pre-disaster planning, including open space management through good land-use planning and design, and incorporating buyout projects within local hazard mitigation plans.

‘We throw a lot of money at disasters after the fact, but we invest very little for pre-event planning in post-disaster recovery or pre-event planning for governance. How does good governance get us to better engage with governmental actors, the private sector and others? Good planning should be able to build networks and coalitions to achieve the aim of greater resilience,’ he said.

A case study of Kinston, North Carolina, highlighted the value of pre-disaster planning when the community was struck with 2 devastating storms in close succession; Hurricane Fran in 1996 and Hurricane Floyd in 1999.

‘The Kinston community viewed multiple disasters as a window of opportunity to change the spatial structure of their town. Pre-event planning really makes a difference in speeding up these bureaucratic programs,’ he said.

Before Hurricane Fran in 1996, Kinston had dilapidated housing stock, lacked affordable housing and was exposed to extreme flood risk. The application of pre- and post-disaster planning tools allowed for temporary prohibition of new construction on floodplains, no rebuilding of substantially damaged structures on floodplains, increased elevation standards and development of floodplain conservation easements. By the time Hurricane Floyd hit Kinston in 1999 the community had comprehensive buyout applications ready for rapid implementation.

‘Kinston developed application forms for 600 homes in case another disaster struck, so when Hurricane Floyd hit in 1999, they were ready with applications, which were approved within 2 weeks after the storm,’ he said.

Pre-event planning was found to be stronger in case studies from New Zealand. Examples include the ‘red-zoning’ of properties in Christchurch and the establishment of a national agency to assist with regeneration plans and open space management.

Adapting for climate change

A case study in Mississippi after Hurricane Katrina in 2005 reiterated the need to use building codes and standards that incorporate climate projections for future catastrophic disasters, rather than rebuilding using existing standards. Working with the Mississippi community, Professor Smith used future flood maps to help residents adopt stringent and relevant standards within their rebuilds.

‘One of the main questions we need to be asking ourselves is: what are the appropriate structural and non-structural design standards in an era of climate change? This is the big unanswered question. Should we be building in areas where you have to elevate your home 30 feet in the air?’ he said.

Protective action incentives

Professor Smith emphasised the importance of incentivising protective action, including the role of insurance and private sector investment to encourage communities to identify and reduce their risk.

‘Historically, our national flood insurance rates haven’t truly reflected flood risk. The idea was to incentivise people to buy flood insurance, but instead, it sent the signal that middle- and upper-income people can access flood insurance that is inexpensive, thereby incentivising development in the floodplain.

‘Now, the US is moving towards more actuarially sound rates. But we have thousands of homes that aren’t tied to new codes and standards or have flood insurance at lower rates. So, it’s going to take some time to move the meter to better reflect risk.

‘We also need to develop better incentives and do a better job of educating people about risk and the implications of not acting, while changing the powerful disincentives such as post-disaster aid. We’ve got to do a better job of informing communities about the risk and giving them the information and tools to take action,’ he said.

Professor Smith’s 3 pieces of advice provide a pathway for Australia to improve buyback and retrofitting programs:

1. Do a good job of pre-event planning by investing the time to build community relationships, engender trust and think through the buyout process as a continuum; think about what you do with the open space and how you resettle thoughtfully.
2. Think about the capacity of national entities to build capacity for governments to undertake these issues.
3. Think about how buyouts and home elevation should be nested within an overall strategy that considers climate change.

‘Take communities forward while considering not only the risks of tomorrow, but also the future,’ he said.

The webinar is available at www.naturalhazards.com.au/news-and-events/events/rising-challenge-learning-natural-hazards-build-resilient-communities.

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Dementia masks for search and rescue training

Jim Whitehead

Queensland Police (rtd)

Up until 2014, Queensland experienced a 25% fatality rate among lost people who were suffering with dementia if not located within 24 hours. This has now been reduced to approximately 5%. This is due, partly, to improved search and rescue training.

In Queensland, missing people with dementia rank third as targets for searchers behind bush and recreational walkers and those intending self-harm. As such, they present particular problems to search coordinators due to the physical manifestations of dementia on their behaviour. Traditional training for search coordinators and searchers has significantly improved since 2013 but there was a known gap that searchers did not fully understand what a lost person with dementia could see in their immediate environment and, therefore, what choices they might have. A dementia mask was developed as a simple aide to provide coordinators and searchers with a practical understanding of the vision limitations of people with dementia.

Dementia is defined as the loss of memory, reason, judgement and language to such extent that it interferes with daily living.¹ Dementia includes AIDS and alcohol-related Dementia, Alzheimer's disease, Down syndrome, early- or younger-onset Dementia, Frontotemporal Lobar Degeneration, vascular Dementia and Dementia with Lewy bodies. Dementia can often result in severe disturbances in how a person perceives and interprets events and sights and sounds around them although the symptoms may vary. People with dementia may have difficulty thinking logically and remembering things, they may become confused easily and may wander, particularly to places from their past. They also often exhibit personality changes, including becoming aggressive when they perceive someone interfering with them. From a search and rescue perspective, this occurs most often when locating a lost person with dementia who is determined on getting to a particular place.

A significant amount of training is devoted to the search for lost and missing people, particularly with respect to lost person behaviour. While much of this training is provided by competent, experienced

and enthusiastic trainers, it is often difficult to fully convey the effects of a medical or mental illness to enable students to place themselves in the mind of the lost person.

Dementia and Alzheimer's disease is an example of an illness that has physical impairments associated with it. Having a better understanding of what a lost person with dementia experiences has many benefits when a search is underway. The development of the dementia mask provides a simple way to convey what a person with dementia sees and, often more importantly, what they cannot see.

From a searcher perspective the intricacies of dementia and how it manifests within the brain do not need to be understood; only the physical manifestations that govern what they either can or cannot do. According to Geldmarcher and Whitehouse (1996)² and with respect to search and rescue, the most visible effects of dementia are:

- physical impairments such as limited vision or walking ability
- taking the path of least resistance, although they may initially attempt to head up hill if it is to a place previously known
- having limited forward vision and little peripheral vision
- having limited or reduced stamina
- heading for a location previously known to them
- having limited ability to fend for themselves, making them very vulnerable to the environment
- having a range of behaviours from passive through to very aggressive.

Traditional training methods of instructor-led training combined with practical exercises provide the necessary skills to undertake a search. However, there was a gap in the training

related to better understanding how a lost person with these types of limitations relates to their surroundings. Putting this in perspective, a search for a lost bushwalker can be understood through map interpretation and environmental considerations from a bushwalker viewpoint. A search coordinator can go into the bush and see what a bushwalker actually sees. This is more challenging if that person has dementia.

Problem solving

Apart from reduced brain functions for these people, another challenge was how they perceive their immediate environment. Studies into vision impairment and dementia indicate problems for vision.³ These include:

- narrowing of the field of vision, sometimes down to approximately 30cm wide
- field of vision is generally downwards at an angle of approximately 45° to the horizontal (i.e. they only see things down and to the front)
- limited or no peripheral vision (stopped by a barrier but not being able to turn left or right because it does not exist)
- potential loss of depth perception (shutting down of input from one eye due to overloading of brain with vision stimulation)
- making physical actions that may seem odd (often based on the lack of depth perception, such as feeling for a step that is further away than it seems).

Giving consideration to these limitations of vision, the dementia mask was designed to replicate the vision of a person with dementia. This provided coordinators and students with similar limitations to their peripheral vision and also restricting their forward vision.

The mask was made of 2mm thick black cardboard and the eye slots were progressively moved down to approximately between 35° and 45° from the horizontal. This provided a corresponding reduction in peripheral vision. An elastic band secures the mask to the face.

Testing

The dementia masks were trialled at a Field Search Coordinators Course. Students operated in pairs for support and safety. The vision-impaired coordinator was guided by the unmasked coordinator as they slowly made their way around a canteen area and parade ground at the Queensland Police Academy. The masks proved to be a big success with many of the students involved in the subsequent discussion (aided by several case studies) clearly indicating that the experiment had worked. The short walk around the Academy exposed the students, for a short period, to the experiences of a Dementia-affected person.

Implications

The masks replicated what a person with dementia might see and, although not applicable in all cases, it provided further



The masks are 24cm wide and 18cm long and eye slots halfway down the nose area.

Image: Jim Whitehead

knowledge and experience to the search coordinators to assist them to develop search areas based on the reduced field of vision.

Wearing the mask increased the understanding that, for people with restricted vision, it is not possible to see the entirety of what they are facing; only a portion and, therefore, it is easy to lose orientation and to trip. The mask also limited peripheral vision, which is normally taken for granted. Without the concept of something being to the left or right, it made it difficult to make directional changes. This provided a deeper understanding as to why some lost people with dementia will be stopped by a hedge, fence or wall and make no attempt to bypass it.

Conclusion

Queensland Police has made considerable effort to improving search efforts with respect to all lost people, and in particular, people with dementia. An obvious effect is the finding people quicker and helping them to safety. With this has come a reduction in fatalities, which has dropped from 20% to be now less than 5%.⁴ This is due in part to improved training, with coordinators and searchers having a better understanding of what a person with dementia might experience or how they might act when lost.

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Rising Reflections on the National Volunteering Conference

Isabel Cornes

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Australia's new *National Strategy for Volunteering 2023-2033* was launched in mid-February 2023 at the National Volunteering Conference on Ngannawal Country in Canberra. Under the theme 'The Future is Now', the conference attracted 580 in-person delegates and 300 delegates who attended online to connect, reflect and reimagine the future of volunteering in Australia.

Over 2 days, the conference plenaries and break-out sessions explored a range of current and emerging research and practice topics such as informal volunteering; the importance of inclusion, diversity and intersectionality; the role of leadership and innovations and evolving understandings of volunteering. These important topics are recognised and embedded in the new strategy.

Following a participatory research and co-design process led by Volunteering Australia, the strategy has 3 focus areas and aims:

- **Individual potential and the volunteer experience:** volunteering is safe, inclusive, accessible, meaningful and not exploitative.
- **Community and social impact:** the diversity and impact of volunteering is articulated and celebrated.
- **Conditions for volunteering to thrive:** the right conditions are in place for volunteering to be effective and sustainable.¹

These focus areas and aims are supported by 11 objectives that identify what needs to be achieved to meet the aims and address the challenges facing volunteering.

The new strategy comes at a critical juncture for volunteering in Australia. Approximately 27% of Australia's population formally volunteered in 2022. Volunteers contribute to the delivery of 'arts, sports, events, community building, social welfare, health, education, animal welfare, conservation, and emergency services'.²

Australia relies on services provided by volunteers and volunteering contributes to significant economic, social, cultural, environmental and personal benefits. Many of these benefits are intangible and cannot be quantified. The struggle to put quantitative measures on the benefits of volunteering means that volunteers are often undervalued, taken-for-granted or rendered invisible in research, practice and across society.

Volunteering is a fundamental component of resilient communities.³ Concerningly, the numbers of people participating in formal volunteering have been declining for several decades. The COVID-19 pandemic contributed to this decline, with numbers not returning to pre-pandemic levels. Several reasons have been identified as contributing to this decline, including:

- the financial costs and increasing time demands associated with volunteering
- the increasing regulations and bureaucracy associated with formal volunteering
- the changing social, cultural, and economic conditions that generate and/or perpetuate barriers to volunteering
- an over-reliance on volunteers for the delivery of essential services.

In the context of emergency management volunteers, these factors have also been identified in research related to the challenges of recruitment and retention.⁴ The conference provided insightful discussion on the evolution of emergency volunteering in the context of climate change and the increasing frequency and severity



Left to right: John Richardson (AIDR), Liz Mackinlay CEO (Australian Business Volunteers), Mark Reilly (Disaster Relief Australia), Bradley Creevey (NEMA) at 2023 National Volunteering Conference.

Image: Volunteering Australia

of disasters. Facilitator, John Richardson from the Australian Institute for Disaster Resilience, asked the audience to consider how diverse forms of volunteering beyond the traditional emergency management sector contributes to community resilience before, during and after disasters. Seemingly disparate forms of volunteering, from community sport, environmental conservation, to supporting small businesses develop skills, all contribute to strengthening the resilience of individuals and communities prior to a disaster and supporting recovery after a disaster. We all therefore have a role in times of increasing crises and uncertainty.

The growth of informal volunteering

While formal volunteering numbers have been declining, the rates of informal volunteering have been growing. The strategy notes that 47% of Australia’s population had volunteered informally in 2022.⁵ Though its definition remains elusive, informal volunteering broadly refers to any volunteering done external to formal organisations. Informal volunteering has also been referred to as spontaneous, unaffiliated or emergent volunteering and mutual aid.

Informal volunteers are often first responders in emergencies and disasters and many remain active alongside the formal emergency management response and recovery phases.⁶ During the conference interactive symposium on informal volunteering, the findings of the Motivating Volunteers Effectively (MoVE) project were presented. MoVE is a collaborative project between the universities of Sheffield, Hull and Leeds in the United Kingdom. The research examined how mutual aid groups operated to support their communities during the pandemic. The rise in (or greater awareness of) informal volunteering offers significant benefits and presents new opportunities. It can also create challenges for volunteering-dominant sectors, such as the emergency management sector.⁷ Shared challenges mean

shared opportunities for learning and collaborating to co-design solutions.

The MoVE project identified 5 principles that enabled effective action of mutual aid groups:

- A hyperlocal footprint – working in small, well-defined areas.
- Relationally driven – focused on fostering relationships.
- Informal and flexible – informality allowed for rapid response to community needs.
- Horizontal decision-making - shared leadership and decision-making premised on respect, listening and shared purpose.
- Mutualism – groups were inclusive of anyone, emphasising reciprocity and lasting relationships.⁸

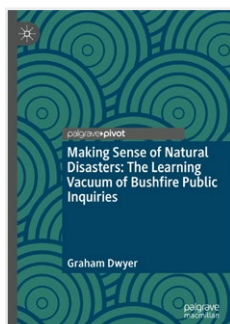
While not all of these principles may be readily applicable in all volunteering settings, it is a valuable exercise to consider and learn from alternative approaches.

The conference provided the opportunity to create connections, consider diverse and alternative viewpoints and reiterated the importance of sharing experiences and learning together regardless of the kinds of volunteering people are involved in. The new strategy sets the foundations by articulating the challenges facing volunteering in Australia and is an opportunity to imagine a better future.

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Making sense of natural disasters: The Learning Vacuum of bushfire Public Inquiries



Author

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Reviewed by

Dr Christine Owen

PUBLISHED BY

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This book analyses the processes and outcomes of public inquiries following 4 major bushfire events in Victoria being the Black Friday fires of 1939, the Ash Wednesday fires of 1983, the Black Saturday fires of 2009 and the summer bushfires of 2019 and 2020. Dwyer's analysis shows that, while public inquiries have yielded significant innovation and learning over the past 80 years, they have also given rise to a learning inertia, insofar as recommendations re-occur and the same issues remain unresolved.

The book poses 2 questions for investigation:

1. How can emergency management organisations facilitate collective learning after public inquiries that have been published and in, particular, does it give rise to lessons for the future?
2. What are the emotions that shape sensemaking in emergency management organisations after the findings from public inquiries have been published and do they influence learning?

The evidence presented for the first question is compelling and, while the answer to the question is not as well articulated, some very important observations are made about the nature of inquiries. The inquiries analysed have all framed the events as equivocal—that is where conditions were 'unprecedented', 'novel' and 'overwhelming'. For Dwyer, the purpose of the inquiry is to make sense retrospectively of what happened and in so doing, to reduce equivocality and provide an account of what happened and why to detect errors (single loop learning after Argyris & Schon 1976¹). Meaning is later achieved through reconciling discrepant cues and interpretations through the social processes of sensemaking. Double loop learning occurs when these narratives lead to changes in organisational practice and values. Double loop learning only occurs for practitioners making sense of recommendations when the full meaning of the implications becomes

clear over time and through multiple iterations of sense making and sense giving.

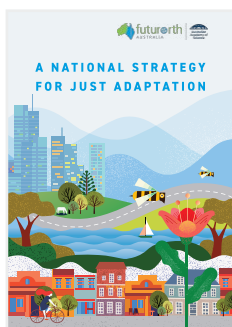
Dwyer's premise is that while public inquiries are framed as an authoritative vehicle for public review they nevertheless are socially constructed phenomena and thus present a partial and incomplete view of what happened. Making sense of recommendations to enact after the inquiry includes an emotional toll on emergency services practitioners as they transition from events framed as novel, overwhelming and unprecedented and for which they are accountable back to their everyday contexts.

In interpreting these cues for learning, practitioners risk a culture of [organisational] entrapment. Emergency services managers become entrapped in certain aspects of organisational change that do little to enable these actors to plan for and respond to future fires. Dwyer quotes Karl Weick and Kathleen Sutcliffe's work where, through social defensiveness, managers become locked into certain lines of action and their subsequent justification. While the book does not provide answers as to how these blind spots to organisational change may be overcome, there is guidance for the future that includes less judicial ways of conducting inquiries to support accounts focused on creating meaning of what happened and less on blaming.

This is a particularly insightful and important book. It will be of interest to those involved in political science, public policy, organisational change and historiography. The final chapter in particular should be compulsory reading for those about to frame and conduct a public inquiry and all emergency services managers taking on leadership positions.

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A National Strategy for Just Adaptation



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PUBLISHED BY

Australian Academy of
Science

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It is a core responsibility of emergency managers to support people, communities and organisations in adapting to the risks and challenges threatened by weather-generated hazards that accompany climate change. In Australia, national strategies for disaster resilience and climate adaptation, provide an existing structure and guide for these activities. *Just Adaptation* examines the flaws and successes of what it calls these conventional approaches to climate change adaptation.

Coming together after the Reimagining Climate Adaptation Summit held in 2021, the researchers of Future Earth Australia at the Australian Academy of Science, brought together an expert working group from diverse backgrounds to re-examine adaptation strategy. In common with many practitioners and researchers, they identified the structural problems in our society that sustain inequality and inequity in peoples' capacities to adapt to climate change and to reduce disaster risk. They have written this guide as a complementary strategy that confronts the problems of social justice issues of adaptation.

In a sense, this is not a conventional book. It strongly resembles the format of the national strategies that it critiques and, as it is written under group authorship, it inevitably tends towards the style of government documents. Although a valuable contribution to the pursuit of social justice, it is quite dense in places as a consequence of the academic language used. The report lacks the passion that may be brought by an individual when writing about the unavoidable hazard risks caused by injustice, inequity and disadvantage.

The authors address the vulnerability of social justice inequity and cite details of the negative outcomes of inequality and disadvantage on communities and groups as they face the unequal task of adapting to climate change and its associated hazards. The report does not give much space to defining exactly what is meant by 'just adaptation' but this problem of poor definition is identified by others.

The working group focuses on practical strategies that they identify as building blocks. These form the structure of the report: 'Practising recognition of all Peoples and their Knowledge, Fostering Inclusion of Communities Experiencing

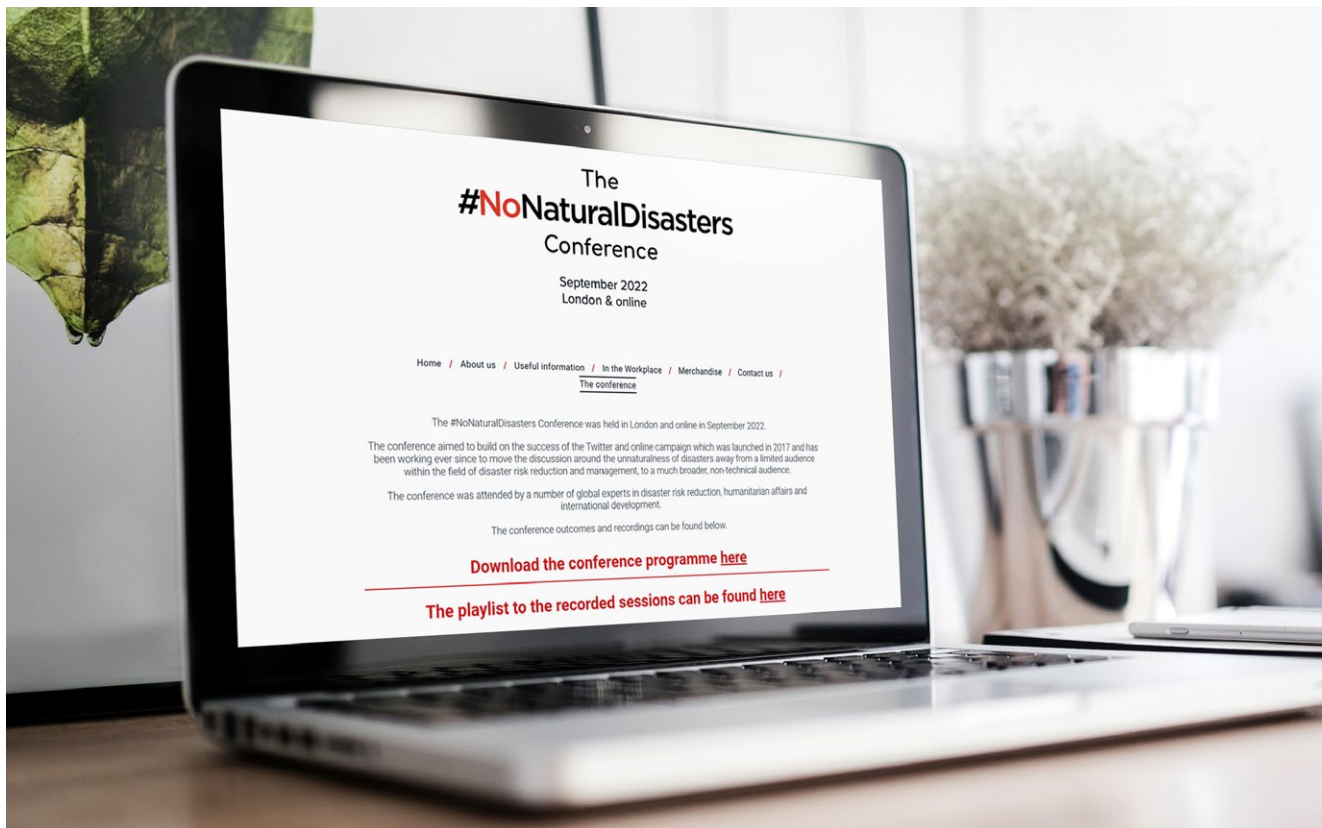
Marginalisation, Addressing Ongoing Injustices, Overcoming Barriers and Acknowledging Limits and Transforming for Just Adaptation'. These in turn generate a further 5 priority reform areas that are incorporated into each of the building blocks. They are empowering Indigenous leadership, embedding a just adaptation framework across governments and sectors, including the voices and experiences of diverse stakeholders across areas of marginalisation into just adaptation processes, supporting communities and community groups to drive transformation, and advancing research agendas that promote just adaptation.

Significantly, it is the structural nature of social injustice and vulnerability that makes the vulnerable characteristics of people and communities things over which they have no control. This led the emergency management sector to focus on a resilience strategy that builds on the strengths and capacities of people. Resilience is not social justice, but it is a more practical strategy for adaptation.

For example, a focus on urban issues identifies the problem of low-cost housing being sited on flood plains, the urban heat-island affect on heatwaves as well as a lack of public housing availability and the poor quality of housing available.

Planners and local governments, despite constraints, have long been committed to social justice and tackle these justice issues. Many professionals have already been working towards social justice in our settlements and in disaster risk reduction. However, this report is well motivated and hopefully might support all who strive for a fairer and just society as we face the reality of adapting to climate change.

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The #NoNaturalDisasters Conference 2022

There is no such thing as a natural disaster.

The term ‘natural disaster’ has become ubiquitous and is used widely in press and media reports, government and aid agency publications and by the public. According to #NoNaturalDisasters, the standard definition of ‘disaster’ is:

...a serious disruption of the functioning of a community or a society at any scale due to hazardous events interacting with conditions of exposure, vulnerability and capacity then we must consider human involvement at the core of the event.¹

So a hazard will only become a disaster when it affects the workings of a society or a community. As such, a disaster can *only happen* where a society or community exists. That society has economic, planning and other socio-economic decisions that will alter their vulnerability to the hazard and change how the

hazard impacts on them. Therefore, to say a disaster is natural is wrong. What’s worse, it misleads people to think the devastating results are inevitable, out of our control and are simply part of a natural process.

The #NoNaturalDisasters Conference was held in London in 2022 and took the discussion around the unnaturalness of disasters to a broader and non-technical audience. Major presentations were recorded. The series is available via the website along with other information and resources.

www.nonaturaldisasters.com

1. #NoNaturalDisasters website, at <https://www.nonaturaldisasters.com/about-us>.

PRESENTED AT THE AUSTRALIAN & NEW ZEALAND DISASTER AND EMERGENCY MANAGEMENT CONFERENCE, 2022

Task Force Flood Assist

Kate Carmody

1300MEDICS

Abstract

In March 2022, northern New South Wales experienced the largest flooding yet recorded. Social media and TV footage showed confronting images of the extent of the loss and suffering of communities. 1300MEDICS, a provider of medical services for public and private events in Australia, responded during the recovery stage. It volunteered a private mobile health response team similar to the public sector mobile health response teams described within disaster plans (NSW HEALTHPLAN, QHMCIPLAN, EMPLAN 2022). This was called Task Force Flood Assist.

Introduction

1300MEDICS provides medical care for hundreds of organisations each year covering mass gathering music festivals, stadiums, professional and extreme sporting events, worksites and filmsets. It employs registered nurses, nurse practitioners, paramedics, doctors and first responders with backgrounds in emergency, critical care and retrieval medicine.

The Task Force Flood Assist mobile medical response to the northern rivers floods was an opportunity to describe and critique the deployment of a highly trained medical service during extraordinary times. The response highlights the benefits of medical expertise, operational readiness, available equipment, communication capability and command-and-governance structure delivered by an organisation with proven expertise in crisis and disasters. This paper provides insight into the author's experience as the medical commander during the response and captures the clinical and logistical challenges the team endured and overcame.

Operation during the flooding

The floods were broadcast as catastrophic, with over 30,000 people across 18 local government

areas given evacuation orders. Many people chose not to leave, perhaps dubious the flood would not be any worse than previous floods in the area (Australian Bureau of Meteorology 2022, ABC News 2022, NSW SES 2022). The severity of the event left communities devastated, causing widespread damage to infrastructure including health facilities, homes, businesses, schools and roads. Communities experienced disruptions to essential utilities, food supplies and health care. Livestock and domestic animals were missing and, tragically, human lives were lost. Families experienced disruption to their routines as they attempted to salvage their homes and belongings or care for their animals. In such circumstances, people sustained lacerations, had bacteria-consumed wounds, missed their regular medications, forfeited routine health checks and may have been exposed to hazardous conditions as well as experienced mental and emotional turmoil.

In collaboration with the NSW Local Health District Health Services Emergency Operations Centre, Task Force Flood Assist (taskforce) became a private mobile medical response team that could bridge the gap between flood victims and essential and vital health care. It was identified that these people were unable to access health care due to physical displacement or immobility, fear of leaving their homes due to the risk of looting, were unable to care for livestock, wanted to stay with their families and communities to aid the clean-up or had minimal to no functional health facilities in the area.

Many of the Northern NSW health care workers were affected by the floods; several had already responded and volunteered in their home towns and were now physically and mentally unable to attend their regular shifts due to ongoing displacement and fatigue. This led to workforce shortages.

I made some phone calls and was able to get in direct contact with the Local Health District Health Services Functional Area Coordinator for Northern NSW and liaise directly with her to gain a full understanding of what, and where, the health need was so that we could use our time efficiently

and strategically. I understood it was important to gain permission and authorisation from the coordinator and the committee so we could enter the disaster-declared regions. It gave the taskforce the legitimacy and credibility [sic] to achieve our objectives.

Medical Commander

The objectives were to reduce the numbers and burden of unnecessary presentations to local hospitals and decrease the risk of ambulance ‘ramping’ or the need to engage state emergency retrieval services. The taskforce’s method was reactive, with advanced life support and resuscitation capabilities for preventative and primary health care. The health specialists within the taskforce understood flood disaster epidemiology and the indirect health effects it can have on a community. This knowledge underpinned health promotion during interactions with casualties and their families. The team was focused on the increased threat of exacerbation of chronic health conditions, diagnosing newly presenting health concerns, and the increased susceptibility of casualties succumbing to flood-related wounds from exposure to hazardous materials.

The team acted to improve the health literacy of residents to prevent a deterioration of any current illness and bridge gaps between patients who were dislocated from their usual general practitioner and primary health care facilities. This is previously reported as an area for improvement in the *Royal Commission into National Natural Disaster Arrangements Report* (Commonwealth of Australia 2020). Part of this included replacing and resupplying important medical equipment and prescription medications. The taskforce health care effort was specialised to each casualty.

Our main area of operation was the town of Coraki in NSW. The whole town was swallowed up by flood water. I'll never forget the frenzied scene crossing the Swan Bay Rd bridge, with raging brown rapids of the Richmond River underneath us. It was getting dark as another thrashing from Mother Nature was impending. There was flashing emergency lights everywhere, convoys of Australia Defence Force bushmasters, Rural Fire Services engines rumbling down the mud-ridden roads, generators whirring, radio chatter, boats roaring beneath us, military-style foot patrols conducting welfare checks, dishevelled and shattered Coraki residents everywhere. It was heartbreaking. Coraki had only just been accessible by road hours earlier after being cut off for days; the locals finding refuge in the evacuation centre, and a makeshift medical space staffed by volunteer locals.

Medical Commander

When water receded in the township of Coraki it left filthy, putrid mud that was ridden with waterborne bacteria and waste. NSW Health released information about the risks of *Leptospira* bacteria as cases were predicted to increase following the flooding. The risk also increased for people who had contact with animals or were exposed to water, mud, soil or vegetation that

had been contaminated with animal urine (NSW Health 2022). The taskforce teams cleaned and dressed dozens of unpleasant wounds and administered tetanus vaccines. We regularly consulted with the on-call doctor who remotely supervised the administration of tetanus vaccinations and the prescription of antibiotics. A lower threshold test was applied due to increased risk from the flood-affected environment and the improbability of timely follow-up from other health services.

We had heard awful recounts from people resorting to drinking floodwater, wading chest-deep without footwear through murky freezing water, banging and slicing up their legs and feet on submerged objects; their bodies now covered in lacerations and wounds. I had also witnessed dead animals strewn everywhere.

Medical Commander

The team applied the 1300MEDICS endorsed protocols and procedures for the administration of medications and medical interventions performed. Many team members had extensive experience working in prehospital environments, some with emergency services experience, former military or critical care experience and all with an understanding of the Major Incident Medical Management and Support (MIMMS) principals.

The taskforce operations followed the ‘7 Key Principles of the All-Hazard Approach’ described in MIMMS. The principles are Command, Safety, Communication, Assessment, Triage, Treatment and Transport (CSCATTT) (MIMMS 2022). Each principle is discussed in more detail below.

Command

The taskforce team had a medical commander on location who oversaw the execution of medical requests while maintaining the team’s objectives. They gained and maintained inter-agency relationships and collaborated regularly about achieving goals. Extreme weather events, in all phases, often required a significant and coordinated multi-agency and community response (COAG 2002).

Safety

A risk assessment was conducted for each task that was received. The team applied the 1-2-3 Code of Safety; Self (personal safety), Scene (environmental safety), Survivors (decontamination and management of exposure to hazards) (MIMMS 2022). Personal safety was prioritised. Team members wore the 1300MEDICS operational uniform and name tags for identification as well as branded high-vis yellow vests. Teams supplied their own protective equipment, food, water and transport (often 4WDs). Life jackets were mandatory if boarding boats. Teams always worked in pairs and carried a radio. The taskforce was intended to be robust, self-sufficient and provide all medical equipment and consumables. The scene was continually scanned to ensure safety. This included situational awareness of moving flood waters, road closures, driving conditions and updating the commander of their location. Permission to enter private property was negotiated with occupants to ensure they

understood and welcomed the assistance offered and did not feel further threatened or disempowered. Teams were conscious of roaming and injured animals becoming frightened and volatile. Reports of crime, such as domestic violence and looting, prompted the teams to be cognisant of their safety. Rendezvous points were established daily and means of egress discussed.

Communication

The teams were provided with communication radios and radio checks were conducted throughout the day. Taskforce radio channels were supplied to other agencies working in the local areas. Teams kept in contact via text or WhatsApp services. In the event of an emergency, the teams called triple zero and provided a situation report to the medical commander at the earliest time.

Assessment

Northern NSW was a declared disaster area throughout March 2022 and the environment was unpredictable and constantly changing. There was a high level of stress and emotion among community members and their families, volunteers and response agency personnel. Requests for medical support were received and triaged by the taskforce medical commander and allocated according to clinical needs, safety considerations, the multi-agency command post requests and priorities, time constraints and available resources (e.g. flood boats and helicopters).

Triage

Mass Casualty Incident triage, or Australian Triage Scale (ACEM 2022) was not exclusively applied during the recovery phase; rather, an assessment was conducted to determine if casualties were safe to stay in-place to receive their treatment and follow-up. The goal was to keep flood-affected people in place for as long as they were safe and thus reduce the impact on local hospitals. The mental and psychological health of people and their safety were measured and the mental health triage scale was considered (Queensland Health 2022). The taskforce arranged reviews of wounds and low-acuity illnesses. The medical conditions of all unwell or unsafe patients were discussed with the medical commander or the 1300MEDICS general practitioner to discuss transfers to a health facility for ongoing care.

Treatment

The skills and expertise offered by the teams were extensive. The expectation was that a large number of patients would require primary health care and low-acuity medical treatment. The Royal Commission into Natural Disasters (Commonwealth of Australia 2020) reported that the main point of contact that people in Australia have with the health system is through primary health providers and networks. The taskforce was adaptable and resourceful in finding solutions that were consistent with best medical practices and evidence-based care.

Transport

Due to ongoing flooding and difficulty accessing patients, transport for team members to treat patients was via boats,

helicopter, 1300MEDICS ambulance 4WDs or by foot. The situation regarding patients who required transport to a health facility was discussed with the medical commander in relation to the suitability of transport methods and if emergency services agencies were required, versus transport by private means.

I received an email from the Northern NSW 'Local Health District Health Service Emergency Operation Centre' advising us the Department of Communities and Justice was closing the Coraki evacuation centre and our ongoing presence was requested. The following morning our arrival into Coraki was welcomed with relief by agencies and locals, and we were soon requested to board SES and volunteer boats to venture up the Richmond River to stricken and marooned farmers whose properties were still cut off from road access. I split our mobile medical team among the boats to cover a larger footprint and reach everyone we could in that time. The river was eerily quiet. It was filthy brown with debris everywhere, deceased animals. Occasionally a helicopter would fly over with an empty rope dangling; a sign of the continuing hay bale drops to stranded animals.

Medical Commander

Challenges

Clinically, some of the challenges faced were the storage and administration of tetanus vaccinations. Transport, according to the Australian Immunisation Handbook (Department of Health 2022), recommends storage of tetanus at +2°C to +8°C. Solutions were to ensure that refrigeration was available and that a registered nurse was attached to each team to administer vaccines. The taskforce also collaborated with NSW Health to ensure the resupply of vaccines was available.

Effective communication is usually a challenge during the response phase, whether it is from loss of telecommunication services, ever-changing conditions and objectives or changes in local government agencies and their command location and staff (MIMMS 2022, Pourhosseini, Ardalan & Mehrolhassani 2015). The recovery phase of floods lasted many weeks and, by then, many staff from government agencies who had been working during the response phase were exhausted and mandatory fatigue management practices were applied. Logistically, communication was problematic for the taskforce due to the constant changing of response agency commanders and their location. This proved difficult in maintaining momentum and precious time was spent identifying the lead response agency and its commander each morning.

We were proactive in continuously seeking out medical jobs and tasks, either by way of formal chains with agencies on the ground like the Australian Defence Force, SES, RFS or via volunteers manning community hubs. We scrolled social media platforms and local groups. We even door knocked and roved in flood-stricken areas. There were times teams would send a tactical mobile medical group

that would attach to SES response boats or helicopters, or convoy with Australia Defence Force bushmasters and the police to conduct welfare checks. I would screen and vet all jobs for appropriateness and safety before tasking mobile medical teams to assist. Logistically, it was challenging with unpredictable terrain to access patients. Some families were surrounded by floodwater for days and weeks, marooned on their properties and often the safest entry was via helicopter or by boat.

Medical Commander

An after-activity report showed that the taskforce was able to treat and manage over 130 patients during its 10-day deployment. Treatments included wound care, administering tetanus vaccines, filling prescription medications, supplying medical devices, conducting welfare checks and undertaking patient wound reviews. Patients with extra needs were identified and referred to appropriate community services organisations, such as aged care, for ongoing support.

The challenges faced were clinical and logistical in nature and have been discussed and continue to be examined for improvements. The overall success of the taskforce was a combination of its preparedness and its clinicians' abilities to respond to a crisis at short notice, to be operationally ready and self-sufficient as a strategic operational deployment force with established objectives. The taskforce provided skilled health clinicians who followed credible and evidence-based clinical governance structure and who could adapt to the dynamic situation. The taskforce could also supply its own medical equipment, consumables and medications and had its own means of communicating.

Acknowledgment

The author thanks the government agencies that the taskforce had the privilege of working alongside; Northern NSW Health District, Aboriginal Medical Services, NSW SES, Coraki Rural Fire Brigade, NSW Police, Australian Defence Force as well as the many local flood-affected residents for their courage and determination.

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About the author

Kate Carmody was the creator and medical commander of 1300MEDICS Task Force Flood Assist 2022. Kate works as a Clinical Nurse and operations supervisor for 1300MEDICS. She specialises in critical and prehospital health care and disaster medical response at the Gold Coast University Hospital in the Emergency Department. Kate sits on the board of 1300MEDICS Clinical Advisory Group, which oversees and advises on the standards and procedures regarding clinical governance within the company.

Understanding lost person behaviour in the Australian wilderness for search and rescue

Peer reviewed

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Introduction

Hiking in the wilderness is a popular activity, with bushwalking being the sixth most participated in physical activity by adults (Sport Australia 2021). This activity comes with both benefits and risks. The benefits of bushwalking include positive effects on the physical and mental health of participants through physical activity and spending time in nature (Pretty *et al.* 2005, Prochniak 2014). The risks include illness, injury and becoming lost.

In Australia, when a person cannot be located in the wilderness, dedicated search and rescue (SAR) teams are mobilised with the goal of rescuing the lost person. Detailed national figures for SAR in Australia are not available; however, in 2019, in Queensland, SAR authorities assisted 1,648 people using 8,733 police person-hours and over 34,000 volunteer hours (Australian National Search and Rescue Council 2019). Part of planning for searches involves creating search areas, which are determined based on many different factors including the distance a person likely travelled, the terrain, deduction through learnt facts and clues, as well as the use of statistical information (Australian National Search and Rescue Council 2022).

Currently, SAR agencies often use summary statistics based on methods developed by Koester (2008) using the International Search and Rescue Incident Database. In Australia, data from lost person incidents are collected via the Survivor Questionnaire and collated in the Australian Lost Person Database (Australian National Search and Rescue Council 2022). This database contains only Australian lost person incident data to account for the unique demographics found in Australia. The database is a collection of historical SAR incident data that records the demographics of lost people as well as the distance they were found from their last known position. These data are aggregated into general categories of lost people and used to create buffer rings of 25%, 50% and 75% probability of the lost person's possible location from their last known position based on the historical data (Figure 1). This method is used to decrease the size of the search area through the improved geographic

Abstract

Search and rescue personnel and volunteers spend thousands of hours attempting to rescue and ultimately save the lives of lost people. One of the most effective ways to increase the speed of locating a lost person is by predicting the highest probable areas they may be located in and determining search areas around them. This study examined the demographics and behaviour of people lost in the Australian wilderness from the perspective of search and rescue authorities and lost people themselves in order to assess similarities between types of lost people. The aggregated behaviour characteristics can then be used to improve search and rescue outcomes by predicting lost person behaviour specific to the Australian wilderness. This study found that different demographic groupings can be expected to behave differently when lost in the wilderness. By using the probable characteristics and behaviours of a lost person, search areas can be better targeted, assisting in locating a lost person faster and improving the outcomes of the search. The results from this study provide insights into behavioural trends and characteristics that can assist in the planning of search areas for search and rescue incidents in the Australian wilderness.

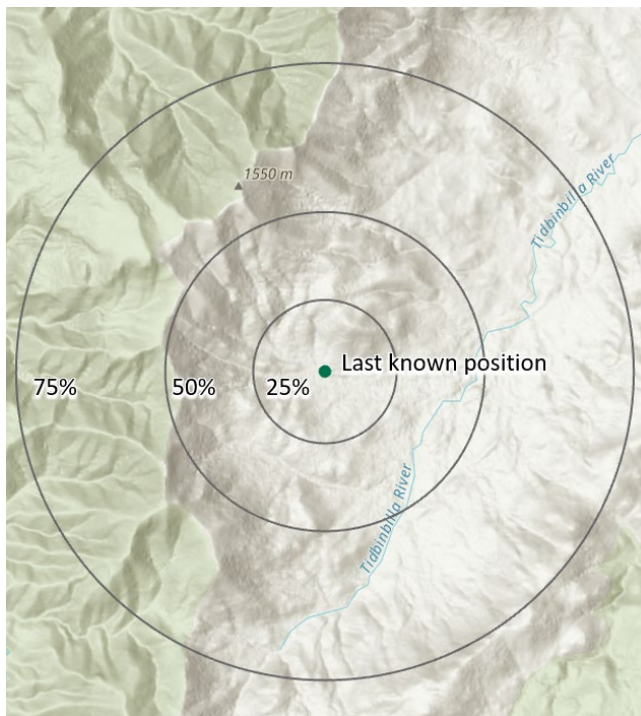


Figure 1: Search area based on the Ring Model used for a missing hiker (Koester 2008, p.184)

assignment of the probable area of location to reduce the time taken to locate a lost person (Doherty *et al.* 2014).

While historical SAR incident data can be collected and analysed to find patterns and similarities, every lost person is unique with a different set of circumstances and varying behaviour (Koester 2008). This study aimed to understand aspects of lost person behaviour in Australia from the perspective of lost people themselves and the authorities tasked to locate them in an attempt to group behavioural characteristics to assist in refining search areas. By highlighting similarities and differences in behaviour between groups of people, we are able to improve predictions to assist in strategic decision-making when it comes to search area determination.

Methods

Multiple data sources were used to gain insight into the behaviour of people lost in the Australian wilderness. An online survey targeted people over 18 years old who had been lost in the wilderness in Australia. The survey questions were developed to obtain demographic information, details on where and how long they were lost and what their goals and motivations were upon realising they were lost. The questions asked were modelled on similar questions in data collection for the Missing Person Behaviour: An Australian Study (Twardy, Koester & Gatt 2006 [hereafter referred to as the Australian Missing Person Behaviour Study]) to establish comparable data. Some survey responses were aggregated for analysis to allow for large enough sample sizes for appropriate statistical tests.



Line search at Wellbourne Hill Station, South Australia.

Image: Photograph owner permission provided.

One of the questions in the online survey was whether participants would be interested in a follow-up interview. Four interviews were conducted between October and December 2020 with people who had been lost in the Australian wilderness. The narrative interviews consisted of the participants explaining their experiences of being lost in detail and then questions were asked to gain additional insight. Interviews were also conducted with 6 members of a SAR authority in December 2020 and January 2021. The interviews provided valuable qualitative insights into lost person behaviour from a search and rescue perspective.

Lost person incident data collected for the Australian Missing Person Behaviour Study were accessed. This dataset contains anonymised land SAR incident data collected by police and SAR officials between 1999 and 2005. From these data, 557 incidents were examined across Australian states and territories and 189 were retained for analysis. The incidents were filtered for people found alive in a wilderness setting and who were not actively attempting to evade police. Incidents of mental illness or dementia were excluded. The data from the *2018 Annual Visits to National Parks and Wildlife Service (NPWS) Managed Parks in New South Wales Final Report* (Roy Morgan 2019) [hereafter referred to as the NSW National Parks Visits Report] were used to obtain a base number of visitors to national parks. As there is a lack of national data, data from the NSW National Parks Visits Report were used to obtain a base number of visitors to national parks. NSW is the most populous state and its national parks make up 7% of its total area (Department of Agriculture, Water and the Environment 2020). Therefore, it is reasonable to determine that, while not representative of all environments

within Australia, the NSW demographics and behaviours would be representative of a large portion of Australia’s population.

The data from the online survey were analysed for statistical significance using Odds Ratio and Pearson’s Chi-squared test with simulated *p*-value (based on 2,000 replicates) in RStudio (RStudio Team 2021). The *p*-value was simulated in the Chi-squared test due to the low numbers from the survey. Data from the NSW National Parks Visits Report were compared with data from the Australian Missing Person Behaviour Study and tested for statistical significance using a 2-sample or 3-sample test for equality of proportions with continuity correction in RStudio (RStudio Team 2021). Interviews with members of the SAR authority were transcribed verbatim and coded thematically using NVivo 12 software (QSR International Pty Ltd 2018).

Ethics approval was granted by the Charles Sturt University Human Research Ethics Committee, protocol number H20131.

The online survey achieved 87 responses. Of these, 6 respondents had a SAR authority called to find them and 4 of the 6 had SAR officials locate them. The majority of the responses from the online survey represent people who experienced being lost but were able to re-orient themselves. Conversely, all incidents recorded in the Australian Missing Person Behaviour Study resulted in a rescue event being undertaken. Therefore, the incidents recorded in the Australian Missing Person Behaviour Study are representative of people who have experienced being lost and were subsequently rescued.

Results

Demographics

Of the online survey responses, 55% were female and 45% were male. However, this cannot be interpreted as females being more likely to be lost than males due to expected bias in female participation in online surveys (Sax *et al.* 2008). Comparing this response data to the number of people who visit NSW national parks, 46% of parks visitors were female and 54% were male (Figure 2). The Australian Missing Person Behaviour Study data indicates that 20% of the people rescued by emergency services personnel were female or in an all-female group. In comparison,

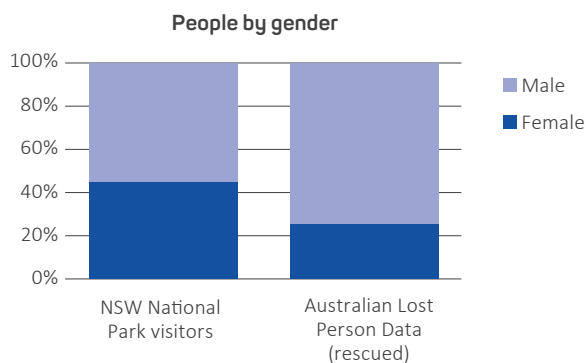


Figure 2: Percentage of NSW national parks visitors (left) and Australian lost person data by gender (right).

64% of rescues were conducted for males or all-male groups. The remaining 16% were rescues for mixed groups. Almost 45% of all rescues in the dataset were conducted for solo males. Compared to the number of people who visit NSW national parks, males are more likely to require rescue than females (2-sample test for equality of proportions with continuity correction, $X^2 = 19.420$, $df = 1$, p -value = <0.001).

The age groups of people who visited national parks and those who were lost and needed rescuing were also statistically significant. Sixty-six per cent of visitors to NSW national parks were over 35 years of age. Of the people who experienced being lost, 43% were over 35 years old and of those who needed to be rescued by SAR officials, 46% were over 35 years of age (Figure 3). When comparing this data using a 2-sample test for equality of proportions with continuity correction, males in the 18–24 age group ($X^2 = 5.738$, $df = 1$, p -value = 0.017) and males in the 35 plus age group ($X^2 = 14.691$, $df = 1$, p -value = <0.001) are more likely to need rescuing than females in these age groups. Additionally, using an odds ratio test on data from the online survey, respondents over 55 years old were less likely to get lost for periods longer than one hour than those under 24 years old (OR = 0.110, p -value = 0.065).

Experience and physical condition

From the online survey data, males tended to report higher levels of experience and physical condition across all age groups

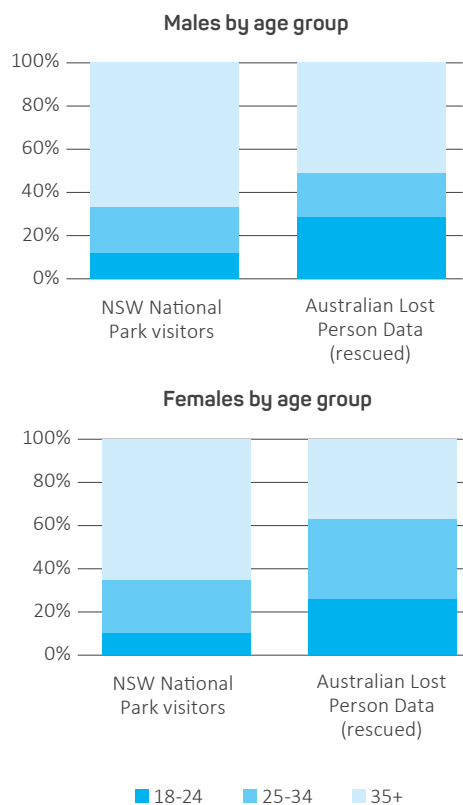


Figure 3: Percentage of male (top) and female (bottom) NSW national parks visitors compared to Australian lost person data by age group.

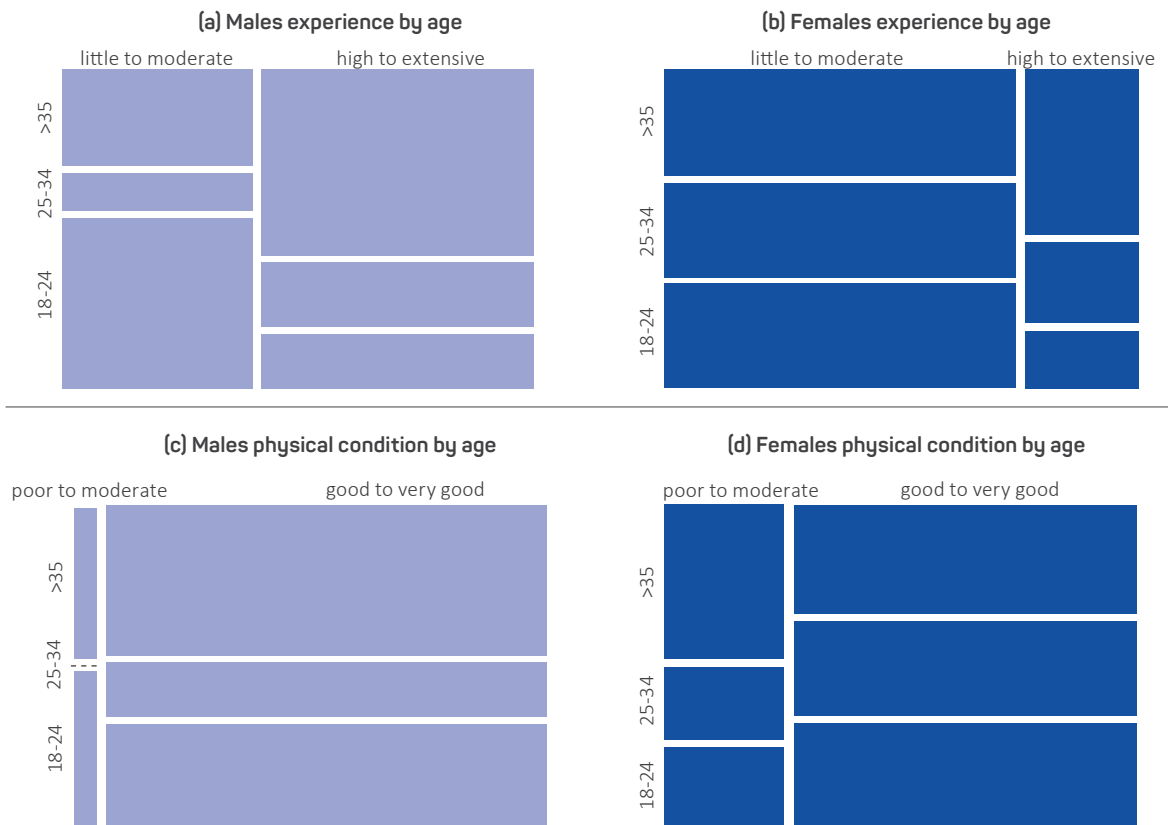


Figure 4: Survey respondent counts of (a) males’ level of experience by age, (b) females’ level of experience by age, (c) males’ physical condition by age and (d) females’ physical condition by age.

compared to females (Figure 4) and the older age groups reported higher experience levels for both genders (Figure 4 (a) and (b)).

Self-reported experience level was collected on a 5-point scale, but only 6 males report ‘little’ or ‘very little’ experience. All these males were aged under 25. The level of experience by age group was not statistically significant for females, but the high proportion of older males reporting moderate to extensive experience, compared to younger males, was statistically significant (Pearson’s Chi-squared test with simulated p-value [based on 2,000 replicates] $X^2 = 14.992$, p -value = 0.003).

No respondents reported being in very poor physical condition, and only 2 females (and no males) reported poor physical condition. While the majority of respondents across both genders reported being in ‘good’ or ‘very good’ condition, there was no statistically significant pattern in physical condition by age (Figure 4 (c) and (d)).

Self-reported experience and fitness level is also perceived to be related to the likelihood of becoming lost. For example, a respondent who self-identified as being experienced reported:

Because someone like me will make – if I’m really lost – I’m probably not likely to be super lost, I’m likely to have had an accident because I’ve had so many years experience. But – so I’m only likely to get lost if I’m injured or sick, bitten by a snake - touch wood – or gone over

on my ankle or something like that, in which case I’m probably not far from where I said I was.

(Over 35-year-old female interviewee, lost in 2004)

Actions when lost

The majority of all respondents (58%) reported that their goal when they realised they were lost was to get back to a familiar track. When realising they were lost, the feeling of fear was reported in a higher percentage of females (46%) than males (23%) ($X^2 = 5.207$, p -value = 0.029). When asked if they stayed on tracks when they realised they were lost, 66% of respondents reported travelling off-track (Figure 5). The gender of the people who had been lost and travelled off-track was statistically significant: males who got lost were more likely to travel off formed tracks when they realised they were lost than females (Pearson’s Chi-squared test with simulated p -value [based on 2,000 replicates] $X^2 = 9.954$, p -value = 0.038).

The physical condition of the lost person was also statistically significant when it came to travelling on formed tracks when lost. People in poor or moderate physical condition were more likely to travel on formed tracks compared to those reporting good or excellent condition ($X^2 = 9.667$, $df = 1$, p -value = 0.002). For example, a respondent who self-identified as being experienced and in good condition reported travelling off-track:

By the time I got into the point where I’m going, ‘This is stupid, I need to turn back.’ What I’d done, I’d zigzagged

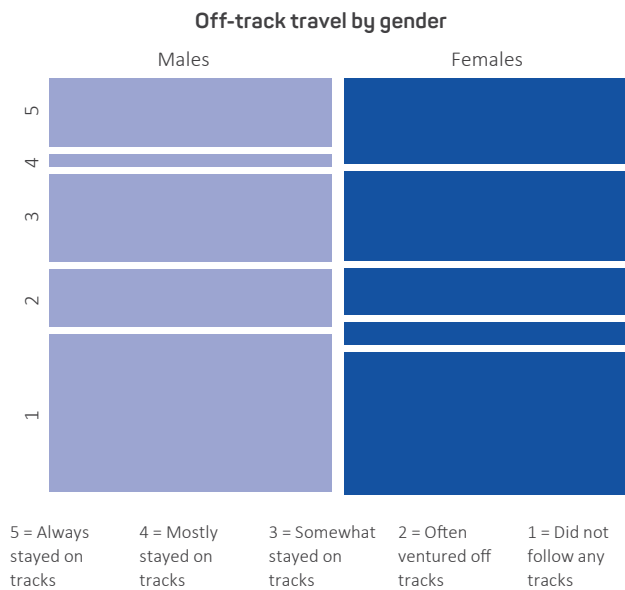


Figure 5: Off-track travel of lost people by gender among survey participants.

so much to try and find the path of least resistance; there was no way known I was going to find my way back because there wasn't a straight line to head back to.

(Over 35-year-old male interviewee, lost in 2020)

Having an operating mobile phone (i.e. within coverage and working) was statistically significant when it came to the time a person was lost. Analysis of survey responses reporting incidents that occurred after 1993 excluded respondents who explicitly stated they did not have a mobile phone with them (13 out of 75). Of the remaining 83% who had a mobile phone with them when they were lost, 74% had no phone reception.

Discussion

The aim of this research was to determine if demographics influenced the behaviour of a lost person. The survey data, when compared with Australian participation estimates, indicate that people most likely to get lost while hiking in Australia are young and male. This finding is not unexpected as there is significant research into the risk-taking behaviours of male adolescents (Lack *et al.* 2012, Ghiglieri & Myers 2016, Heggie & Heggie 2012). The results also demonstrate that while older people were more likely to visit national parks, they were less likely to get lost. This result was particularly evident for males. While stereotypes exist for gender and navigation, there is evidence of differences in spatial strategies for navigation by gender (Rosenthal *et al.* 2012). Munion *et al.* (2019) studied the advantage of male spatial navigation over females, finding that males and females produce different wayfinding behaviours, including directional persistence and pausing and revisiting, which provided consistency in the relationship between gender and success in navigation. There is also a relationship between age and spatial navigation strategies, with older people tending to use an egocentric strategy

(a body-centred frame of reference) and younger people using an allocentric strategy such as using external cues and landmarks (Rodgers, Sindone & Moffat 2012).

The results of this study found several commonalities that provide insights into lost person behaviour that could be used to inform search-area planning. The study revealed that experience does not prevent a person from getting lost. This result may be explained by people with high levels of wilderness experience spending more time in the wilderness, hence having a greater probability of getting lost. However, more than half of the males who completed the survey who were lost when aged 18–24 reported little or very little experience. Emerging adulthood is a time of self-discovery and exploration, which, for many adolescent males, means trying new activities, expanding their social circle and taking risks (Giaccardi *et al.* 2017).

The physical condition of the lost person was not related to getting lost. The majority of respondents reported themselves as having moderate or better physical condition when they were lost. It was also notable that respondents who reported that they were in lower physical condition were more likely to stay on track when they realised they were lost. According to the National Search and Rescue Manual (Australian National Search and Rescue Council 2022), 48% of lost people are found on a track indicating that remaining on a track improves the likelihood of being found. Additionally, working mobile phones can decrease the time a person is lost. While most people who were lost had a mobile phone with them, the majority did not have phone reception. Problems can occur with Global Navigation Satellite System-based tracking devices where communication coverage is lacking due to the remoteness of an area, such as the inability to send positioning data within a mobile phone network and increased power consumption of the device (Rajamäki & Knuuttila 2013).

While lost person behaviour remains unpredictable to a certain extent, this study found some significant results. Specific demographic groups have different behaviours; for example, an experienced male hiker is more likely to attempt self-rescue and move away from formed paths, while an older female is more likely to be found closer to the last known position and on a path. These insights can be translated into smaller search areas focused closer to tracks for female hikers, hikers with less experience, lower physical condition and older hikers. Males, hikers with more experience, better physical condition and younger hikers would require larger search areas, with less influence of tracks. Age, gender, physical condition and experience would be useful demographic characteristics for developing search areas. For all hikers, lack of mobile phone coverage had an impact on the length of time lost.

Further data collection on different demographics in different settings would provide more information about likely behaviours for specific groups of lost people. The insights about lost person behaviour can be combined with spatial information, including terrain, vegetation, and paths, and used in predictive modelling to create time-sensitive search area probability maps to improve the efficiency of SAR operations. An agent-based model has been



Searching at Wellbourne Hill Station, South Australia.

Image: Photograph owner permission provided.

developed using the insights found in this study (Dacey, Whitsed & Gonzalez 2022).

Limitations of the study

This study had limitations, such as the small survey response numbers resulting in some potentially meaningful correlations not being statistically significant. Comparisons and analyses between geographically and temporally inconsistent data were also necessary due to the lack of aligned datasets. Therefore, behaviour influenced by temporal factors such as advances in technology (in particular, availability of mobile phones and online maps) will be inconsistent over time. However, at the broad demographic scale, comparisons between datasets can be valid. Additionally, the online survey required self-reporting of physical condition and experience, which can be subject to bias. Experience can also be relative to age, with older people tending to have more knowledge and, often, more time spent in the wilderness.

Conclusion

The behaviour of lost people is varied and can be confounded by different aspects, such as age, gender, physical condition, emotion and a working mobile phone. From the available data and the online survey, there were some statistically significant findings that may be used to refine search area determination. While almost half of lost people surveyed were found on paths, the data suggest that more than half chose to travel off-track

when they realised they were lost. The age, gender and physical condition of a lost person may assist in determining their likelihood of being on or off-track.

This study determined that the similarities in hiker characteristics can be used to decrease the time taken to find a lost person by narrowing down the probable area where the person may be located. Refining search areas can reduce the time that a lost person remains unlocated. Shortening this time is one of the most effective ways to improve search outcomes for both lost people and those searching for them.

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Abstract

The *Sendai Framework for Disaster Risk Reduction 2015-2030* (UNDRR 2015) advocates for incorporating Indigenous knowledges and practices to complement scientific knowledge for effective and inclusive emergency and disaster management. Such traditional and local knowledge is an important contribution to developing strategies, policies and plans tailored to local contexts. A comparative analysis of local disaster management plans in Australia was undertaken as part of a larger project on emergency and disaster management in Indigenous communities and was performed to benchmark against the Sendai Framework priorities. A comprehensive search of publicly available local disaster management plans and subplans in selected local government areas was undertaken. Eighty-two plans were identified as well as 9 subplans from a list of Indigenous communities and associated local government areas. This study found a wide disparity in the organisation, presentation and implementation of knowledges and practices of local communities. While some plans included evidence of engagement and consultation with members of local communities, overall, there was little evidence of knowledges or traditional practices being identified and implemented. This analysis was conducted during the COVID-19 pandemic (2020–21) and most councils had local pandemic management subplans. However, many were not publicly available and targeted approaches for Indigenous communities were not evident on council websites. To reflect the priorities of the Sendai Framework, better consultation with local communities and leaders at all levels of government needs to occur and subplans need to be easily available for review by policy analysts and academics.

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Incorporating First Nations knowledges into disaster management plans: an analysis

Peer reviewed

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Introduction

Historically, First Nations¹ peoples' knowledge regarding preparing for, coping with and recovering from disaster events has been overlooked (PAHO & WHO 2014, UNDRR 2015). However, international charters such as the *Sendai Framework Priorities for Action* (UNDRR 2015) call for the inclusion of Indigenous peoples' knowledge to complement scientific knowledge in disaster risk management (PAHO & WHO 2014, UNDRR 2015). Specifically, within the Sendai Framework (UNDRR 2015), the inclusion of Indigenous knowledge is highlighted in the Preamble (p.10), Priority 1 (p.15), Priority 2 (p.18) and Priority 4 (p.23).

This paper provides a comparative analysis of local disaster management plans benchmarked against the Sendai Framework directive to incorporate First Nations knowledges in risk management planning. A content analysis methodology incorporating critical theory as a means of revealing equity issues was conducted. To provide context, information on disaster management planning arrangements in Australia and the importance of incorporating Aboriginal and Torres Strait Islander peoples' perspectives were reviewed. As a result, this study calls for action to consult with local communities and Indigenous leaders to ensure relevant local knowledge is embedded in risk planning in Australia.

Background to the research

The Sendai Framework was adopted by Australia and other members of the United Nations to acknowledge the importance of managing disasters and disaster risk. Australia's *National Disaster Risk Reduction Framework 2018* (National Resilience Taskforce 2018) outlines Australia's commitment to the framework and details policy that reduces disaster risk (Portillo-Castro 2019). Stepping down from the national level, states and territories in Australia have developed local disaster management plans through collaboration with various emergency and disaster management bodies. These plans are informed by risk assessments relevant at the local, district and state or territory levels.

1. The terms 'First Nations', 'Aboriginal and Torres Strait Island peoples and 'Indigenous' are used interchangeably in this paper. The terms include Aboriginal and Torres Strait Islander peoples and we acknowledge their rich traditions and heterogenous cultures.

Figure 1 provides an overview of the national, state and local disaster response, management and recovery arrangements at the time of this study. While there are some differences in the procedures and/or governance arrangements, essentially, the state and local structures are based on the national policy outlines.

At the local level, disaster management plans provide the framework to plan and coordinate capability and operations with the intent to safeguard people, property and the environment. These plans provide information for communities to manage hazard risks, respond to events and be resilient. Subplans, situated within local and/or district management plans, address specific susceptibilities of the region as identified during the risk assessment phase. These detail processes and practices and the activities to be undertaken by disaster management groups or agencies (QFES 2018). It is within the national, state, district and local disaster management plans that the Sendai Framework (UNDRR 2015, p. 15) recommends inclusion of Indigenous knowledges to complement scientific knowledge in disaster prevention, preparation, response and recovery.

Disaster management and First Nations peoples

There has been research in Australia about incorporating localised knowledge into disaster management plans. However, a paucity of information remains concerning implementing practical actions to engage First Nations people (McKemey *et al.* 2022, Williamson & Weir 2021) in the prevention, preparation, response and recovery

approaches to risk management (Sangha, Edwards & Russell-Smith 2019).

To initiate inclusion, international benchmarks suggest focusing on:

- integrating Indigenous perspectives into national policies to provide a strategic framework for action, self-determination and protecting cultural knowledge
- incorporating traditional Indigenous knowledges into national, state and local disaster management strategies and policies, especially as risk reduction tools
- including local communities in the design and implementation of early warning systems to ensure linguistic and cultural relevance
- conducting training programs for youth on technologies that are part of early warning and GIS² mapping applications, which could include training developed by Elders on how to adapt traditional knowledge to the contemporary context
- highlighting the effects of climate change (PAHO & WHO 2014, UNDRR 2015).

Methodology

This study was part of a larger project to understand hazard risk in rural and remote communities with a high proportion of First Nations peoples and to identify challenges and gaps that occurred during the COVID-19 pandemic. The research design used

2. A Geographic Information System (GIS) connects all types of data to a map. See: www.esri.com/en-us/what-is-gis/overview.

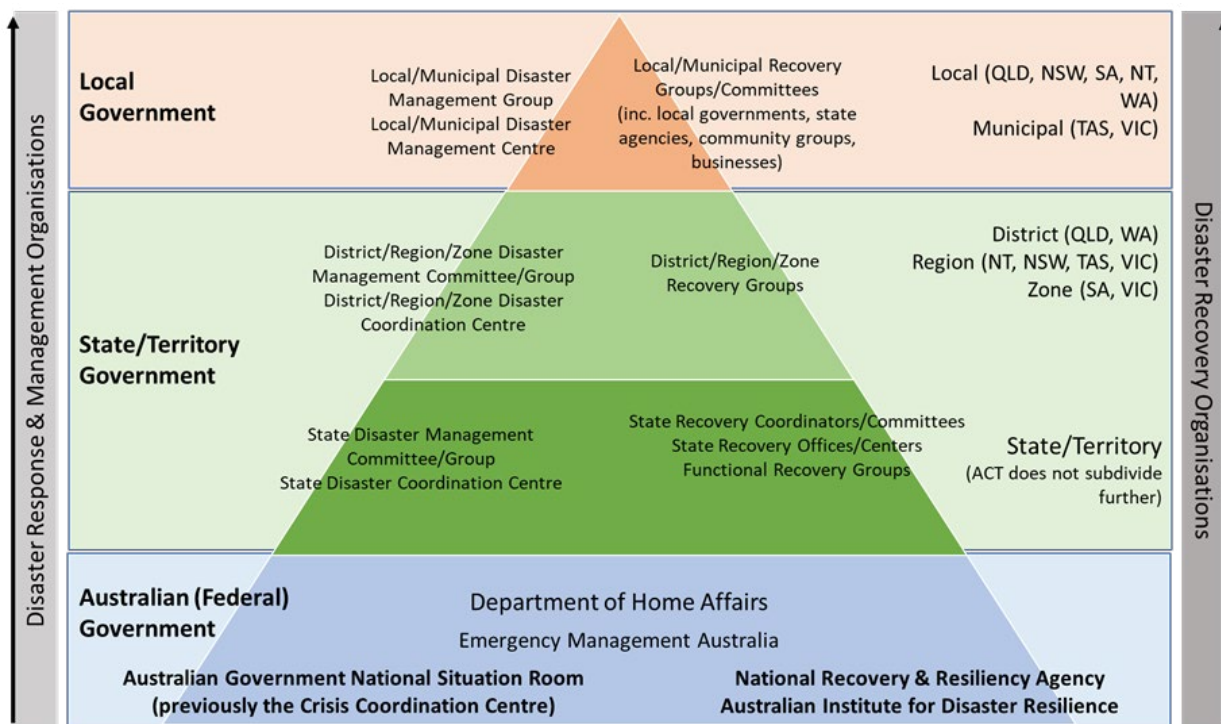


Figure 1: Australia’s national, state and local disaster management and recovery arrangements.

(Source: Adapted from Australian Capital Territory Parliamentary Counsel 2014, Department of Home Affairs 2022, Government of South Australia 2021, New South Wales Government 2018, Northern Territory Emergency Service 2021, Queensland Fire and Emergency Services 2018, Tasmanian Government State Emergency Service 2019, Victoria State Government 2021, Western Australia Government 2021).

content analysis techniques to unitise, sample, code and reduce the data (Krippendorff 2019, p.88). The data were examined through a critical theoretical lens (Bohman, Flynn & Celikates 2005; Braaten 1991) to uncover and critique the structures and agency for Indigenous community inclusion and engagement in the development and implementation of these. Using a critical theoretical approach allowed for the exploration of the practical and emancipatory qualities of knowledge embedded in the plan to analyse the ‘inter-subjective and in-depth perception of the social world’ (Kendall 1992, p.6). This allowed for the examination of the content for relationships between Indigenous knowledge practices and the public policy texts (Braaten 1991, Kendall 1992).

The study compared a sample of plans and subplans against the Sendai Framework recommendations. Australian local government councils and/or shires that have significant proportions of Aboriginal or Torres Strait Islander peoples were identified based on a 3-stage process:

- all shires or councils with high percentage populations of Aboriginal or Torres Strait Islander peoples in Queensland were included
- a list of Indigenous communities and their respective local government areas from the states and territories was compiled from the National Indigenous Australians Agency website
- Australian Bureau of Statistics data (2022) was used to identify local government areas with significant populations of Aboriginal or Torres Strait Islander peoples.

A final list of 88 local government areas became the research sample. Of those 88, 9 had no publicly available local disaster management plan. In Queensland, the Torres Strait Regional Council and the Torres Shire Council use one common plan. Thus, 78 publicly available local disaster management plans were used for the comparative analysis (see Table 1). A further 4 community Local Emergency Management Arrangement documents from the Northern Territory were included as they directly related to the Territory’s Indigenous communities and were not captured in the local disaster management plans. In addition, 9 pandemic-specific subplans were identified and analysed. Hence, a total of

91 documents were collated as the sample for the critical content analysis.

Content analysis was used to determine the presence of certain words, themes or concepts within the data (Krippendorff, 2019). The analysis identified and analysed the presence, meanings and relationships of words, themes and concepts. The content analysis coding and reduction processes examined the plans and subplans for a range of comparison terms and themes as shown in Table 2.

Results and discussion

The comparative analysis focused on 2 areas:

- Indigenous knowledges: to identify whether the plan incorporated Indigenous knowledges and/or practices.
- Local government pandemic management plans: to identify whether local disaster management arrangements have pandemic management plans including specific considerations for Indigenous communities.

Inclusion of Indigenous knowledges

The critical content analysis revealed no evidence of Indigenous knowledges or practices being incorporated into the plans, in contrast to Sendai Framework recommendations. There was no evidence of mapping or listing of Indigenous practices or traditions nor any arrangements to identify Indigenous ways of managing or recovering from a disaster. As noted by Lambert (2015) and Lambert & Scott (2019), the diversity of Indigenous contexts and knowledges often excludes such knowledges from the ‘boiler-plate’ government documentation that constitutes the framework for response and management of disasters.

While there is consensus on the significance of Indigenous knowledges in managing climate change, coastal area erosion, river basin health, fire practices and sustainable food security, there is also resistance and biases within institutional structures that prevent meaningful change (Lambert & Scott 2019, Parter & Skinner 2020, Shaw *et al.* 2008). The absence of including Indigenous practices and the lack of acknowledgment of its

Table 1: Total number of local disaster management plans used in this study.

Document type	Number sampled for analysis
Plans publicly available	78
Additional Northern Territory community-specific local emergency management arrangements	4
Subtotal - number of plans/community local emergency management arrangements	82
Pandemic subplans	9
Total - number of plans/community local emergency management arrangement and subplan documents analysed	91

Table 2: Key comparative search terms and associated relational themes.

Indigenous	Knowledge	Community	Culture	Pandemic
First Nations	Traditional methods	Community engagement	Cultural considerations	Pandemic risk
Aboriginal	Practice(s)	Community consultation	Culturally sensitive approach	Pandemic management
Torres Strait	Wisdom(s)	Consultation with Elders		

existence in all plans included in this study is an example of such resistance. Genuine consultation, cooperative discussion and collaborative research are crucial to integrate Indigenous knowledges in modern approaches to disaster management (Ali *et al.* 2021).

Community consultation, engagement and action

The content analysis revealed numerous mentions of community consultation undertaken while developing local disaster management plans and subplans, but evidence of active community engagement was limited. There were some councils and shires, mainly in Western Australia, where specific Indigenous community consultations were undertaken and ongoing consultation and engagement was noted (this is discussed later).

In other states and territories the situation is less clear. Queensland is unique in that there are discrete Aboriginal and Torres Strait Islander peoples' councils and shires.³ As such, many of these local government plans recognise local Indigenous contexts as they are administered by Indigenous councillors and local group members. South Australia and Victoria councils and shires included in this analysis mentioned the need for close coordination between disaster management agencies and Indigenous communities to mitigate risk and build resilience. The Northern Territory provides a community-specific local emergency management arrangement instead of council- or shire-based plans. However, in most cases, the plans appeared to be generically drafted rather than tailored for communities and do not present any particular evidence of incorporating local, Indigenous knowledges and practices nor any ongoing community engagement.

Western Australia community consultations

The local disaster management planning structure of Western Australia requires mention in this analysis. Out of the 18 councils and shires included in this analysis, 14 plans specified evidence of community consultations, consultations with Elders as well as mentioning cultural considerations to be undertaken during and after a disaster. Halls Creek Shire and Laverton Shire provided a list of Australian Indigenous languages used in the areas to be considered during planning and response phases. Eleven of the 18 council or shire plans included special considerations for language and cultural requirements for remote communities in the region and also emphasised the use of appropriate communication strategies to reach remote communities. The state's local disaster

management planning documents evidenced greater community engagement and local community involvement compared to other states and territories and provides a good example for community consultation and inclusiveness.

Pandemic management plans

This analysis also looked to identify whether pandemic management plans were available at the local government level in line with the Australian Emergency Management Arrangements Handbook (AIDR 2019) and the Australian Health Sector Emergency Response Plan for Novel Coronavirus (COVID-19) (Department of Health 2020) recommendations. The pandemic subplans primarily list the structural requirements and departmental responsibilities at the local level and include risk-specific approaches for management. This study shows that most councils and shires had pandemic subplans, however, they were not publicly available and appeared to be internal documents for use within the organisation.

The majority of local disaster management plans analysed included the risk of the pandemic and some had updated information regarding previous pandemics. The risk of various human diseases—Dengue, Influenza, Ebola, H1N1 and COVID-19—were mentioned in most plans and some lessons from past outbreaks were included. Many councils and shires had their pandemic management plans and recovery policies on their websites. However, as with the local disaster management plans, there was no evidence of Indigenous-specific, culturally appropriate pandemic management arrangements or community-focused pandemic management. An example of what to include would be the local arrangements for managing the potential high vulnerability of Elders to disease and how remote communities accommodate and support isolation or lockdown while meeting cultural obligations and practices.

The comparative analysis of pandemic subplans discovered 2 exemplary mentions from South Australia. The Flinders Ranges Council's pandemic management subplan underlines the need for region-oriented pandemic management and close coordination between local communities.⁴ Similarly, the Viral Respiratory Disease Pandemic Plan⁵ for South Australia identifies increased risks for Indigenous communities and notes the need for additional healthcare support for remote communities along with culturally appropriate messaging. These 2 cases show significant steps towards inclusive planning for Indigenous communities.

Recommendations

The following recommendations were drawn from the analysis.

Recommendation 1: Incorporate Indigenous knowledges

Local Indigenous knowledges should be incorporated into all levels of disaster management plans. This requires effective consultation with communities and Indigenous leaders related to appropriate messaging, policy, legislation and documents. Consistent with the UNISDR policy note (Shaw *et al.* 2008) and discussions, this research suggest steps forward should

3. Queensland has a colonial history of protectionism, political and legislative controls on the lives of Aboriginal and Torres Strait Islander peoples. As a result of these historic controls, many Aboriginal and Torres Strait Islander councils and shires were only established in 1984 as the local government authorities for Aboriginal Deed of Grant in Trust lands with their roles and responsibilities set out in the Community Services (Aborigines) Act 1984. From 1 January 2005, Indigenous community councils began the transition to shire councils with their roles and responsibilities set out in the Local Government Act 2009. See: State Library of Queensland [SLQ]. (2022). Community history. Queensland Government - State Library of Queensland. At: www.slq.qld.gov.au/research-collections/aboriginal-andtorres-strait-islander-people/community-history [15 June 2022].

4. Flinders Ranges Council website, at www.frc.sa.gov.au/.

5. SA Health Viral Respiratory Disease Pandemic Response Plan, at: www.sahealth.sa.gov.au/wps/wcm/connect/a7539fe7-7d39-43e0-920d-94ac63983796/SAH_Viral_Respiratory_Disease_Pandemic_Response_Plan_final.pdf?MOD=AJPERES&.

include establishing a resource group to document and validate Indigenous knowledge in disaster management and policy advocacy to initiate change.

Recommendation 2: Publicly available subplans

Local subplans should be available publicly to assist with localised risk assessment, prevention, preparedness, response and recovery. These subplans need to be written for the community audience they are aiming to support. The subplans need to include First Nations peoples through consultation and engagement to ensure the plans are relevant and effective for specific community contexts. Thus, there is need for consultation and prior preparation to optimise localised disaster management and close coordination with the communities must be undertaken. This study found that while most communities had developed a pandemic subplan, it was done as a reaction to the current pandemic rather in preparation for such events.

Conclusion

This analysis found little evidence of incorporating Indigenous knowledges and practices into local disaster management plans. The lack of inclusion of Indigenous ways was evident in all of the plans analysed. Most of the local disaster management plans appeared to be generically drafted, either within the organisation based on state guidelines or by consultancies rather than being tailored plans that identify and address local requirements and regional and population challenges. There was minimal evidence of close coordination with Indigenous communities when managing a pandemic and the higher risks of pandemic effects on Indigenous communities was not widely recognised in the plans. The findings of this analysis verify that the recommendations of the Sendai Framework are not being met and this underlines the immediate need for action.

This study showed that Indigenous communities use practices and methods to manage a disaster including early warning signs that are often straightforward, sustainable and cost-effective. However, the lack of incorporating Indigenous knowledge and practices into local plans shows the need for urgent action, especially given the increase in the frequency and severity of high-risk hazards. Achieving the equilibrium between science and technology-based disaster management and traditional Indigenous knowledges and practices requires genuine collaboration with Indigenous communities.

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Abstract

Residents look to state leaders during high-risk events for advice and guidance. Previous events have reinforced the vital role that governments play in delivering emergency messages. Creating meaningful messages during emergencies is vital to inform affected populations and to encourage them to take appropriate actions. In February 2022, South East Queensland experienced a significant flooding event that resulted in the loss of life and property. This study identified that conflicting information was released due to the uncertainty of the weather event. Many residents used Twitter to post about what was being experienced, creating a real-time display of what was happening. This study analysed the public-facing government media conferences held over 4 days against Situational Crisis Communication Theory¹ and compared the response to Twitter posts during the key days of the February flood. The study found an overwhelming use of the theory's denial and diminishment approaches used by some communicators combined with the rebuilding approach used by others. This had great potential to cause conflicting and confusing messages. This research is important because language encourages people to believe that floods can be prevented. Conflicting messaging can cause significant harm by not providing clear direction regarding evacuation and other safety measures.

#bnefloods: An analysis of the Queensland Government media conferences during the 2022 Brisbane floods

Peer reviewed

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Background

In February 2022, areas of South East Queensland experienced heavy rain that resulted in significant localised and river flooding. Several lives were lost in this event, including that of an SES volunteer (QFES 2022). While residents watched the water rise, the messages from authorities suggested the event was ‘unprecedented’ and not similar to past flooding events (Nally 2022). Eleven years prior, South East Queensland was inundated by a ‘wall of water’ (AIDR n.d) that resulted in the rapid rise of the Brisbane River, primarily from dam releases, and inundated more than 28,000 homes (AIDR n.d). A Commission of Inquiry was conducted to investigate the cause of the flood and this cemented the event in the memory of residents. The inquiry found that the dam manuals required updating to mitigate future floods. This contributed to a popular mindset that floods will be prevented (Cook 2018). Despite the short time between events and the similarities felt on the ground by residents, the events were scientifically different. The Queensland Premier commented, ‘this is not the same situation as 2011’ and ‘there is no concern for alarm’. However, online platforms, particularly Twitter, showed scenes experienced by residents of the river breaching banks and inundating properties.

This research considers crisis communication by exploring how Situational Crisis Communication Theory (SCCT) was reflected in 6 media conferences delivered on the 4 prominent days of the flood event. This study analyses the conferences by comparing the key messages to social media commentary, particularly visual evidence on Twitter under the hashtag #bnefloods. It examines the role social media could play in government crisis communication messaging during life-threatening events.

1. Situational Crisis Communication Theory, developed by Coombs (2017), recommends that businesses tailor their crisis communications to the crisis' potential to damage reputation.

Media conferences have a significant role in Australia and have increased in importance since 2010, when events began to be live-streamed (Queensland Police Service n.d.). Although people in Australia do not necessarily watch entire media conferences regularly, live-streaming has increased in use since the COVID-19 pandemic (Villegas 2020). Audiences have become familiar with watching full-version broadcasts rather than viewing a compressed version delivered in the news. Media conferences can be highly performative and play a part in public politics (Craig 2016). They have played a significant role in providing information to the public, are a public spectacle and a symbolic display of political accountability (McLean & Ewart 2020). In Queensland, media conferences are typically run by the Premier and the State Disaster Coordinator who can propose resolutions to issues or approve warnings advice (Craig 2016, McLean & Ewart 2020).

There is significant scholarship on crisis communications, particularly related to how an organisation should communicate. It is essential for organisations to actively listen to and engage in social media discussions to assist in maintaining reputation (Coombs & Holladay 2014). Although its use pre-dates social media, SCCT can also help retain reputation by linking responses to crisis types (Coombs 2017). The communication approaches are set out as 4 options:

- denial
- diminish
- rebuild
- bolster.

Denial is where the communicator denies the event, the severity of the event or any responsibility for the event. This is not a recommended approach during an emergency situation as it can reduce trust as the crisis unfolds.

The diminish approach minimises the event's effects. It is also not recommended during emergencies as the public expects communicators to show control regardless of their ability to take control.

Rebuilding is a recommended approach where the communicator takes responsibility and action. Ultimately, it is about showing control and guiding those affected to a desirable outcome.

Bolstering is where the communicator reminds audiences of the good work previously done to maintain reputation. This approach should not be used on its own but should be combined with one of the other 3 approaches.

SCCT has been used to analyse crisis responses in scholarship, particularly regarding organisations' responses. This research used the theory to analyse government media conferences. Stakeholders are at its core, and the theory encourages crisis communicators to place affected stakeholders first (Coombs 2017).

Methods

Media conferences were viewed on the Queensland Premier YouTube channel, where they were presented in full and are unedited. Six media conferences over 4 days were considered.

The conferences related to the weather event and subsequent flooding between 25 and 28 February 2022. Drawing from Villegas (2020), the videos were analysed by taking notes on the communicators involved, their role, the key message and the SCCT approach used. Further, tensions exhibited through body language or vocal tone were also noted to bring attention to conflicts that may occur in the delivery of the message.

Netlytic² was used to collect posts from Twitter between 25 and 28 February 2022. A total of 43,233 public tweets were collected using a Twitter API. The tweets were first analysed by date. The majority (n = 22.68k) was posted on 27 February, which aligns with the peak of the flood and when members of the community were most affected. Tweets were then analysed for sentiment and theme to allow examples to be extracted and used as comparisons for key messages from the conferences.

Findings

Table 1 shows the communicators at each media conference, their role and when they were present. Despite being lead authorities in the response, there were some representatives not present at any media conferences.

Table 2 shows that the SCCT communication approaches were mixed and that there was a shift in approaches from 26 February PM to the denial and diminish approaches.

25 February

The media conferences were run in a similar format each day. They generally began with comment from the leading political representative. There was no political representative at the first media conference. Instead, the Bureau of Meteorology was the lead speaker and handed over to emergency services representatives. The primary SCCT approach used was the rebuild approach. All participants took control of the message and focused on the severity and dangerous nature of the event. There were hints that the event was going to have a serious effect, as seen in this quote from the Coordinator:

As you've heard from.. the Bureau of Meteorology, it is expected to continue for some time, yet it won't be over for a while, and we're coming into the night, and of course, that makes things more difficult.

In this 15-minute media conference, the word 'dangerous' was used 7 times and 'life-threatening' was used 6 times. This suggests that the impending weather event was substantial and likely to have significant consequences.

26 February AM

On 26 February, the media conferences occurred in the morning and afternoon as the weather intensified. The Minister for Police, Fire and Emergency Services led the morning media conference. The minister used the rebuilding approach when delivering the news of the death of 2 people in flood waters, particularly an SES

2. Netlytic is a text and social network analyser. It can be used to capture and analyse publicly available posts from Twitter to explore emerging themes (Gruzd 2022).

volunteer who died while on duty. This approach was reflected in his comments:

The event is not over, though and for many parts of South East Queensland, this is the biggest flooding event that they will see for a decade.

People need to be really aware of their circumstances, continue to listen to the authorities and make very sensible decisions about what they are doing.

These comments are consistent with commentary on Twitter during the morning of 26 February (Figure 1).

The Bureau of Meteorology was consistent in using the rebuilding approach by warning residents of the impact the flood could have on communities in the coming days:

Just know for the next 24 hours we're in a high flood risk with the potential for a lot of flooding around the south-

east and it's not just going to stop tomorrow once this weather system moves on this flood waters are going to continue.

The overall tone of this conference was of sadness and assertiveness perhaps due to the deaths. However, journalists asked questions about comparisons to the 2011 floods. The Bureau of Meteorology representative stated:

In comparison to 2011, every location is different ... all the flooding that happened across the Lockyer Valley as of yesterday again very similar though some of the peaks were just shy of what happened back in 2011.

The prominence of the rebuilding approach in this conference suggests a significant event and that residents should be on high alert. The theme of danger and severity are continued with the use of words such as 'dangerous' (used 11 times).

Table 1: Role and attendance of each speaker at the media conference.

Queensland Premier	The Premier is the state leader, an authoritative figure who informs people of what to expect.	26 February PM 27 February AM/PM 28 February
The Hon. Mark Ryan MP	Minister for Police, Fire and Emergency Services and Minister for Corrective Services who provided an overview of the situation.	26 February AM
The Hon. Mark Bailey MP	Minister for Transport and Main Roads who provided information on road and transport impacts.	27 February AM
Lord Mayor of Brisbane	The Lord Mayor is the elected leader for the City of Brisbane. While his role was not clear, he was introduced by the Premier to inform on local impacts.	27 February AM
Bureau of Meteorology Representative	Bureau representatives were different on each day and they provided information about predicted flood levels and rainfall.	Present at all media conferences
Queensland Police Service Commissioner	The Commissioner provided updates on the loss of life, searches for missing people and other police-related matters.	26 February AM/PM 27 February AM/PM 28 February
State Disaster Coordinator	The Coordinator is the lead for the response and recovery who provided an overview on the approaches being taken. As a Deputy Commissioner of Police, he also provided some statistics related to police activity.	Representative
Queensland Fire and Emergency Services Commissioner	The Commissioner provided an overview of swift-water rescues and the SES response and rescue.	Present at all media conferences
SEQ Water	SEQ Water representatives (including water experts and dam experts) provided information on dam levels, release approaches and the implications on flooding.	26 February PM 27 February AM/PM 28 February

Table 2: Use of SCCT communication approaches in media conferences.

Date	Denial	Diminish	Bolster	Rebuild
25 February				√
26 February AM				√
26 February PM	√	√		
27 February AM	√		√	
27 February PM	√	√		√
28 February	√	√		

Thoughts are with #QLDers right now. We're in a very scary situation. One sis is now unable to leave her home, all exit roads under water & 3 babies. The other could not have made it home without strangers opening church gates to avoid the quickly flooding road.

#qldfloods



6:04 AM · Feb 26, 2022 · Twitter for Android

Figure 1: Tweet 26 February, AM.

26 February PM

The Premier led the afternoon media conference. This was her first appearance for this weather event. In her opening statements, she displayed the denial approach through comments such as:

I know this is of concern to many people who have experienced 2011, Please there is no concern for alarm.

However, the Bureau of Meteorology spokesperson took on a rebuilding approach by raising concerns about safety and possible similarities to 2011:

With many catchments now saturated, there is a potential for dangerous and life-threatening flash flooding ... 2011 levels for both these catchments are still much higher but again, rain is still falling across these catchments.

There was less focus on danger at this conference. The Bureau of Meteorology, the Coordinator and the Queensland Fire and Emergency Services Commissioner used the word 'significant' to describe the flooding. The word 'evacuation' was used 6 times. Five of these mentions were by the Coordinator. The Premier mentioned 'evacuation' once related to Gympie. There was no advice on where evacuation centres were located. The Coordinator mentioned evacuation information was available online.

27 February AM

The critical issue with the denial commentary from 26 February PM was that many residents awoke to significant flooding. This was represented in tweets shown in Figure 2.

The Premier led the morning media conference on 27 February and was joined by the Lord Mayor of Brisbane. The presence of

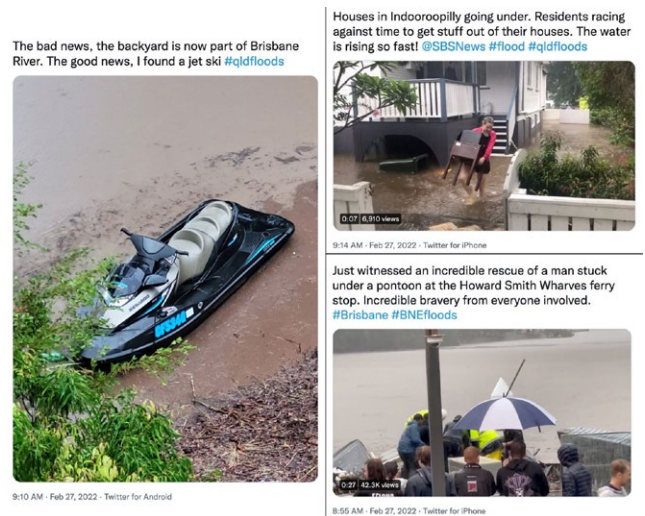


Figure 2: Tweets 27 February AM.

the Lord Mayor is significant as he had issued a tweet (Figure 3) that morning about the potential inundation of thousands of homes. This tweet is consistent with the rebuilding approach in that it provides information on what to expect, where to get help and evacuation advice. However, he used the bolstering approach at the media conference by reminding people to stay home as they did during the pandemic. He moved to the rebuild approach

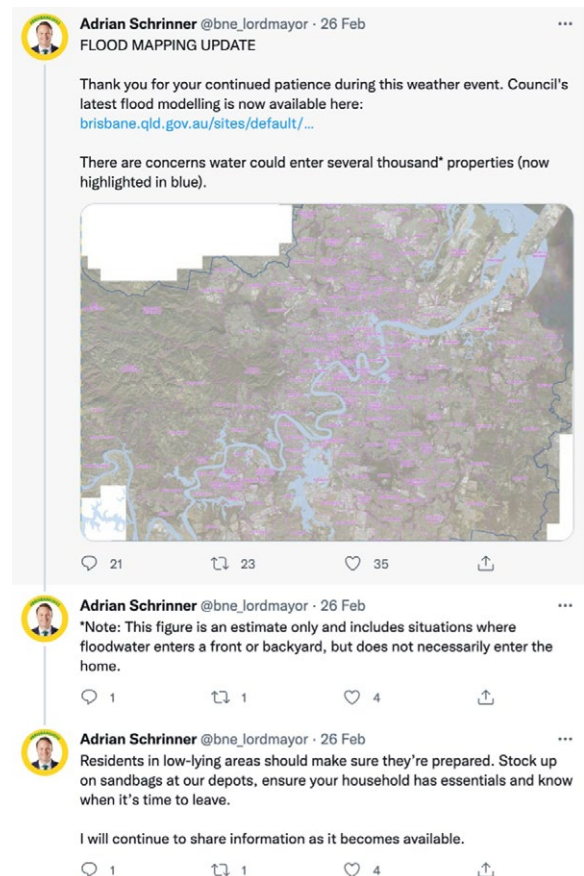


Figure 3: Tweets by Brisbane Lord Mayor Adrian Schrinner.

when he reminded residents to stay safe. He also talked about the difference between the 2011 flood, which led to the denial approach.

Police provided information on 2 more deaths. The police contribution used the rebuilding approach. The Coordinator and the Police Commissioner focused on the need for everyone to stay off the roads and away from flood waters. There remained a level of emergency in delivering this information.

During this conference, the word ‘evacuation’ was used only 4 times. The first mention was by the Premier regarding the Gympie evacuation centre and the evacuation orders the day prior. The next 2 mentions were by the Coordinator, who gave numbers of people in evacuation centres across Queensland. The final mention was from the Lord Mayor of Brisbane who included the location of an evacuation centre in Brisbane. There was no indication for people to be ready to evacuate or what to consider when deciding to evacuate.

27 February PM

By 27 February PM, the weather event was increasing in magnitude. In an opening statement, the Premier encouraged residents to consider evacuation:

Now is the time to start thinking about your safety plan.

However, by this time, many residents were already trapped by floodwaters, as seen in tweets such as:

Ha! I am in Brisbane getting trapped in my building by brown water. Your situation would be preferable.

11:07 AM · Feb 27, 2022 · Twitter for iPhone

Figure 4: Tweet 27 February PM – 1.

The police appealed to the public to take the flooding seriously as there were several incidents where residents had to be rescued due to complacent conduct. The Police Commissioner was stern in the delivery of this information and stressed the severity of the situation.

Emotions were more obvious throughout this media conference, with questions from journalists becoming heated. The Premier was asked about water releases from dams and how the actions aligned with the updated dam manual that was an outcome of the Queensland Floods Commission of Inquiry. SEQ Water provided information on how the dam works, but journalists raised questions about why the city flooded again despite an inquiry to mitigate future floods.

The Premier’s advisor attempted to wrap up the conferences as the Premier was due to meet with the Prime Minister. However, journalists stated that the flood crises was of greater importance given that people had their homes flooded 11 years ago and were going through the process again. A few more questions were asked but the conference was brought to a close.

On Twitter, Brisbane residents posted images as shown in Figure 5.

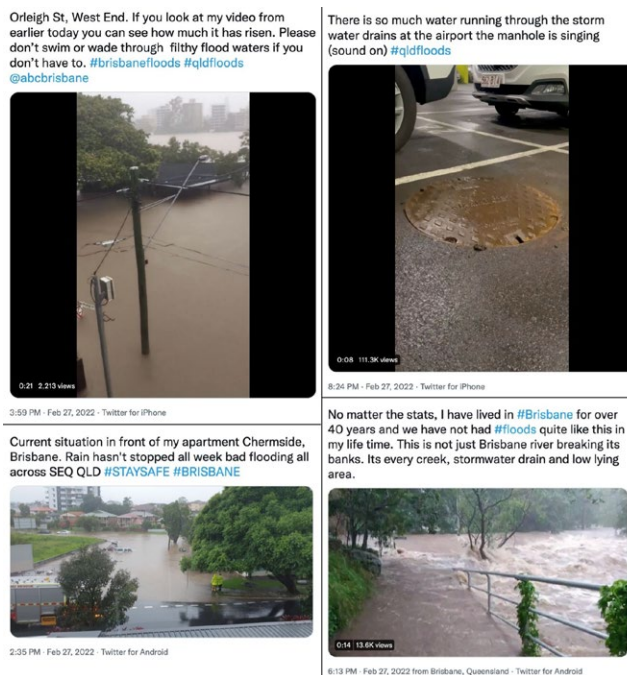


Figure 5: Tweets 27 February PM – 2.

28 February

On the morning of 28 February, Brisbane experienced further flooding and residents were alerted or awoken overnight by an evacuation alert issued through the Brisbane City Council text message service (Figure 6).



Figure 6: Brisbane City Council text message alert.

The Premier opened the media conference with a reserved tone. She discussed the impact of the event on residents and on infrastructure. Her opening statement included the number of emergency calls received by Queensland Fire and Emergency Services and SES and the Queensland Fire and Emergency Services Commissioner provided specific numbers.

Questioning from journalists was calmer, but there was persistent questioning regarding water releases from dams and subsequent flooding. The Premier appeared frustrated and one journalist highlighted that the Premier appeared dismissive of the weather event on Saturday. The Premier responded that she did not downplay the severity of the event. Further conflict was witnessed in this conference when the Bureau of Meteorology representative stated that they alerted the Queensland Government of the

potential for heavy rainfall on the Tuesday of the week prior. Words such as ‘unpredictable’ were used often in this conference. The Premier talked about ‘mother nature’ 7 times, perhaps to highlight that we have no control over such incidents.

On Twitter, the trending discussion related to the lateness of the evacuation alert (Figure 7).

Residents in the firing line of a major flood of the Brisbane River are fuming that an evacuation alert was sent when “most of us are in bed. The river is now expected to peak at 4m today, just 46cm below the level of the 2011 floods. bit.ly/3ImndXb

6:38 AM · Feb 28, 2022 · TweetDeck

Figure 7: Tweet 28 February – 1.

Also, on 28 February, images posted on Twitter showed damage and devastating scenes experienced by residents (Figure 8).

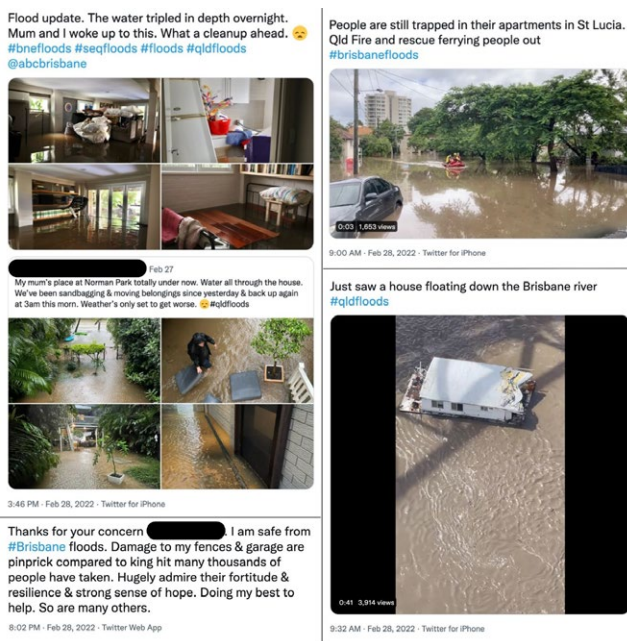


Figure 8: Tweet 28 February – 2.

Discussion

Media conferences are highly performative and strategic events and give governments control over the message being delivered (Craig 2016, McLean & Ewart 2020). In this study, the contradictions noted in conferences on 26 February do not support the level of control that should be delivered in government-provided information. Media conferences should show the support between the authorities, and all should point to a unified outcome (Craig 2016). In the earlier conferences, the consistent use of the rebuilding approach creates a sense

of harmony within the messaging. The message is that of a substantial weather event that will likely cause significant flooding. However, this approach did not flow through to the later conferences. Instead, the denial and diminishment approaches became prominent.

Challenging questions from journalists are an example of what Coombs (2017) calls a ‘challenge paracrisis’ that occurs when a stakeholder publicly claims the organisation is acting irresponsibly. The Premier and SEQ Water responses on 27 and 28 February align with ‘refutation’. Coombs (2017) explains this to be when the responder claims the challenged information is invalid and that they are compliant with the expected actions. Instead, this appears as conflict in a publicly facing space such as a live-streamed conference. Although media conferences are scripted with key messages for news reproduction, the events being live-streamed give the public access to greater detail presented, along with the questions from journalists.

Media conferences can be referred to as ‘rituals of affliction’ (Cottle 2006, Villegas 2020) and are held for citizens, journalists and other stakeholders during events. A media conference, as a ritual of affliction, is described by Villegas (2020) as a way to activate processes to respond to trauma. They can be used to prevent future concerns, perform political accountability and require a ‘responsible person’ (Villegas 2020, p.356) to generate public action through meaningful advice. In the conferences viewed for this study, the Premier is the responsible person. She is the one the public looks to for information on how to act. The contradictions and conflict presented in the conferences from 26 February PM are at odds when her role is to provide stability (e.g. the lack of evacuation information). Water was beginning to flood homes so evacuation advice would be expected at this stage of the conference proceedings. Although evacuations are the responsibility of local government, the Premier has a significant profile and influence to support and deliver this messaging.

The appearance of the Lord Mayor on 27 February added to the confusion given the day prior where the Premier had stated there was ‘no concern for alarm’. The change in messaging from the Lord Mayor’s tweet to the information delivered at the conference added to the confusion. Cook (2018) discusses the need to change the language used during events. Reference to ‘one-in-one-hundred-year’ or ‘unprecedented event’ has little relevance and can confuse the public. Although the weather event was scientifically different from 2011, people’s flood memory can influence society more than the scientific explanation for



Figure 9: Tweet – disaster language.

the weather (Cook 2018). The collective memory of people living in Brisbane is of a recent flood that resulted in the loss of life and property and the significant disruption to everyday activity. By focusing on scientific explanations and taking what could be regarded as a dismissive stance to prior flood events, authorities created uncertainty within the community, as evidenced by the collected tweets in this study.

Although most of the tweets related to this study were positive in tone, they also indicated confusion. This was represented in the apparent complacency shown by police in the 27 February PM conference. The late notice of evacuation was reflected in the number of calls to the SES that were received on the evening of 27 February. The SES received 2,200 requests for assistance; 41% of these callouts occurred in one night (QFES n.d). The Twitter commentary raises questions regarding the approach taken by communicators in conferences when crises occur. It highlights the challenges faced when the public is relying on flood memory to make comparisons. While it is clear that the communicators involved in these conferences were attempting to provide truthful and useful information to clarify the differences between the 2 events, this attempt created confusion.

Conclusion

This paper offered commentary and analysis of the Queensland Government media conference response to the 2022 Queensland floods. It concludes that taking multiple approaches to crisis communication can cause confusion. A combination of the denial and diminishment SCCT approaches was noted despite the desired rebuilding approach having been established. It is important for an organisation to focus on a consistent rebuilding approach when communicating about a crisis. Conflicting messaging can potentially put lives at risk (Miles 2022). Social media platforms must be used and acknowledged by communicators when delivering public safety messages. This highlights the challenges facing communicators when explaining scientifically specific weather events. Further research is required to cross-examine crisis communication approaches based on crisis type and location, particularly regarding the effect past disaster history can have on public responses to official messaging. This analysis found that when drawing from SCCT approaches, one approach should be taken by all parties. There should be unity in the delivery of messages to avoid complacency because conflicting messaging can cause harm through a lack of clear directions regarding evacuation and other safety measures.

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About the author

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Understanding community-led disaster preparedness

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Introduction

Community engagement, participation and leadership are significant challenges to enacting shared responsibility in all aspects of emergencies and disasters. Policy makers and those on the front line of preparedness, response and recovery demonstrate a willingness to strengthen the community aspect of shared responsibility (Binskin, Bennett & Macintosh 2020). While the number of case studies of projects that have successfully enacted community engagement and participation is growing (see for example Mitchell 2019, Jolly 2020, McLennan 2020, Jewett *et al.* 2021) these remain to a great extent descriptive and the practices unmapped. There is also an increasing literature that attests to what might be understood as ‘culture clash’ between command-and-control processes (emergency services organisations) and ‘organic grass roots processes’ (community-based groups and organisations) (Crosweiler & Tschakert 2021). This paper provides an approach for supporting, mapping and gauging community-led disaster preparedness based on research and theoretical conceptualisation of communities and complexity.

Understanding communities

Any efforts to strengthen the community aspect of shared responsibility must first define the notion of ‘community’. While a shared understanding is assumed, theorists and community development workers have struggled with the trickiness of the concept of ‘community’. In contemporary uses, the concept of ‘community’ is often ill-defined and infused, particularly in advertising and media, with romanticism (Ewart & McLean 2019; Rawsthorne & Howard 2013; Germov, Williams & Freij 2011). Geographic descriptors provide limited insight into how communities are constituted, experienced or function. Binary descriptors (resilient/vulnerable or prepared/unprepared) are also unhelpful. Understanding the contours of community processes is, however, vital if we are to support community actions and shared responsibility in disaster events. This is far from straightforward as each community is unique, despite often exhibiting similar contours (Taylor 2015, Ife 2016). Communities are socially produced, not an object to be acted upon. It is for this reason that policies that ‘roll out’ projects in a cookie cutter fashion often have very uneven traction between locations. These approaches are largely short lived

Abstract

Community participation and leadership as a shared responsibility of emergency and disaster preparedness is receiving increasing attention. This paper offers an approach informed by complexity and community development theories to support, map and gauge community-led disaster preparedness. A review of existing research, theoretical debates and primary research with communities suggests community preparedness is supported by action across 7 domains: information, networks, communication, resources, decision-making, self-organising and inclusion. These dimensions are best understood as part of a complex system; that is, dimensions interconnect and adapt in non-linear and dynamic ways. The aim of this paper is to offer theoretical foundations for work that strengthens community preparedness.

with outcomes shaped by the project or funding logics rather than community priorities and processes.

There is no doubt that the notion of ‘community’ holds significant social, psychological and political power. In terms of shared responsibility, community is an ‘elastic’ concept (Collins 2010) that can be usefully mobilised to support social action. It is through dialogue with community members that shared understanding emerges, challenging the assumptions about community and power.

Community development theory and practice

Working with communities is an approach that is being embraced by many organisations and front-line workers, however, this is often unsupported by community development theoretical insights. The approach presented here adopts a relational lens, ‘a way of thinking about community that stresses the importance of relationships and connectivity’ (Oliver & Pitt 2013).

Effective community development practice, rather than following ‘rules’, requires Bourdieu’s notion of ‘a feel for the game’ (*habitus*). By observing sports people, Bourdieu (1990) argues that excellence arises from ‘a feel for the game’ that integrates both knowledge and technical skills with creativity, improvisation and inventiveness (Rawsthorne & Howard 2013). What is implicit in this metaphor is that developing a feel for the game in working effectively with communities requires practice. It is this experimental element of work with communities that draws heavily on reflection and creativity. If every community is unique then every engagement needs to be unique. This work requires an ability to shift power, to deeply listen and to participate.

Those seeking to strengthen community participation in shared responsibility need to develop a nuanced understanding of power, most particularly their own professional power to shape experiences (Crosweiler & Tschakert 2021, Moreton 2018). Rawsthorne & Howard (2013) argue that shifting power is fundamental to community development practice (see also Howard & Rawsthorne 2019). This includes paying attention to symbolic power embodied in physical space (who sits at the head of the table) and uniforms and expertise (whose perspectives are privileged). It is also about paying attention to structural power such as who chairs meetings, how information is controlled, the balance between community members and ‘experts’ and, importantly, who sets the agenda. Shifting power is both enabled and demonstrated through the practice of deep listening (Oldam *et al.* 2020, Bacon 2013). This involves ‘loitering’ in communities (Howard & Rawsthorne 2019, Ledwith 2016), spending time in the everyday life of the community, not merely engaging with the community instrumentally around an agenda. Calling a community meeting will quickly surface the known or traditional leaders in communities (Sampson *et al.* 2021) who are likely to be very helpful to mainstream efforts in strengthening communities, but deep listening is also about taking time to seek out people and experiences that are not usually included (Howard & Rawsthorne 2019, Bacon 2013). This is particularly important given that marginalised sectors within communities are often those most affected by disasters (Mayer 2019, Crosweiler & Tschakert 2021).

A practical way that deep listening can be incorporated into project development is to include a ‘discovery’ phase in the planning (Howard & Rawsthorne 2019, Ledwith 2016). The specifics of the remainder of the action or intervention should be subject to what is learnt in the discovery phase. Strengthening community participation in shared responsibility requires facilitation skills. This is not only understanding meeting procedures but creating environments that are safe for participants to share perspectives; environments in which ideas can be explored. This could include creating non-meeting-related opportunities for participation, such as community events or competitions or working through schools or sporting clubs. There are many examples to draw on; the approach will be informed by the deep listening.

Supporting community action for disaster preparedness

Drawing on theoretical insights and empirical research (Howard *et al.* 2014, 2017a, 2017b, 2018, 2020, 2021), 7 dimensions of community action have been identified that support disaster preparedness. For those working with communities, these domains provide an adaptable approach to map, support and gauge community-led disaster preparedness. A singular, static, ‘cookbook’ model is not recommended, and this is not the only way to strengthen community-led disaster planning. The approach has guiding principles based on research and theory about community development, participatory planning and social change that informs its theory of change, including that:

- change takes place when local communities can express their needs and have decision-making power to influence planning
- to enact change, local knowledge, participation and decision-making needs to be connected and integrated with formal regional, State and national preparedness, response and recovery approaches
- recognising, supporting and building on existing community strengths embeds change and supports sustainability in local planning.

Figure 1 places the 7 dimensions within a complex system and highlights the relationships between the dimensions that are interconnected, non-linear, dynamic, adaptable and emergent. Complexity theory presents an alternative to reductionist approaches that seek to simplify difficult or multi-layered problems (Turner & Baker 2019). It acknowledges and values the messiness and uncertainty that are inherent in social life. Through this lens, it is possible to incorporate the changing, unexpected and only partly knowable characteristics of communities. While the goal of traditional efforts to reduce complex problems into simplified, understandable and quantifiable parts seek to ‘provide us with at least the illusion of control’ (Pycroft 2014) or ‘to facilitate ease of ... action’ (Hager & Beckett 2019), complexity theory argues that to do so is inherently ineffective, due to the ongoing influence of excluded elements. The 5 core concepts of complexity theory are particularly helpful to understand community preparedness.

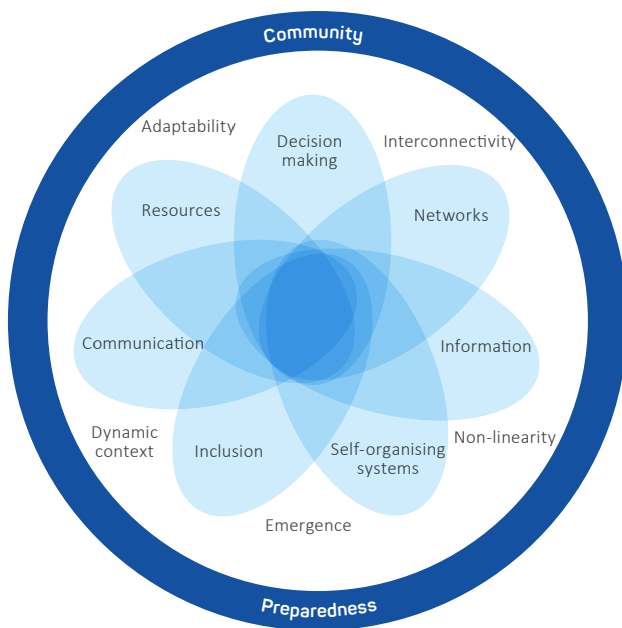


Figure 1: Community action on disaster preparedness.

Interconnectivity

Fundamental to the notion of complexity is the idea of interconnection between elements within a system (Cilliers 1998, Pycroft 2014), and between multiple systems that may be nested (Byrne 1998). Most importantly, the concept of interconnectivity reflects active processes occurring over time, as opposed to a static structure. Cilliers (1998) notes that the interconnections in complex systems occur primarily between proximal elements (in this context, in relationships at the local level). This is an important aspect of community preparedness as it emphasises the importance of local action in building preparedness and may go some way to explaining the challenges faced by those who attempt to impose interventions from afar.

Non-linearity

The interconnections between elements in complex systems occur in non-linear ways. In contrast to linear and predictable approaches where interventions can be designed, implemented, measured and evaluated against predicted outcomes, community life features non-linear processes with delays, reversals, multiplicity and the (often intangible) influences of human relationships. In complex systems, non-linearity means that cause-and-effect relationships may be difficult to track. Furthermore, the non-linear nature of interactions results in consequences that may be disproportionate and difficult to predict. Adopting a sensitivity to complexity and non-linearity is a marked departure from formalised planned approaches. As an example, a community gathering to celebrate the beginning of the rebuild of a community hall can be an opportunity to build inclusion (through a smoking ceremony lead by local Indigenous peoples) or strengthen networks (through inviting a club or association to cater for the event). Coincidental or unexpected outcomes may emerge, with local Aboriginal and Torres Straits Islander residents sharing their knowledge of Country with members of traditional

community-based organisations whom they might not normally have contact with.

Dynamic context

Byrne and Callaghan (2014) suggest that systems have narratives, with histories and futures. As such, the structure and activity of communities and organisations, as well as the wider environments in which they are situated, can be understood to exist in a dynamic state in both time and space. While a system’s history can suggest trends, ‘(t)here are things we do not know which might have a determinant influence on future trajectories’ (Byrne & Callaghan 2014). Earlier iterations of systems theory proposed that systems seek to maintain a ‘dynamic equilibrium’ in response to stressors. But Cilliers (1998) argues that disequilibrium itself can, to an extent, be energising.

Equilibrium, symmetry and complete stability mean death. Just as the flow of energy is necessary to fight entropy and maintain the complex structure of the system, society can only survive as a process. It is defined not by its origins or its goals, but by what it is doing. ... (and) to yearn for a state of complete equilibrium is to yearn for a sarcophagus. (Cilliers 1998)

Moreover, the dynamic interplay between elements of the system, and between multiple systems, can offer hope for future trajectories as ‘working with, rather than against (notions of ambiguity and complexity), will produce more creative and innovative responses’ (Stalker 2003).

Emergence

Emergence acknowledges the way in which the interconnected relationships and processes that occur within a community are productive, bringing about a shared and locally informed identification of problems and resources. As an outcome of the dynamic and non-linear interconnections of a community, the emergence can be seen of new ways of being, doing and knowing, in a process of ‘co-evolution’ (Allen 1997, in Byrne & Callaghan 2014). The concept of emergence incorporates both uncertainty and unpredictability. This is at the heart of system complexity, where ‘simple bits interacting in a simple way may lead to (a) rich variety of realistic outcomes’ (Johnson 2007, in Byrne & Callaghan 2014).

Adaptability

Binary understandings (‘resilient/vulnerable’ and ‘formal/informal’) are unhelpful in achieving effective and sustainable outcomes in community development. Using the lens of complexity theory, it is possible to recognise flows of power that are interconnected, dynamic and non-linear. The combination of the characteristics of a system allow it to adapt in response to challenges, changes and threats. In contrast to linear cause-and-effect models, adaptive systems are influenced by multiple interactions and effects that may be disproportionate. While this makes outcomes difficult to predict, the decentralised nature of such systems fosters adaptability as the absence of a

single ‘control mechanism’ allows other parts of the systems to innovate and compensate (Pycroft 2014).

Dimensions of community action

Despite the complexity of communities and disaster events, we repeatedly see communities act collectively. There are 7 broad dimensions that contribute to disaster preparedness that we have identified through review of existing research, theoretical engagement and primary research.

Information

Information is generated before, during and after crises by multiple players. Central control of information is impossible during any of these stages. Without information, or with incorrect information, community action may be hindered, ineffective or, at worst, dangerous. It is vital to understand how information moves within a community as it is a key domain of action. Information needs to be understood not only as a product but also as a process. Mapping how information flows within communities is a useful tool in strengthening community-led disaster preparedness (Chazdon *et al.* 2017). Those interested in supporting community-led disaster preparedness need to be attentive to what sources are used to generate information with a view to supporting the local production of information. In this way, communities can be understood as consumers of information and also producers of information. This mapping identifies the sources and the credibility of the information and how people put this information to use.

When communities are producers of information it is more likely that this information translates into action. Policy makers and emergency services agencies rely on information provision to change behaviours. The risk is leaving communities feeling bombarded by information products if attention is not paid to the coordination and relevance of information. Developing trusted information sources through ongoing discussion that includes community members and other stakeholders supports effective information flow and utilisation.

Networks

The ability to map and mobilise (or tap into) networks is important. Strengthening community action requires an in-depth knowledge and understanding of the strength, diversity, density and interconnections of local networks. These networks may be formal or informal and are likely to shift over time. Taking the time to listen and observe community networks is important to understand the historical processes that play out in community actions. The integration of formal emergency services agency networks and informal community networks supports community participation in shared responsibility. This integration needs to acknowledge the power differentials and the historical processes that make it so challenging.

Networking enacts collaboration that ideally supports emergent community action that is flexible, adaptive and inclusive. Strengthening community-led disaster planning requires collaboration based on co-configuration and distributed expertise,

that is, the actions reflect the ideas of many ‘experts’ particularly residents whose knowledge is based on lived experience. This means there is no one prescribed approach as it will differ in different settings. The ability to mobilise networks requires a combination of values (a commitment to working with others), skills (the capacity to work with others) and structures (the existence of locally tailored processes). A particular challenge is letting go of control and feeling comfortable as new ideas or directions emerge from bringing people together. The most creative and exhilarating partnership practice requires highly skilled ‘boundary crossers’ engaged in expansive learning from others.

Decision-making processes

Decision-making processes are vital to realising community-led disaster preparedness. This is not about how decisions are made within formal structures but about who is included in the decision-making process, where decisions are made and the transparency and accountability of these decisions. It is often a point of conflict between emergency services agencies and other systems and community processes, due to the traditional command-and-control hierarchy. Rather than decisions being made by external experts, strengthening community-led preparedness requires collaborative planning processes in which decisions are reached over time through consensus. Conflict occurs when community-driven decision-making is overridden or ignored by formal systems.

Communication

The importance of communication in strengthening community-led disaster preparedness can be obvious, however, more effort is needed to support communication processes rather than products. During emergencies and disasters, communication prioritises the delivery of messages (one way). However, effective communication is multi-directional, involves institutions, communities and stakeholders in a local area. There is a wealth of important knowledge within communities that can be harnessed for all elements of the disaster cycle as well as localised communication pathways. Who is included in which discussions and planning processes now and who else needs to be included for integrated communication are important questions. Closely related to information, communication, is deliberative and ongoing with the most important work being undertaken outside response times.

Self-organising systems

Self-organising initiatives or systems are well recognised in disasters, particularly in the response and recovery phases. Often this is an imperative given that local people are ‘on the ground’ when disaster hits, even when it is anticipated. Australia has a long history of communities self-organising around disasters and this is viewed as a valuable cultural practice (Handmer & Maynard 2021). Self-organising is important in the preparedness and prevention phase as well. Communities self-organise across a diverse range of issues such as the physical environment, the built environment, social connections and people’s wellbeing. These self-organised systems should consider disaster preparedness as part of their work. Identifying, supporting and integrating existing self-organising systems during preparedness has the added benefit of strengthening community capacity in response and recovery.

Resources

Resources are commonly viewed as significant to community engagement by emergency services agencies locally and globally. These resources historically have been material resources (sandbags, generators, boats) but, more recently, a significant focus on mental health resources has emerged. There needs to be an additional understanding of resources related to access to funds, time and expertise. Long-term community preparedness actions that rely only on goodwill or self-interest is unlikely to create sustainability. Time and local knowledge are resources often overlooked and taken for granted in disasters. It is vital these are acknowledged and supported.

Philanthropic donations as well as food, clothes and furniture donations risk overwhelming communities. Organising, distributing and managing the inundation of donations and support requires robust, reliable and already established local social and economic infrastructure. Long-term community action sets up local ways (including local groups, organisations, networks and relationships) to manage and, in some cases, resist the well-meaning but potentially chaotic convergence of assistance during and just after a disaster.

Inclusion

There is clear evidence within Australia and internationally that those at the social margin are often the groups and community members most affected by disasters. For this reason, reducing social exclusion needs to be a priority in community preparedness. Disaster preparedness should specifically include diverse groups within the community. In each community it is likely that different groups will experience exclusion. The experiences of First Nations people, people with disability and people experiencing homelessness are commonly overlooked in planning and research. Genuine inclusion is only achieved when formal structures are disrupted and alternative processes are introduced. Mainstream processes such as meetings, community workshops and committees are effective in supporting disaster preparedness with those already engaged in these processes (Sampson *et al.* 2021). Again, long-term community action needs to seek out the people who are not normally involved, take discussions outside of the traditional forums and listen deeply to the experiences of excluded groups. This requires loitering or proactive outreach (invited) in places such skate ramps, social groups, shopping centres or gathering places used by local residents of diverse backgrounds.

Conclusion

The frequency and extent of emergencies and disasters is likely to increase in Australia with significant social, economic and political costs. Enacting government policies of 'shared responsibility' is proving difficult with a significant gap between policy and practice in community participation and leadership in preparedness and recovery. This paper contributes to efforts to bridge this gap, drawing on theoretical insights on community development and complexity. It outlined a framework to support community-led preparedness through action across 7 interrelated dimensions. Supporting communities to pay attention to these dimensions strengthens their capacity to prepare for and recover from future disasters.

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