

Australian Journal of EMERGENCY MANAGEMENT

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About the Journal

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, AIDR or AIDR's partners.

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Cover image: Emergency Preparedness Workshop lead by Deaf Liaison Officers at Blacktown SES, April 2016. Get Ready Program partners include The Deaf Society, NSW SES, NSW Rural Fire Service, Fire and Rescue NSW, Red Cross and the University of Sydney.

Image: The Deaf Society.

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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

Judy Slatyer, Australian Red Cross

While the type and scale of disasters are many and varied there is a constant inevitability, both within Australia and globally, that not everyone will be affected in the same way. Health, wellbeing, finances, connection to community, experience, knowledge and ability to access support all influence how people prepare and recover. Many people do not have the resources to prepare and build resilience, and are unable to afford the cost of recovery.



There are many different people who may fall into this situation. Depending upon their ability to cope they can include children, the elderly, women, people with a disability, people with acute and chronic health conditions, newly arrived migrants, people experiencing homelessness and people on low incomes. The success of the Diversity in Disasters Conference, attended by 300 people in Melbourne in April 2018, is a testament to the growing interest in this topic that, until recently, has been largely invisible.

Our sector has had a tendency to label everyone in these groups as vulnerable. But it's more complex than that, and more helpful to focus on what contributes to people being at risk, as highlighted by a number of the papers in this edition.

Rather than generalising, we need to talk less and listen more; giving people the dignity to articulate their priorities. Support agencies, such as emergency services, local government or community groups should be led by the beliefs, values and motives of the communities they serve in developing robust recovery programs.

Listening well and deeply allows individuals to open up about their strengths as well as their vulnerabilities. It encourages thinking about the ways that challenges and

solutions are perceived subjectively by people in crises. It means not limiting our interest to those areas where our agency or organisation has a predetermined agenda of services to offer.

We also know communities that support each other bounce back better. Communities who have hope for the future and confidence in their own abilities to influence change are able to build a foundation for sustainable livelihoods and wellbeing. Individuals, agencies and others can do their best to help bring hope, but must respect the community as its source.

An approach that focuses on people's strengths and fosters a sense of community through the development of social capital will ensure that people look out for one another all the time including during times of disaster and that those most at risk aren't forgotten.

I hope you find the articles in this edition of the *Australian Journal of Emergency Management* both interesting and challenging as we continue our commitment to shared responsibility in developing resilience.

Judy Slatyer
Chief Executive Officer, Australian Red Cross

Implementation of the Sendai Framework for Disaster Risk Reduction in Australia

Maddison Merrin-Davies, Emergency Management Australia

Global momentum to reduce the impact disasters have on communities has gathered pace. In line with this momentum, Australia is taking meaningful steps to implement the *Sendai Framework for Disaster Risk Reduction 2015-2030*.

The Sendai Framework is a 15-year international framework that shifts focus from disaster management to cross-sectoral disaster risk management. It represents global best practice towards reducing disaster risk.

The Sendai Framework fosters a more collaborative, innovative approach, including targets that promote all-of-society and all-of-states engagement. It also recognises that the impacts of disasters affect people in many ways: not just economically but also in terms of health, education, society and the environment.

Strong disaster risk governance is central to managing disaster risk effectively because it encourages collaboration towards disaster risk reduction and sustainable development.

Regional and global platforms for disaster risk reduction

The Australian Government is actively engaging in regional and global platforms to share best practice, discuss lessons learnt and encourage participation across all sectors to implement the Sendai Framework.

In July 2018, Australia sent a delegation to the Regional Platform, the Asian Ministerial Conference on Disaster Risk Reduction in Mongolia. The meeting will result in a number of positive outcomes on disaster risk reduction, including the 'Ulaanbaatar Declaration', a 2018-2020 Action Plan for the Asia region, and voluntary commitments.

In 2017, the Minister for International Development and the Pacific, Senator Concetta Fieravanti-Wells, led an Australian delegation to the Global Platform for Disaster Risk Reduction in Mexico. The Minister delivered Australia's National Statement, which highlighted Australia's role as a responsible international partner in disaster risk reduction and resilience and demonstrated Australia's willingness to share its own domestic experiences and knowledge in disaster risk reduction.



The Minister for International Development and the Pacific, Senator the Hon Concetta Fieravanti Wells, at the 2017 Global Platform in Cancun, Mexico.

Image: Emergency Management Australia

At the Ministerial Roundtable on Integrating Disaster Risk Reduction into Overall Economic Planning, the Minister shared Australia's experience with Tropical Cyclone Debbie in Queensland and New South Wales to illustrate Australian Government investments that had mitigated the impact of the cyclone, as an example of sound economic planning leading to reduced disaster risk exposure.

Implementation in Australia

The Sendai Framework offers a set of guiding principles for all levels of government and non-government sectors to draw from in the design and ongoing implementation of policies, programs and practices. The Department of Home Affairs is leading Australia's reporting against the Sendai Framework and driving implementation at a national level.

A National Resilience Taskforce within the Department of Home Affairs is leading national efforts to reduce the impacts of natural hazards on our critical infrastructure, economy, cities and regions. It will lead the development

of a five-year national disaster mitigation framework with states and territories and other key sectors. The framework will deliver a coordinated national approach for reducing existing risk, preventing future risk and delivering improved disaster risk information.

All jurisdictions are working together through the Sendai Framework Working Group to deliver a national roadmap for implementation and reporting against the framework. The roadmap will establish a set of nationally appropriate indicators based on the United Nations' 38 global indicators to measure progress against the Sendai Framework's seven global targets. This will give Australia a long-term view on the effect of policies and programs, and how to best mitigate and respond to disasters.

Importantly, the roadmap will translate the Sendai Framework priorities into existing Australian disaster resilience and emergency management policies and complement already established and matured initiatives within the states and territories. It will also consider a National Platform for Disaster Risk Reduction to support all stakeholder and multi-sectoral collaboration on disaster risk reduction.

Australia's National Fire Danger Ratings System

Australia is already taking steps to reduce the risks associated with bushfires. Australia is currently trialling a prototype of a next generation National Fire Danger Ratings System (NFDRS). The prototype of this new system is a significant advancement on the 60-year-old technology currently in use. It improves how we predict fire weather, measure the seriousness of burning conditions and understand the threat of fire to life, assets and the environment. When put into full production, the NFDRS will significantly improve how we understand, plan for and respond to bushfires. The NFDRS is also designed to help fire authorities accurately communicate bushfire risk to the community, enhance agency readiness and preparedness, and contribute to risk management prevention (including input into building standards and planning controls). While it is still in its infancy, the NFDRS represents an ongoing scalable program of continuous improvement, involving multiple government departments and emergency management agencies from all jurisdictions with support from research organisations and universities.

What is next?

Effective investment in disaster risk reduction relies on strong partnerships and collaboration to produce evidence-based and all-of-sector policy and planning.

To achieve this, it is beneficial to strengthen the networks of communities and organisations and work with research groups and communities-of-practice to build a strong interface between research, disaster risk information and decision-making.

Promoting awareness of how disaster risk is created and opening dialogue on potential reduction strategies will lead to a greater understanding and interest by organisations and members of the community. Successfully driving the principles of the Sendai Framework requires collaboration and commitment from all levels of government, organisations, communities and individuals.

What is the Sendai Framework?

The Sendai Framework is the global blueprint to reduce disaster risk. The expected outcome over the next 15 years is to realise 'the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries'.

Building on the progress made under its predecessor, the *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*, the Sendai Framework places a strong emphasis on disaster risk management as opposed to disaster management.

To achieve its outcome, the Sendai Framework outlines four priorities for action:

- Priority One: Understanding disaster risk.
- Priority Two: Strengthening disaster risk governance to manage disaster risk.
- Priority Three: Investing in disaster risk reduction for resilience.
- Priority Four: Enhancing disaster preparedness for effective response and to 'build back better' in recovery, rehabilitation and reconstruction.

The Sendai Framework also articulates seven global targets that:

- substantially reduce global disaster mortality by 2030
- substantially reduce the number of affected people globally by 2030
- reduce direct disaster economic loss in relation to global gross domestic product by 2030
- substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030
- substantially increase the number of countries with national and local disaster risk reduction strategies by 2020
- substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present framework by 2030
- substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

Get Ready: a model for deaf community leadership and preparedness

Genevieve Roberts, The Deaf Society

The Deaf Society Get Ready program began as a one-year project under the Natural Disaster Resilience Program. Get Ready is the implementation of recommended interventions arising from university research into disaster resilience in the deaf community.

Get Ready Deaf Community NSW is a highly successful emergency preparedness program undertaken by The Deaf Society. It is a partnership between The Deaf Society and NSW State Emergency Services, NSW Rural Fire Service, Fire and Rescue NSW, Australian Red Cross and the University of Sydney.

The Get Ready program helps deaf, deafblind and hard-of-hearing people to increase their readiness for, and recovery from, disasters. It helps emergency services personnel increase their deaf awareness and ability to communicate with deaf people. Consistent with the *National Strategy for Disaster Resilience*¹, the deaf community and emergency services organisations share responsibility for helping the deaf community prepare and recover from emergency events.

The Get Ready program stemmed from university research conducted in partnership with The Deaf Society and emergency services organisations.² Get Ready is the implementation of recommendations arising from that research that are designed to:

- increase deaf people's accessibility to emergency information
- strengthen social capital within communities and build stronger institutional links
- increase the capacity of emergency service organisations to better support the deaf community in hazard situations and meet identified needs
- facilitate greater deaf community engagement and action on emergency preparedness.

The program uses an asset-based community development and capacity-building approach. 'Effective risk communication and disaster preparedness strategies are inclusionary, decision-relevant, two-way and they foster trust, awareness, understanding and motivation to act' (Calgaro *et al.* 2013, p. 65). Hence, at



Deaf Awareness Training is part of the Get Ready program.

Image: The Deaf Society

the core of Get Ready are Deaf Liaison Officers (DLOs), volunteers who provide a bridge between emergency services personnel and the deaf community.

¹ Attorney-General's Department 2011, *National Strategy for Disaster Resilience*, Commonwealth of Australia, Canberra.

² Calgaro E, Allen J, Craig N, Craig L & Dominey-Howes D 2013, *Increasing the Resilience of the Deaf Community in NSW to natural hazards: Final Report*, UNSW, Sydney.



Deaf Liaison Officers complete emergency management training with members of the NSW State Emergency Service.

Image: The Deaf Society

The DLOs who were recruited were highly motivated, had fluency in Auslan and English, were well-networked within local communities and were trusted and culturally sensitive sources of information. The DLOs received training from the Office of Emergency Management, NSW RFS, NSW SES, Fire and Rescue NSW and The Deaf Society. They obtained basic emergency management training as well as preparedness training in bushfires, floods, storms and house fires. They also received training in leadership, community development, workshop delivery and mentoring.

In addition to capacity building in emergency preparedness, the program has built community capacity. The DLOs are community members who take up volunteering roles that involve workshop facilitation, teaching basic emergency preparedness, building neighbourhood networks, visiting schools, translating videos and mentoring new DLOs. The DLO is a positive role model; promoting deaf pride and leadership.

The DLO program builds a resilient community because 'people work together with local leaders using their knowledge and resources to prepare for and deal with disasters. They use personal and community strengths, and existing community networks and structures' (Attorney-General's Department 2011, p. 5).

DLO activities include:

- providing a conduit to the deaf community for emergency services organisations
- delivering emergency preparedness workshops to deaf and hard-of-hearing people
- disseminating preparedness information through networks suited to deaf and hard-of-hearing people
- providing feedback to emergency services organisations on accessibility and appropriateness of information resources
- participating in deafness awareness training
- participating in scenario training
- participating in emergency services advisory committees
- promoting campaigns and services delivered by emergency services organisations.

There are DLOs in Illawarra, Campbelltown, the Blue Mountains, metropolitan Sydney, the Central Coast and Hunter Valley regions of NSW. DLOs have also delivered workshops in Coffs Harbour, Tweed Heads and Lismore. To date, 11 DLOs have delivered 13 workshops to 312 people in the deaf community throughout NSW.

Information provided in accessible forms is paramount for resilience. The Australian Red Cross RediPlan has been translated into Auslan in a suite of seven videos available at The Deaf Society website. These videos are used as the basis of community preparedness workshops delivered by DLOs. The RediPlan was chosen as the foundation resource because it is a national multi-hazard plan. It is a great fit for the multi-hazard, multi-agency approach of Get Ready.

Through collaboration with our partners, we have built capacity and social capital in the emergency services sector. Hearing people have little understanding of the alternate 'world view' and profoundly different life experience of those in the deaf community. This has resulted in the development of emergency management tools and strategies that have had little effect. 'People cannot find answers to problems that they don't fully understand or acknowledge' (Calgaro *et al.* 2013, p. 62).

The Get Ready program has established emergency preparedness knowledge for the deaf community. It has injected deafness awareness into the emergency services. Deaf Awareness Training is delivered to emergency services personnel so they are better prepared to communicate with deaf people. DLOs are able to advise emergency services personnel on accessibility and cultural appropriateness when they are developing new resources and campaigns. DLOs have been involved in the making of SES videos.

There has even been a recognition of the value of including a deaf perspective in the emergency sector as deaf people have very specific situational awareness. Hence, DLOs may be involved in scenario training for emergency services personnel, giving them first-hand experience of interacting with deaf people in simulated emergency situations. For example, in late 2016, DLOs were involved in a large-scale simulated flood scenario for SES training on Cockatoo Island and around Sydney Harbour.

The success of the initial project is leading to systemic change within the NSW SES. The Deaf Society is working with NSW SES to establish a multi-hazard, multi-agency deaf unit that is the first of its kind. This unit will be a permanent home for the DLOs.



Deaf Liaison Officers involved in SES Scenario Training on Sydney Harbour.

Image: The Deaf Society



Deaf Awareness Training participants in Lismore.

Image: The Deaf Society

Disaster recovery: are we doomed to repeat the same mistakes?

Kate Brady, Australian Red Cross

There are significant barriers to lessons management in disaster recovery in Australia. The 2017 AFAC Lessons Management Forum looked at the challenges and why they exist.

Disasters are increasing in frequency and severity globally. A growing body of evidence demonstrates that the effects of disasters are long-term and costly. Poorly managed recovery efforts may have as many negative consequences for disaster-affected communities as the event itself.

Despite the efforts of passionate and dedicated community members and workers for hard-won advances, there are significant systemic challenges to learning lessons from the past and implementing them for future disasters.

Multiple factors result in lessons management in recovery being underdeveloped in Australia. These include:

Limited workforce continuity or development: The nature of recovery work, particularly at the local level, is generally short-term contract based, or 'off the side of the desk' to substantive roles. As a result, most recovery workers may only ever work on one disaster event. In almost every disaster, the recovery workforce has no prior recovery experience (irrespective of the excellent skills they may bring with them). This limits the scope for an ongoing community-of-practice and opportunities for meaningful training and professional development. Professional or education pathways to recovery management are incredibly limited.

Highly political: All aspects of disaster management are political. Many politicians are inexperienced with disasters but naturally wish to support their communities during these events. It is common for politicians to make early announcements directly effecting operational recovery decisions in a way that is unheard of in other aspects of disaster management.

Multi-sector, multi-organisational nature: The number of organisations involved in recovery is necessarily wide-reaching and varied. The multifaceted nature of recovery management makes it difficult to tackle from a lessons-management perspective.

No review process required: Recovery management is rarely included in disaster reviews or enquiries. Program evaluation is currently optional good practice, rather than standard practice or a requirement, though this is starting to change.

Timing of lessons identified: Even when comprehensive evaluations take place, recovery lessons are often

collected at the end of an operation (or end of funding). There are currently limited mechanisms to share and implement these lessons.

The challenges to lessons management in disaster recovery are interrelated. At the heart of it, there is an apparent failure to consider the effects of the aftermath of disasters to be as significant as the hazard event. This limits the way that lessons from previous events are implemented for the future.

We rightly value the education, training and professional development of first responders and incident managers, knowing the risk that may befall both the workforce and the community if we don't. Yet we systematically expect people who are inadequately trained or resourced before a disaster to coordinate community-led recovery. While we continue with this approach, we cannot expect to see dramatic improvements from lessons management.

Over the last few years, there has been a concerted effort at a national level to develop a monitoring and evaluation framework for recovery support, which is positive and much needed. Additionally, a number of jurisdictions are making creative and concerted efforts to develop tools for recovery workers. There are passionate people who are doing great work and are improving the way communities are supported.

But it's not enough. While local recovery managers are appointed and trained after a disaster event has occurred, even if the best monitoring and evaluation took place after every disaster, this still may not lead to the improvements we would hope for. Unless we build recovery capability before a disaster event, we can't hope for a cycle of ongoing improvement.

The saying 'recovery starts on day one' is popular and represents a positive and progressive shift; that as a system, we need to think about the long-term consequences of disasters from day one. But there is also a literal interpretation that is frighteningly accurate. For many of the people who will support community recovery, it really does start on day one. The introduction to the most basic information, systems and tools all starts when the disaster starts, at the time when meaningful learning is hardest.

Until we are able to support an ongoing, resourced workforce to support community-led recovery after a disaster, the hard-won lessons of previous events will not be implemented in any meaningful way.

Evolution of a community resilience strategic plan

Jayme Moreland, South Australian State Emergency Service

Developing a community resilience plan entailed understanding what communities need and how emergency management services can build resilience. These needs don't always match.

The AIDR Resilience Ambassadors Program upskills young people to become champions of resilience in their organisations and regions. As part of the program, I worked with colleagues to develop a Community Resilience Strategic Plan for the South Australian State Emergency Service (SA SES).

In 2017, the SA SES was already delivering and contributing to a range of community engagement and resilience-building initiatives. What was missing was a framework to align these activities to organisational objectives. The Community Resilience Strategic Plan provided the strategic direction, objectives and goals necessary to benchmark and evaluate success. Undertaking this project developed my understanding of what a community needs to be resilient and how an emergency services organisation could support that resilience. The needs of agencies and communities don't always match. Priorities, timelines and even the language used to describe resilience-building are often disparate.

What does a resilient community look like?

In the book, *The Resilience Dividend*, Dr Judith Rodin writes:

There is no ultimate or end state of resilience. But, by working together to build resilience to the greatest degree possible, we can reduce our reliance on crisis as a driver of change and, instead, deliberately take the future into our own hands – for the well-being of our families, our communities, our cities, and indeed, the planet we share.

These questions guided the thinking on the vision of what resilience is. If there is no end state to resilience, how can we develop a community enough in order to achieve resilience? What behavioural, procedural or environmental changes are needed to improve or achieve resilience?

One size does not fit all

The community is the centre of a Community Resilience Strategic Plan and objectives are tailored to community needs. The needs of the community and the strengths and assets that contribute to a community being resilient need to be researched and documented. Consultation

South Australian State Emergency Service Community Resilience Strategic Plan 2018 – 2020



is essential and this should be conducted internally and externally with other organisations and the community you are developing the plan for.

Change takes time

The strategy, objectives and goals need to be achievable with observable benchmarks for success. The challenge with some initiatives that foster community resilience is that they are reliant on behavioural change in order to show success. This could span many years, beyond the time period the plan covers. Planning requires interim benchmarks that provide a pathway to change and success.

Realistic influence

There are many elements that contribute to a community developing its resilience. Organisations may not have the capacity or authority to achieve some objectives and not all problems can be solved. In order to foster resilience, creating partnerships with change-makers and other organisations may be needed to advance support for communities. This contributes to a 'shared responsibility' that brings government agencies, non-government organisations, communities and those who have influence to make change together to build resilient communities.

Lessons learnt from innovation: Red Cross volunteers

Georgia Hay, The University of Western Australia

Before Red Cross can foster disaster resilience in communities, its volunteers must be resilient.

In late 2016, as part of the AIDR Resilience Ambassadors Program, I began working on a project with the Capacity Development Coordinator of the Australian Red Cross in Western Australia to help emergency services volunteers become leaders within the organisation. The Red Cross Emergency Services Volunteer Leadership Group (ESVLG) comprises volunteers with leadership experience or potential who support and enhance emergency preparedness, response and recovery activities through collaborative projects. The ESVLG is a committed group of volunteers who have achieved strong and integrated knowledge-sharing and collaboration networks.

Over the time of the project there have also been many lessons learnt that may be useful for others building capability in volunteer organisations.

You don't need to be an expert to help

Even though individuals were invited to the ESVLG because of their demonstrated leadership skills and their enthusiasm for Red Cross and emergency services, most members of the ESVLG expressed that they were unsure what they could contribute to the group, and to Red Cross.

It is true that any offer of an 'extra pair of hands' is usually welcomed. However, the most valuable ESVLG members are those who are engaged in the challenges and projects that Red Cross tackles. Sometimes, this is because that individual has a wealth of experience in the area, or perhaps within Red Cross in another country. However, just as often, they are individuals with a passion for emergency service; who are curious about and driven to uncover ways to make it better and who are willing to put up their hand and learn. No volunteer starts off as an expert.

Honesty is crucial for collaboration

Psychological safety is when team members feel it is okay to speak up about issues, ideas or questions, knowing that there won't be negative repercussions. It

sounds simple, but is often hard to establish in practice. At the beginning of one of the ESVLG meetings, one of the members expressed concern that the group was not making progress. The comment broke the ice and allowed the group to have an honest discussion about what was working, what was not, and then to brainstorm about how we could make more progress as a group. Moments that produce tension and discomfort can be profound triggers of progress for the group.

Just. Get. Started.

The ESVLG sessions were mapped out with starting points, progression points, and plans for 'immersion sessions' with Red Cross staff across preparedness, response and recovery. Brainstorming sessions were to establish prioritised lists of projects and tasks and form a steering group and sub-committees that had detailed Terms of Reference.

There were two reasons why this detailed planning was not suitable:

1. **The 'return on investment' would not match the skills and capacities of volunteers.** ESVLG members would have spent a lot of time learning about the historical and current areas of need in Red Cross emergency services, only to then focus on one specific area or project; rendering time that they spent on the other areas useless. This was unnecessary and inefficient.
2. **Volunteers want to *do* something.** The volunteers were enthusiastic about being involved and making a difference to the organisation at a higher level. The volunteers committed time, energy and capabilities. However, I wanted them to wait months and months before the ESVLG started working on projects. From a motivational perspective, this was not the right approach to take.

The ESVLG is currently embarking on three projects: Map the Gap, review of Psychological First Aid training and developing storytelling for use in training.

Australian input into international security standards

Catherine Dunkerley, Standards Australia

With over 96 years of experience in developing Australian Standards and a longstanding commitment to and involvement in International Standards, Standards Australia continues to lead from the front.

Standards Australia has a long history of contributing to international security standards and its representatives at international meetings are well-respected industry experts. Having such a strong voice on the international committee is vital to ensure Australia's concerns are addressed and international security standards are developed with benefit to Australia.

The international committee, ISO TC 292 Security and Resilience, completed a week of meetings in Sydney in March 2018. These meetings were attended by 130 security experts from more than 20 countries contributing to the ongoing international effort towards security standards.

The purpose of the meetings was to work towards standards that enhance and sustain a state free from danger or threat, and for its citizens to feel safe, stable and free of fear and anxiety. The meetings proved particularly timely for Australia, with developments coming at a time when government and the private sector are working towards enhanced security and resilience across a number of focus points.

Key discussions at the meetings covered continuity and organisational resilience, protective securities architecture and framework, interoperability, emergency management (social media in the emergency framework), community resilience, security terminology and fraud risk and counter measures.

One outcome of the March meeting was the formation of a project team to study the terms 'security' and 'resilience'. Two Australian industry professionals will

lead this work, building on their initial research and presentation of a draft whitepaper. The document will be presented at the next plenary meeting in Norway in late 2018 and will assist in defining and contextualising these terms in all ISO TC 292 documents. This group will also work with the UN Cooperation Group to refine 'urban resilience'.

Another outcome from the meetings was the appointment of an Australian delegate as co-convenor for the Justification Study on ISO 28000. This group of standards addresses security management for supply chains that impact on organisations of all types and sizes.

The international meeting, with all of its significance globally and domestically, follows the same principle as any other venture of Standards Australia; there must be a benefit to Australian communities. The increased capacity for organisations and the government to manage a growing security threat is of substantial benefit to Australia.

As the visiting delegations return home and discuss what next, for Australia, the work will get underway immediately. A forum is planned to advance security standards and help Standards Australia to understand what industry needs.

For more information visit: <http://www.isotc292online.org>



International security experts gathered in Sydney in March 2018 at a meeting of the ISO TC 292 Security and Resilience.

Image: Standards Australia

Making crowded places safe and healthy

■ Jacqui Douglas, Australian Institute for Disaster Resilience

A crowded place can be defined in simple terms: a number of people who intentionally, predictably or spontaneously find themselves gathered in a physical space. Small and large crowds are everywhere—in shopping centres and stadiums; around transport hubs and main thoroughfares; in pubs, clubs, and hotels; at sporting and cultural events and places of worship. The congregation of people in different public places is an important and positive aspect of many societies.

The dynamics of crowded places however are far from simple, evident in the growing body of legislation, rules and regulations applicable to them. The Australian Institute for Disaster Resilience (AIDR) has recently published the *Safe and Healthy Crowded Places Handbook*, to support anyone with an interest or involvement in managing a crowded place to understand and fulfil the accompanying legal and moral responsibilities. This includes event organisers, venue owners and operators, health and safety regulators, local governments, businesses, industry suppliers, public health providers, associations, insurers and emergency service agencies.

The handbook replaces the 1998 *Safe and Healthy Mass Gatherings Manual*, following an extensive review process managed by AIDR. The review synthesised expertise, capability and knowledge of Australian and international organisations and individuals; consultation engaged leading event, crowd and security management professionals, as well as representatives from emergency services, the health sector, government, non-government and not-for-profit organisations. The handbook makes reference to current Australian and international standards, legislation and regulations, highlighting where requirements particular to local jurisdictions may apply.

The handbook is structured to provide managers of crowded places an overarching framework for risk management, communication and incident and emergency planning. This gives context to advice relating to security, site safety, and health issues including food and water security, waste management and disease control. The handbook includes reference to crowd behaviour and psychology, preparing managers of crowded places to understand and anticipate different elements that may produce or result from an incident or emergency. The guidance also reflects the heightened focus in Australia and globally on hostile acts, including terrorist incidents.

The *Safe and Healthy Crowded Places Handbook* is not designed to sit on a shelf, but to inform practical planning for both normal and emergency conditions. The handbook contains contemporary terminology but avoids industry jargon; in-text vignettes illustrate principles using real-world examples. The guidance within applies equally to one-off crowds like events and festivals, to the ongoing management of 'predicted' crowded places – central business districts, shopping centres and airports, to name only a few.

Key themes of the *Safe and Healthy Crowded Places Handbook* include:

- encouraging personal resilience and responsibility and safe behaviours in crowds
- volunteer management
- planning for and managing post-incident recovery, including psychosocial
- effective information sharing and communication within and in relation to crowded places, in both 'normal' and emergency conditions
- providing safe, positive experiences for attendees through planning and site design
- collaborative, cross-sectoral event planning and risk management
- using monitoring, situational awareness and data to identify emerging trends and issues in crowds
- crowd psychology

The handbook is freely available online on the Australian Disaster Resilience Knowledge Hub¹, with supporting companion toolkits including checklists for putting the principles into practice. Hard copies are also available for purchase.

¹ At knowledge.aidr.org.au/handbooks

Health surge: thunderstorm asthma

Dr Ameer Morgans, Emergency Services Telecommunications Authority

On 21 November 2016, the largest recorded global epidemic of thunderstorm asthma occurred in Victoria. Its scale was unprecedented with public calls for assistance well beyond normal volumes during high-demand events.

The maximum daytime temperature was 35 degrees Celsius, the daily pollen count in Melbourne was high, but had been higher in previous weeks. Wind gusts were up to 83 km/h. Soon after 6.00pm, an active storm cell hit north-west Melbourne and the sudden downpour caused airborne pollen to burst into tiny, allergenic particles and create a high-allergic asthma case load. This caused a mass allergic reaction and caused asthma in people who had not had asthma before.

Emergency communications centres are prone to surge activity. However, most demand is predictable such as heatwaves, public and weather-related events. Thunderstorm asthma presented as a watermark surge where unplanned demand continued to rise beyond forecast volumes.

Emergency operations call teams quickly realised that a state-level health emergency was taking place. There was a clear pattern of respiratory cases, spreading across the state. The cause was unknown. Over the next 12 hours, more than 9000 people arrived in hospital emergency departments across Victoria and 2666 calls presented to Triple Zero for emergency ambulance assistance. Between 6:00pm and midnight, the state-wide emergency management services case volume was 1.93 times greater than the two prior years 2014 and 2015.¹

There are lessons to be learnt from this event about overwhelming demand, preparedness and sector integration. An event overview is available at www.bmj.com/content/bmj/359/bmj.j5636.full.pdf.

Sentinel surveillance

Demand forecasting is the cornerstone of how the Emergency Services Telecommunications Authority (ESTA) manages its average of 7000 calls a day for five emergency services. We have developed sentinel surveillance analytics based on actual demand

proportionally above forecast. This allows early detection, evaluation and decision-making and supports timely community and sector advice.

Optimisation of consequence estimation is an emerging opportunity. The data used to predict surge, such as weather warnings, are generic and do not easily translate into information to guide forecast of relevant consequences to emergency services. Analytics underway with partner agencies, including the Bureau of Meteorology, are translating generic weather information into geospatial and event type demand consequences to better predict impacts and enhance preparedness for surge.

Instant surge workforce

The Victorian ESTA model centralises dispatch and call-taking functions across all emergency services at state level. There is greater opportunity to leverage multi-agency, skilled staff and dynamic Triple Zero call routing to allow agency specific demand surge to be met. Optimisation of off-shift workforce could ensure sufficient resources when major or ongoing demand requires.

The ESTA model of centralised services allows for alignment of emergency response and disaster management protocols. In the wake of the thunderstorm asthma event it became clear that differences in nomenclature and definitions relating to disasters, incidents and event type classifications limited the ability to align community messaging and response. Interagency work since this event has ensured a mutual understanding of event size, impact and consequence.

¹ At: www.igem.vic.gov.au/sites/default/files/embridge_cache/emshare/original/public/2017/07/80/c414fe2ba/ReviewofemergencyresponsetoNovember2016thunderstormasthmaeventfinalreport.pdf

The review of the National Principles for Disaster Recovery

Louise Mitchell, Department of Health and Human Services, Victoria, Dr Margaret Moreton, Leva Consulting and Mark Stratton, State Recovery Office, South Australia

The National Principles for Disaster Recovery create a set of fundamental underlying truths that form the foundation of our knowledge and values and guide actions and practice. This article describes the process and outcomes of the 2017 review of the Principles.

The complexity of many agencies working with communities post-disaster requires an approach that enables all partners to navigate the changed terrain. The Principles hold an important place in disaster recovery in Australia, as recognised at the national level. They were originally intended for use by government workers involved in providing recovery planning and services. In 2017, they were reviewed with the assistance of over 80 agency stakeholders along with the input of two communities that had experienced a disaster and recovery. The review has produced an updated version of the Principles and validated their relevance. They remain useful to both the recovery sector and affected communities.

Disasters deeply effect lives and livelihoods. Organisations that work with communities recovering from disasters know how complex and challenging it is to achieve the best outcome for the most people, particularly when they are in transition or trauma.¹ The complexity of working with a community post-disaster includes coordination and collaboration between individuals, groups, volunteers, professionals, governments and the private sector. It also involves working within uncertain, complex and rapidly changing environments. These circumstances require a principles-based approach.

The term 'principle' is defined in Webster's New World College Dictionary Fifth Edition as 'a fundamental truth, law, doctrine or motivating force, upon which others are based'. Emergency management research speaks of principles forming a basic strategy to improve emergency response capabilities.

The objective of disaster recovery is defined at the national level as 'helping communities to reach a point where they are sustainable and resilient':

- 'A sustainable community has the capability and capacity to manage its own recovery, without government disaster-related assistance. If government disaster-related programs are withdrawn, the recovery process in a sustainable community will continue; it will not stop or reverse the gains achieved during the government-assisted phase.'

- A resilient community is better able to withstand a future disaster'.²

In the field of emergency management, recovery managers work in local, state and federal spheres with the private sector and not-for-profit agencies. As more government work is privatised, a growing portion of government emergency management work involves the use of non-government organisations including private contractors and volunteer organisations. Given this complex system, having a principles-based approach means that recovery is not 'owned' by any single sphere or player. The core values reflected within national principles can be considered independently by a variety of partners, aspiring to preferred outcomes and consistency in approach irrespective of position, authority or responsibility. The Principles create a set of fundamental 'truths' that form the foundation of shared knowledge and guide action and practice.

Methods

The Principles were initially developed and endorsed by the Standing Committee of Social Administrators in 1986. The Principles underwent a substantial review in 2008 and another during 2017, under the guidance of the Social Recovery Reference Group (SRRG), an independent reference group with an advisory role to the Community Outcomes and Recovery Subcommittee of the Australian Emergency Management Committee. Mark Stratton, the then National Consultant Disaster Recovery for the SRRG, led the process with agencies and Dr Margaret Moreton conducted community consultations.

1 Marsh G, Ahmen I, Mulligan M, Donovan J & Barton S (Ed.) 2018, *Community Engagement in Post-Disaster Recovery*, Routledge, Oxon, UK, offer this as what should be aimed for in the recovery process. Reilly MJ & Markenso DS 2011, *Health Care Emergency Management: principles and practice*, Sudbury, MA, USA speak in terms of 'attempting to ensure the best possible outcome for the greatest number of people' p. 341.

2 Australian New Zealand School of Government 2016, *A Monitoring and Evaluation Framework for Disaster Recovery Programs*. At: <https://knowledge.aidr.org.au/media/1779/a-monitoring-and-evaluation-framework-for-disaster-recovery-programs.pdf>.

The SRRG involved over 80 agency representatives, including experts from all levels of government, private and not-for profit agencies in New South Wales, Tasmania and South Australia. Workshops with SRRG were held in Adelaide and Brisbane and involved all states and territories along with Department of Human Services, Emergency Management Australia and Australian Red Cross. Practitioner workshops analysed the 2011 version of the Principles addressing the questions:

- Are the six existing principles 'right' in terms of title?
- What changes need to be made to the underlying text?
- Do the Principles adequately address all domains of recovery, non-natural events and culture, diversity and equity?

Community consultations were held with people directly affected by two recent disaster events in different states in Australia. A total of 32 people attended these consultations to explore and validate the principle 'using community-led approaches'. The inclusive and participative process of review was integral to its outcome and engaged recovery experts, groups of practitioners and communities. It also included findings from recent academic literature.³

Agency forum findings

A broad range of organisations was represented in the forums and all agreed the six Principles should be: understand the context; recognise complexity; use community-led approaches; ensure coordination of all activities; employ effective communication; and recognise and build capacity.

In particular, the meaning, validity and suitability of 'use community-led approaches' was explored. Numerous groups considered alternative terms such as 'community focused' and 'community centred'. At the end of the discussions, there was no clear resolution to this question.

Community forum findings

Communities sought a sophisticated and mature discussion about disaster and community-led recovery. Community members want community-led recovery while also acknowledging they need timely support. This requires a change in the relationship between affected communities and governments and organisations seeking to support them. Engagement must include authentic listening before, during and after a disaster event. Communities advocated for recovery processes that build the self-reliance and resilience of the community.

Community members emphasised the diversity of community identity and experience, both within and between communities. Community recovery must be

flexible and adaptable, be based on common sense, with a willingness and ability to respond to emerging issues, ideas and problems. The communities recognised the complexity of community recovery and leadership including identifying and engaging with leaders and supporting them immediately after a crisis and into the long-term. They identified that recovery begins in the planning stage and continues for many years.

It became clear during the forums that the Principles could be adopted more broadly than simply by governments and other large agencies. While the primary audience for the Principles is recovery workers, community members and representatives from community organisations expressed a desire to include the Principles in their own work. The language of the Principles has been adjusted to reflect this desire.

These findings from agencies and communities began a process of adjusting language so that the Principles speak to both organisations and communities. In this way, they are validated by lived experience and may create opportunities for partnership.

The changes reflect:

- modernised language that 'speaks' to both communities and agencies
- a greater emphasis on community strengths-based approaches, resilience and pre-event planning
- a recognition of the centrality of community; necessary if the outcomes being sought by emergency management partners are to be achieved

The Principles were validated as relevant and of great utility to those engaged in recovery.

The 2018 National Principles for Disaster Recovery

The 2018 National Principles for Disaster Recovery were endorsed by the SRRG, align with the 2011 *National Strategy for Disaster Resilience* and apply to all phases of recovery. In fact, with a central focus on community and public value, they also provide guidance to an approach to emergency management more broadly.

The Principles are available as a brochure at www.knowledge.aidr.org.au/resources/national-principles-disaster-recovery. The Principles are also expanded on in the *Community Recovery Handbook* at www.knowledge.aidr.org.au/community-recovery-handbook.

³ This has included incorporation of relevant research-based principles for community engagement in post-disaster recovery and findings from Beyond Bushfires examining the impacts over six years of the fires that occurred in Victoria in 2009.

How overseas fire agencies recruit for diversity

| Bronnie Mackintosh, Fire and Rescue NSW

The number of female firefighters in the urban sector in Australia is less than five per cent, despite good efforts to broaden the catchment for recruitment. How can this be improved using best-practice recruitment?

In Australia some agencies have recruited females well but retention has been poor because of toxic cultures and outdated systems that act as barriers. In other cases, recruitment efforts have been so focused on the numbers that entry standards have been compromised and transparency of processes has been lost.

The research shared here was conducted through a Churchill Fellowship that explored opportunities for fire service recruitment to increase the number of women and the ethnic diversity of recruits within the workforce. The research looked at recruitment that attracts, retains and promotes a diverse workforce. It focused on three broad strategies: quotas, targeted recruitment and social-change programs. The research included 21 fire departments in eight countries and over 100 interviews and meetings. Included in the research were human resources doctrines and organisational policies, such as recruitment programs, maternity leave policies and other support systems.

Quotas or gender targets

The fire services that used a quota or gender target in their recruitment were the ones with the largest proportion of women. Tokyo Fire Department (6.4 per cent women) and San Francisco Fire Department (16 per cent women) have the highest statistic for operational firefighters. This can be directly attributed to 20 years of government-sanctioned quotas. The other conspicuous observation in both these departments was the normalisation of women firefighters and an inclusive culture in the fire stations. This can be attributed to the sustained and systematic inclusion of women in the workforce for over two decades.

Quotas ensure sustained and systematic recruitment of women and, over time, lead to the normalisation of female firefighters. Quotas can and should be administered without compromising performance standards. The fire services with the highest percentage of women in their ranks use quotas and gender targets.

In the Tokyo Fire Department, women do not perform all the same firefighting roles as the men. Women are prohibited by Japanese law from participating in activities that pose a risk to future child-bearing. They cannot respond to any chemical, biological or radiological incidents or participate on urban search and rescue teams.

The San Francisco Fire Department had a court-sanctioned consent decree in effect between 1988



Female recruits at the Tokyo Fire Department Academy, where the role is normalised for women due to gender targets and social change programs.

Image: Tokyo Fire Department

and 1999. This mandate was enacted after litigation against the city and county of San Francisco for illegal hiring practices. Under the decree, the San Francisco Fire Department was required to recruit women to 10 per cent of its operational workforce and for 50 per cent of those women to be of colour. This quota was successful in the increase of women, but research into the culture¹ suggests that the male majority was sometimes resentful of the women hired and promoted during this time. This created distrust, which broke down communication, team unity and overall effectiveness.

Quotas can negatively affect inclusion if they are not delivered transparently. This can erode trust and communication on which inclusive team cultures are built. Agencies should ensure robust communication and performance-management plans are in place before implementing quotas.



Bronnie Mackintosh with female firefighters of Rajasthan where a government quota is used to recruit women.

Image: Sita Khatik

Targeted recruitment

Targeted recruitment is a strategy to identify specific populations and increase their access and opportunities to being employed. It has been a standardised approach to recruitment since diversity was first recognised as a workforce need. Examples of targeted recruitment programs include women-only information and physical preparation sessions, information stands at sporting, social and community events and careers exhibitions in residential areas of target demographics. Australian fire agencies have generally adopted targeted recruitment as the default strategy for recruiting through a diversity lens. Australian fire services have had varying success with this approach.

Historically, the London Fire Brigade used positive action programs to recruit and promote women and ethnically diverse firefighters. Current Commissioner of the London Fire Brigade, Dany Cotton, is a product of their talent identification program and has been instrumental

in mentoring other female firefighters into leadership positions.

The London Fire Brigade also had a graduate program that gave a preferential pathway for firefighters entering with external qualifications. In another targeted initiative, the London Fire Brigade ran a talent development program aimed to develop people with leadership potential. People were selected for their teamwork and ability to engage with the community rather than by traditional exams used in merit selection. Although both programs were successful in identifying talent and eliminating barriers for women and cultural diversity, resistance from resentful firefighters caused issues for inclusion.

Agencies must have a specific talent identification program and be able to 'sponsor' the promotional pathway of those who consistently demonstrate a capacity for leadership. There should also be appropriate ways to performance-manage those who attempt to undermine these selections. Once again, transparent process and rigorous selection is paramount to success.

One of the more successful models of targeted recruitment in the UK, was at Staffordshire Fire and Rescue. Under the direction of the female fire chief, the Staffordshire Fire and Rescue navigated the UK austerity measures and transformed their culture to be prevention-focused while still upholding their response performance in the community. Her team worked collaboratively with other emergency services by making home fire safety and wellness checks to all homes in their jurisdiction. She employed fire prevention technicians from at-risk communities and allowed them to wear the same firefighter uniform as the response firefighters. This demonstrated that every single person in the organisation contributed something to public safety and deserved to wear the same uniform. The fire prevention officers greatly expanded the diversity mix of the workforce and were well received by the at-risk communities because of their shared language and religious beliefs. When safety risks were identified during the home checks, the fire prevention personnel would refer the person or family to the relevant authority that could resolve their risk. This built community connection with all emergency service providers, gave a platform for educating the community, addressed safety issues and linked community members with each other.

The Los Angeles Fire Department used targeted recruitment for their past two campaigns. They use strong marketing, social media and web presence, connect with the community at multiple events and provide support programs for their target groups.

¹ Krieger A 2012, *Beyond the Consent Decree: Gender and Recruitment in the San Francisco Fire Department*, National Fire Academy, San Francisco.

One of the strengths of the Los Angeles Fire Department recruitment strategy was their use of data as well as tracking candidates through the recruitment process.

Targeted recruitment requires sustained efforts to run programs tailored to a particular demographic. They should be measurable and use data systems to track individual progress as well as the impact of the program. Data analysis supports the use of specific programs.

Social-change programs

Social-change programs aim to change a social perception of firefighting for both the participant as well as their family and social network. Generally, the participants are aged between 14 and 19 and, for most fire services, are still too young to apply for recruitment. However, these programs prepare their broad-based skills, expose them to the physical and mental requirements of fire and emergency services and help them to understand what is required to get employed by a paid service.

Both the Los Angeles Fire Department and the Fire Department of the City of New York have high school and cadet programs for students aged 14 and 18. These volunteer programs are based on army cadets and taught by paid firefighters in a working fire station. Students study fire science and complete their emergency medical technician training; a prerequisite for most US fire agencies.

Girls' fire camps are also popular in the US and Canada. These camps build self-esteem and self-efficacy for girls aged between 14 and 18, through experiential activities modelled on the roles of a firefighter. They learn fire science, extinguishment, rescue operations, first aid and develop teamwork and leadership skills. The other unique outcome of these fire camps is the professional development of the volunteers who participate as instructors or crew leaders during the camp.

In a broader context, the girls' fire camps impact the greater community. Through publicity in schools, the media and connection to the local fire department, the camps contribute to a change in social beliefs and attitudes about women as firefighters. This helps disseminate information about the changing role of fire services and every person connected to a camp becomes a recruitment and fire safety conduit.

Social-change programs are necessary for normalising women firefighters. They empower young girls to overcome fear and feel great about physically demanding tasks. Even if they don't end up in fire or emergency services, these young women learn to be better community members and first responders.



Volunteer school and cadet programs provide foundation skills for teenagers considering a career in the fire service.

Image: Los Angeles Fire Department

Recommendations

Australian fire agencies could adopt quotas, targeted recruitment and social-change programs to recruit, retain and promote women and ethnic diversity within the service. Quotas increase numbers and targeted recruitment and social-change programs ensure sustainability. Without quotas or gender targets we won't see significant change. Without normalising firefighting as a role, women will continue to feel tokenistic or leave the agency. These approaches rely on agencies addressing inclusion, shifting cultures and adopting robust performance-management procedures for dealing with culture change.

Access to the full Churchill Fellowship report is at www.churchilltrust.com.au/media/fellows/Mackintosh_B_2015_Women_and_ethnically_diverse_people_in_Australian_Fire_Agencies.pdf

Jurisdictional collaboration on emergency management capability development

Jane Zsombok, Jurisdictional Emergency Management Education Network

An emergency management capability development network established in 2017 has already achieved beneficial outcomes for capability development.

The Jurisdictional Emergency Management Education Network (JEMEN) was established through the support of the Australian Institute for Disaster Resilience. It has been designed as a knowledge-sharing forum that develops and promotes a collective vision for emergency management education and capability development for Australia.

The JEMEN was established to provide a forum to collaborate and share knowledge on emergency management capability development. Specifically, the JEMEN aims to develop national consistencies on emergency management training, education and learning and development. It also identifies opportunities for cross-jurisdictional collaboration, provides a national voice for consultation and advice on emergency management education matters and offers advice, consultation and jurisdictional contacts for capability development programs.

JEMEN members comprise one representative from each Australian state and territory from lead agencies with primary responsibility for emergency management education in their respective state or territory. Emergency Management Australia support JEMEN activities and provide vital linkages to national capability enhancement policy and initiatives. Secretariat and coordination support is provided by the Australian Institute for Disaster Resilience.

Established in 2017, JEMEN has already achieved beneficial outcomes for emergency management capability development in Australia. These include the identification of areas for influencing national capability development policy, links to national doctrine development and, importantly, specific opportunities for cross-jurisdictional collaboration in emergency management curricula, frameworks and learning management systems.

JEMEN members have all actively contributed to a significant curricula mapping project which has provided a strategic overview of current capability development programs delivered jurisdictionally for disaster management stakeholders. Importantly, this mapping process has enabled the identification of curricula where support and collaboration can be facilitated between

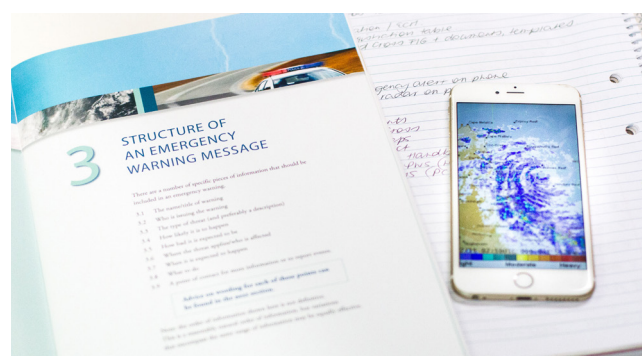


Image: Queensland Fire and Emergency Services

jurisdictions. In addition, the project outcome presents a critical national synopsis of disaster management capability development programs within Australia at the jurisdictional level.

JEMEN meets formally biannually and members teleconference and connect throughout the year on issues arising on an as-needs basis. Biannual meeting locations are rotated through the jurisdictions with the upcoming JEMEN meeting in September 2018 being held in Perth, Western Australia.

The collaboration and networking opportunities JEMEN provides are proving invaluable to members, their agencies and each jurisdiction. JEMEN enables jurisdictions to maintain confidence that their emergency management capability enhancement and curriculum strategies remain contemporary and consistent with national approaches. A level of consistency in curriculum, where feasible, also enhances opportunities for cross-jurisdictional interoperability.

All member agencies should be congratulated for their contribution and commitment to jurisdictional collaboration. The work of the JEMEN is an important step in Australia's capability development journey.

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ABSTRACT

The immediate disaster response environment exposes people to a multitude of risks, including identity risks. Those working in disaster response environments use identity management systems to protect people, especially vulnerable people and children. This paper examines identity management systems and the way they address risks of child trafficking and exploitation. This research offers a unique perspective into the experiences of non-state actors and the role they play in identity management systems during disaster response. A case study of Tropical Cyclone Winston is used to explore views of identity management and how they reduce risks to children. The case study showed that the role of the community in identity management, verification and associated controls were geographically concentrated and not readily portable. This created risks to children of trafficking and exploitation, particularly where evacuation centres and shelters were geographically removed from the children's communities. An Event Analysis of Systemic Teamwork method revealed that those working in the disaster response environment rely heavily on information from the community and government when identifying children. Where there are gaps in the information and social networks in the identity management process there are significant risks to children. These insights are relevant to disaster response planning.

Based on a presentation at the Australian and New Zealand Disaster and Emergency Conference May 2017.

Identity management in disaster response environments: a child exploitation mitigation perspective

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Introduction

Children are vulnerable members of society and their risk of being affected by natural disasters is higher than other members of the population. The inherent chaotic and complex nature of a disaster response environment (DRE) includes the breakdown of normal protections, including law enforcement and regulations. In these environments, children are at an increased risk of being trafficked and exploited and require increased protection (Harper 2009).

The connection between the risks of child trafficking and exploitation and the adequacy of identity management systems and related controls is not new. In 2011, the United Nations (UN) Special Rapporteur on the sale of children, child prostitution and child pornography, Ms. Najat Maalla M'jid, found that the data for unaccompanied children was inadequate and the exact risk of vulnerability was unknown (M'jid 2011).

Save the Children (2007) found that children in developing countries are disproportionately affected by natural disasters because child protection is not integrated as a priority. DREs are characterised by actor interdependencies, individual and common agendas and are overlaid with environmental uncertainty where existing systems are damaged or non-existent (Harper 2009, p. 15; European Commission 2013, p. 7; Save the Children 2010, p. 26; Anaya-Arenas, Renaud & Ruiz 2014, p 55, 66). M'jid's (2011) findings suggests there is lack of knowledge and experience in identification and registration processes among first responders and this increased the risks to children. These findings indicate the need to understand identity management systems and, where risks occur, the exposure of children to exploitation and trafficking.

Vulnerable people and exploitation risks

The literature on vulnerable people and the increased risk of exploitation and trafficking is extensive from a practical perspective, but limited from an academic perspective. The Inter-Organisational Protection Assessment of Tropical Cyclone Winston recognised that security risks including family violence, sexual violence, missing persons and children and child abuse increase during a disaster (Safety and Protection Cluster 2016, p. 10). The most vulnerable to these risks are young and adolescent girls, female-headed

households, boys and adults with disabilities (Lonigan *et al.* 1994, Shannon *et al.* 1994, Vogel & Vernberg 1993, Safety and Protection Cluster 2016).

There are few academic studies that connect the three concepts of trafficking, exploitation and identity management systems in DREs. Research efforts draw the connection between trafficking and exploitation, geographical dislocation and travelling alone. One-third of child trafficking victims are unaccompanied or separated children (Bump & Duncan 2002). Unaccompanied minors travelling without identity documents are at risk of being trafficked during the reunification process with parents, guardians or caregivers (Derluyn *et al.* 2010). The risks arise when the parent, guardian or caregiver's identity is not checked, or checked by staff with inadequate training in recognising false identity documents (Derluyn *et al.* 2010).

The 2010 Haitian earthquake provided press articles on child trafficking post-disaster. The complexity of stakeholders, specifically non-government organisations (NGOs) not accountable to a higher body or system, were a high risk to children. Article 27 of the *UN Convention on the Rights of the Child*, states that it is the responsibility of the State to protect its children. However, increasingly, the role has shifted to non-state actors (UN General Assembly 1989). The large volume of NGOs indicate that communication and consensus is difficult; 400 NGOs were present after the Indian Ocean 2004 tsunami (Tatham & Houghton 2011). Contemporary natural disasters with Australian involvement include Hurricane Yolonda (Philippines) and Tropical Cyclone Winston (Fiji). In both examples the literature highlights the safety of children and vulnerable persons as an area of concern (Oxfam International & Aksyon Klima Pilipinas 2013, Lum & Margesson 2014, European Commission 2013, OCHA 2016a, OCHA 2016b, Safety and Protection Cluster 2016).



Children are reunited with their grandmother for evacuation from Port-Au-Prince, Haiti following the earthquake in 2010.

Image: US Air Force

Methodology

A mixed-method, multi-disciplinary approach was used to analyse the identity management system present following Cyclone Winston and its effects on children. The data are qualitative and collected in the form of Critical Decision Method (CDM) interviews with experts who worked in the Tropical Cyclone Winston (Fiji) DRE in February 2016. CDM is a method that extracts critical decision-related information in human factors research (Klein, Calderwood & Macgregor 1989). CDM allowed the examination of specific identity and child protection processes, dependencies and decisions, timelines, actors, information exchange, processes and tasks. CDM offered a data collection method that afforded naturalistic environment extraction through key actor recounts of decision-making and observations. The interview data are supported by qualitative data in the form of primary and secondary reporting including operational reports.

The creation of networks facilitates analysis via a simplified version of the Event Analysis of Systemic Teamwork (EAST) method. A strength of EAST is that it enables researchers to build a multiple network view of a research context (Walker *et al.* 2006). Research artefacts examined in the application of EAST enables the extraction of interdependencies, vulnerabilities and opportunities for response system optimisation. This research examined the social networks present in the case study and combined them with the task and knowledge networks developed using EAST to provide a 'network of networks' view of the problem (Salmon *et al.* 2014).

Approach

A total of 110 situation reports from Tropical Cyclone Winston, written by the National Disaster Management Office, were analysed in conjunction with CDM interviews (National Disaster Management Office 2016). The situation reports indicated the timeline of the disaster and the interviews indicated the elements of the identity management system. The timeline of the identity management system construction and implementation was extracted from this material and divided into 'tasks' using the EAST framework. Each task is represented in a joint social and information network to analyse the system's effectiveness in recognising and addressing child trafficking and exploitation risks.

EAST method

The EAST method specifically analyses collaborative activities (Annett & Stanton 2000, Diaper & Stanton 2004, Birkmann *et al.* 2013, Vinchon, Carreño & Contreras-Mojica 2011, Walker *et al.* 2012). Identity management systems are characterised as being highly information and control dependent, where actors are dependent on the actions of others outside of their control to effectively mitigate risk (Lacey 2015). These environments are typically highly complex and

Table 1: Participant information.

Participant	Age Bracket (years)	Gender	Professional background	Qualifications	Years in position/ industry	Organisation type	Organisation size	Role overview
1	33-44	Female	Over ten years' experience working for IGO and NGOs globally	Masters of Anthropology and Geography	One year in current position	NGO	Large 1000 or greater	Disaster response coordinator for large NGO
2	55-64	Male	22 years' experience in the government sector and 15 years in the IGO sector working on gender and child related projects	Over 30 years' experience in government and non-government agencies	Three months in current position	NGO	Large 1000 or greater	Managing rural projects in the Cyclone Winston response
3	NA	Male	Social worker and NGO worker	Social worker	One year in NGO	NGO	Small 100 or less	Child protection coordinator
4	NA	Female	School teacher and NGO worker	School teacher	Less than five months in NGO	NGO	Small 100 or less	Child program development
5	NA	Female	Experience of over ten years in the NGO sector, experience over five years in the state sector	University education and experience in the sector	15 years	NGO	Small 100 or less	Coordinator, CEO of national NGO

collaborative; providing an appropriate basis for the research to adopt the EAST method. This approach is relevant to Cyclone Winston where actors did not remain the same.

Participants

For the purpose of this paper, 'expert' is defined as someone with experience in the DRE of Tropical Cyclone Winston. For fair perspective of the system, experts were from different organisations so information could be verified and compared to analyse the system's reality, where data were put together to create the most realistic network possible. A small number of participants were interviewed for a rich qualitative dataset. A gender balance was sought for fair analysis of the system. Table 1 provides information about the participants.

Procedure

Initially, participants were interviewed using the CDM method. Once the interviews had been conducted and transcribed the data was analysed using EAST. The analysis used content analysis, taking keywords and concepts from situation reports and transcripts. The keywords and concepts were then connected to individual tasks. The identified relationships between

tasks and actors created an output in the form of networks of information. In this study social network analysis is the key network portrayed.

Limitations

Limitations in data collection included the range of participants, where state actors were invited to participate but did not participate. The nature of the identity management system and shifting of identity responsibilities to non-state actors meant all participants actively engaged with state actors and provided detailed descriptions of roles and functions. There is a risk that limitations in interview data may create bias. To alleviate these risks, the data collection methodology included non-interview data to capture the actor perspectives (National Disaster Management Office 2016).

Results

The analysis indicates that the Fiji task network would look like Figure 1. This follows the top-down approach where the state is the lead actor. CDM interviews revealed that reality is more complex. The task network constructed from the case study represents how each actor is connected. This is achieved by combining the social and information networks in each task.

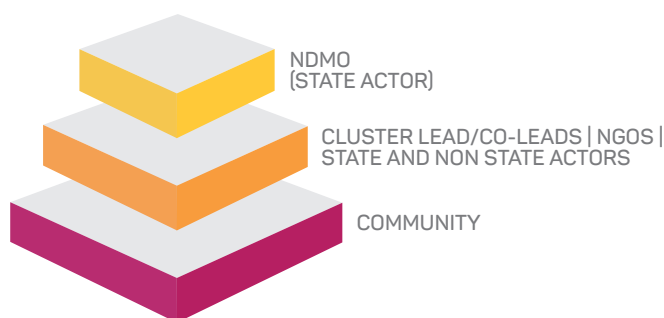


Figure 1: A traditional approach to the task network in identity management systems.

The EAST analysis has been split into a timeline (Figure 2) with each task along the timeline represented in a network. The communication methods between actors included teleconferences, face-to-face meetings, email, phone calls, radio, television, word of mouth and SMS messages.

Task 1 (Figure 3) illustrates the social and information networks in the child protection rapid assessment. Each line represents information being shared between actors. A risk is present where NGO volunteers lack training and English fluency, thus increasing the risk of inaccurate information sharing. Risks occur when assessment is executed by one actor and shared. This procedure is based on trusting one actor solely for accurate and reliable information, thus increasing the potential for error.

Task 2 (Figure 4) represents the identification process of a child within a child-friendly space in an evacuation centre. The red lines in the network represent a risk to the child where participants identified a lack of reliability of birth registration and enrolment data. The lack of

information meant organisations were unaware of the exact number of children until they were in the DRE. The lack of birth registration and enrolment data indicates a risk where, if children were to go missing, formal identity processes could not be relied on. In this task, the reliance of knowledge-based authentication of identity is high and represents significant reliance on community-based identification processes.

Task 3 (Figure 5) represents the identity management system of children from the perspective of the Education Cluster. The more lines pointing at the child node, the higher the risk, where more actors coming into contact with the child means less accountability of individual actor actions. For example non-registered organisations and individual 'helpers' are not connected with other actors and are not accountable to the government nor to other organisations and there is an inconsistency in identity management training. Additionally, for individual actors, their identities and qualifications are not always verified, nor do they follow the same child protection codes as those registered in the cluster. This represents a significant risk to children.

Task 4 (Figure 6) represents the reporting process of a missing child in a rural area in Fiji. This is significant because it highlights the importance of the community in the process where outside actors are not contacted until 24 hours after the initial report. This directly relates to Task 5 (Figure 7), where the identity management system relies on the child finding an organisation and the organisation reporting the missing child to the state. These tasks represent both sides of a situation of a missing child. However, the actors involved in the individual systems bear no resemblance to one another. Where Task 4 relies on the community to find the child, Task 5 relies on cluster-based actors to identify the child. As shown in Task 2, children are not always registered

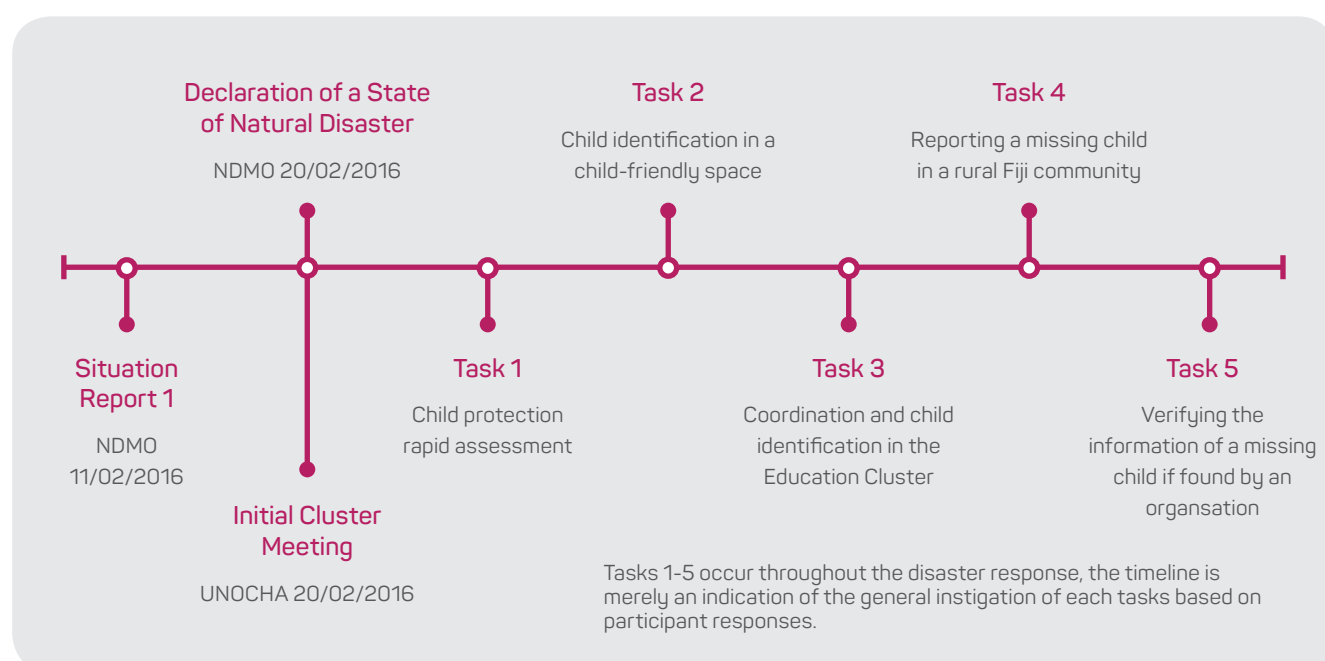


Figure 2: Progression of disaster response for Tropical Cyclone Winston.

within a DRE, particularly when the child is separated from parents and the community. The networks indicate that the identity management systems of the community protect children using a grassroots, bottom-up approach. Interviews revealed that parents are the initial layer of protection, proceeding to neighbours and then the community with the state as the overarching actor in formal identity management systems. However, findings show that community-based informal identity management process provides the best risk-mitigation practice.

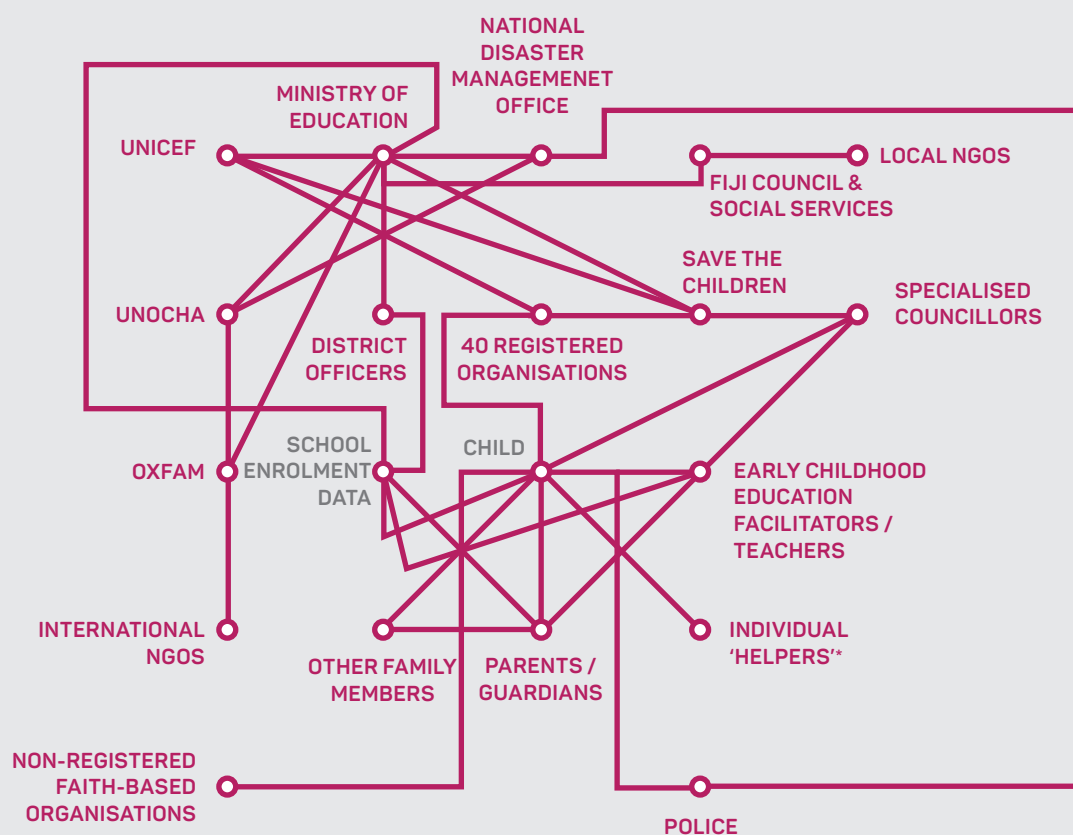
A key risk factor in traditional top-down identity management processes was data reliability and communication. The lack of reliability of formal identity meant it could not be 100 per cent effective. Community-based identity management, especially those formed by teachers, was the primary methods of identity management and protection

The risks of child trafficking and exploitation in the DRE in Fiji were not seen as high in this research. All participants stated this was due to the community-based culture of Fiji, where children are the community's

priority in a disaster. However, all participants stated that exploitation was present in Fijian society and that risks in a DRE were no higher than normal unless children were taken out of the community or were in evacuation centres. Participants emphasised that Cyclone Winston was unique to other disasters because most evacuation centres were in schools or early childhood centres. This meant that teachers had influence and responsibility in the child protection system. The teachers' familiarity with children in their localities filled gaps in formal identity systems. NGOs relied on community grassroots levels of identity management, intertwined with the top-down system. This only works when information sharing is present and consistent across all actors; when communication breaks down so does the identity management and protection process.

Non-state actor experiences during Cyclone Winston

In this study, the overarching responsibility of identity management systems was the state. This was identified as a unique aspect of the Fijian disaster response.



*Of the 40 registered organisations this included overseas state agencies. Not all agencies were reported as active. It is unknown how many remained active in the disaster response environment.

*Helpers refers to persons from overseas who went directly into the community and did not integrate into the cluster through the NDMO.

Figure 5: Coordination and child identification in the Education Cluster.

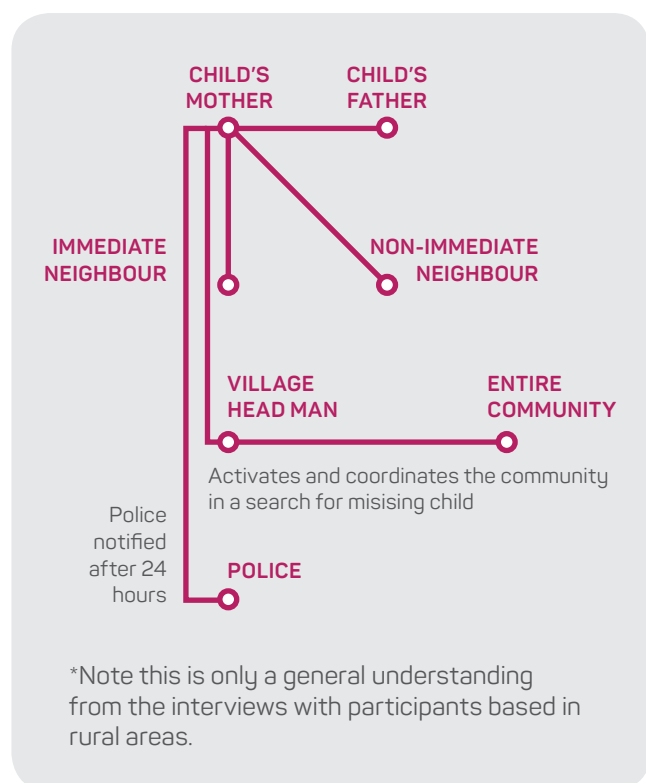


Figure 6: Task 4 - The Reporting of a missing child in a rural Fiji community (Koro Islands).

Participant 1 had significant experience in disaster response across three continents and stressed that the Fijian response was unlike that of other nations. For example, the child protection cluster was headed by the Department of Women, Children and Poverty Alleviation and co-led by Save the Children and UNICEF (Participant 3). This shows the top-down approach to policy implementation where the state remains the responsible actor. The two large Intra-Governmental Organisations (IGO) and NGOs as co-lead indicates the importance of non-state actors in the implementation of policy and systems.

The DRE of Cyclone Winston involved over 100 stakeholders with 42 organisations in the child protection cluster. Interviews revealed that state-led disaster response mechanisms were effective, however, the number of actors involved provided implementation challenges. Participants 2, 3 and 4 considered that duplication of response was a concern for organisations. Communication and implementation issues arose when stakeholders by-passed the cluster formation and proceeded with individual response plans. This lack of accountability to the state and processes meant organisations and individuals who worked separately exposed children to risks that are not easily tracked. Interviews revealed concern with reliability and quality of aid, specifically in psychological first aid provided to children by organisations and individuals outside the cluster system.

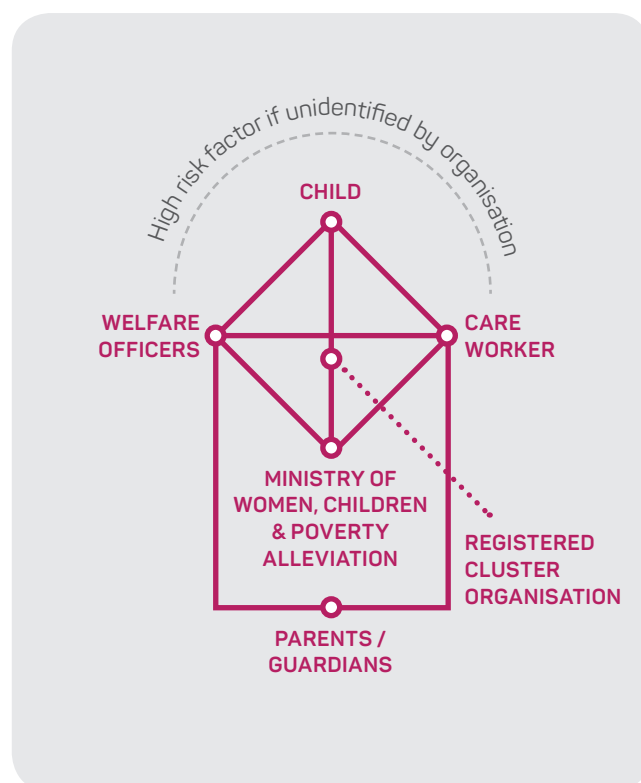


Figure 7: Task 5 - Verifying the information of a missing child if found by an organisation.

Conclusion

The DRE of Cyclone Winston was a complex environment with a multitude of state and non-state actors. The modified EAST method showed the identity management system was reliant on community actors, revealing that risks were escalated when children were taken out of the community. The EAST method provided a unique view of the dependencies between actors. Teachers, early childhood centre facilitators and village head-men played a key role in communicating and validating identification information. The lack of formal registration of children meant there were significant gaps in data for identity management. Limitations in the accurate recording of identity data meant that knowledge-based authentication was the primary verification method. Unaccompanied or separated children relied on welfare and case workers for family reunification. Interviews identified a high-risk factor for children who did not encounter an organisation, where data is lacking and that missing children are difficult to trace. Where an identity management system exists and verification mechanisms have geographical portability, risks to children are low. Further research is recommended into identity management systems and implementation where frameworks outside the community environment must be created to mitigate risks to children.

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ABSTRACT

Climate change projections indicate that low-elevation areas along the Queensland coastline will experience increasing adverse effects of submergence, coastal flooding and coastal erosion due to sea-level rise. Current and future climate change scenarios pose significant risks to coastal populations, economies, communities and the natural environment. Without planned pathways and predetermined trigger points for adaptation, coastal environments will remain susceptible to geophysical, hydrological and meteorological hazards. This paper describes hazards (heatwaves, bushfire, floods, storm surges, cyclones and coastal erosion) that impact on lowland areas of the Sunshine Coast region. This assessment is done in the context of converging disaster risk reduction and climate change adaptation strategies using a framework of Define-Analyze-Implement-Reassess.

Cumulative climate change influences and hazards affecting the Sunshine Coast

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Introduction

Projected changes in the climate and environment of the Sunshine Coast of Queensland, as well as throughout much of coastal eastern Australia, have been outlined by the CSIRO and BOM (2017), CSIRO (2016) and the Sunshine Coast Council (2014). The changes include continuing sea-level rise, higher minimum and maximum temperatures, more hot days and fewer cold nights, lower annual average rainfall and extended droughts, more frequent and more intense bushfires, more intense storms, increasing tendency for cyclones to track south, increasing risk from large hailstorms and an associated increase in storm surges along the coastline. Most of these changes directly exacerbate specific natural hazards (e.g. coastal flooding and erosion), but some changes can act synergistically to cause multiple or cascading hazards (Sidle *et al.* 2013). As such, regional protocols are being recalibrated to facilitate future planning and development in low-elevation coastal locations subject to sea-level rise and other climate change phenomena. However, more work and better data are needed to clarify climate-driven trends. It is in this nexus of climate change adaptation (CCA) and disaster risk reduction (DRR) where major challenges for governments and planners lie (e.g. Forino *et al.* 2014, Sidle, Gomi & Gallina 2017).

There is renewed focus on managing the consequences of climate variability threats by developing actions to protect current and future coastal environments and communities (e.g. beach renourishment, sand dredging, sea wall construction, foreshore protection). Evidence suggests that land-use planning and DRR strategies require close alignment to build sustainable and resilient communities (Burby *et al.* 2000, Bajracharya, Childs & Hastings 2011). While these are complementary processes to accommodate predicted climate change, there is a need for improved and ongoing downscaled hazard assessment using a comprehensive approach that embraces the cumulative effects and challenges related to climate change. There is also a need for improved collaboration and shared responsibility to adapt to changing hazard environments and to create motivated populations capable of responding (Attorney-General's Department 2011). The objective of this study is to identify the cumulative climate influences and hazards that are likely to impact on Sunshine Coast lowlands and to articulate knowledge gaps and converging strategies that support DRR and CCA.

Assessing climate change hazard risk

Once the temporal and spatial aspects of hazards and risks are understood, they must be translated into relevant controls and mechanisms for dealing with them (Attorney-General's Department 2011). They must be embedded into strategic planning to anticipate the range of threats that a changing climate may bring (Sidle, Gomi & Gallina 2017). There is general agreement that more effort is required to integrate DRR with CCA, as the two approaches converge at global, national and local levels (Asia-Pacific Network for Global Change Research 2014, Birkmann & Teichman 2010). The Define-Analyze-Implement-Reassess (DAIR) framework proposed by Sidle and co-authors (2017) emphasises the importance of first defining the temporal and spatial extent of planning efforts and whether hazards are chronic or episodic (or both) (blue areas in Figure 1). The link between DRR and CCA is then addressed by articulating different analyses (brown areas in Figure 1) and implementation strategies (yellow areas in Figure 1) for chronic hazards (e.g. sea-level rise, heatwaves) associated with CCA (as opposed to episodic hazards). Certain episodic hazards, like flooding and storm surges, can be affected by climate change, while other hazards may respond to tipping points that occur when chronic environmental changes decrease

ecosystem resilience to the point where catastrophic collapse of process functions occurs (Sidle *et al.* 2013, Woodruff, Irish & Camargo 2013). The risks associated with chronic hazard change emerge in a slow, but progressive manner, thus periodically reassessing hazard risk is essential (green area in Figure 1). The DAIR framework can help guide initial phases of planning based on improved understanding of changing hazard processes and occurrence across the urban-rural spectrum, as well incorporating multiple or cascading hazards into the decision-making process (see Figure 1).

Converging strategies

It is increasingly evident that DRR, CCA and hazard assessment are interconnected (Serrao-Neumann *et al.* 2015, Thomalla *et al.* 2006, UNISDR 2009). The terms DRR and CCA represent challenges to ongoing natural hazards and the emerging issue of cumulative climate change effects. Because DRR and CCA are interrelated via social impacts, weather and climate, and both are monitored and measured using similar tools and methods to reduce disaster risk (UNISDR 2009), both need to be considered in integrated approaches (O'Brien *et al.* 2008).

Natural hazard and climate change risk reduction strategies are recognised as areas of convergence (Thomalla *et al.* 2006) to the extent that they both need

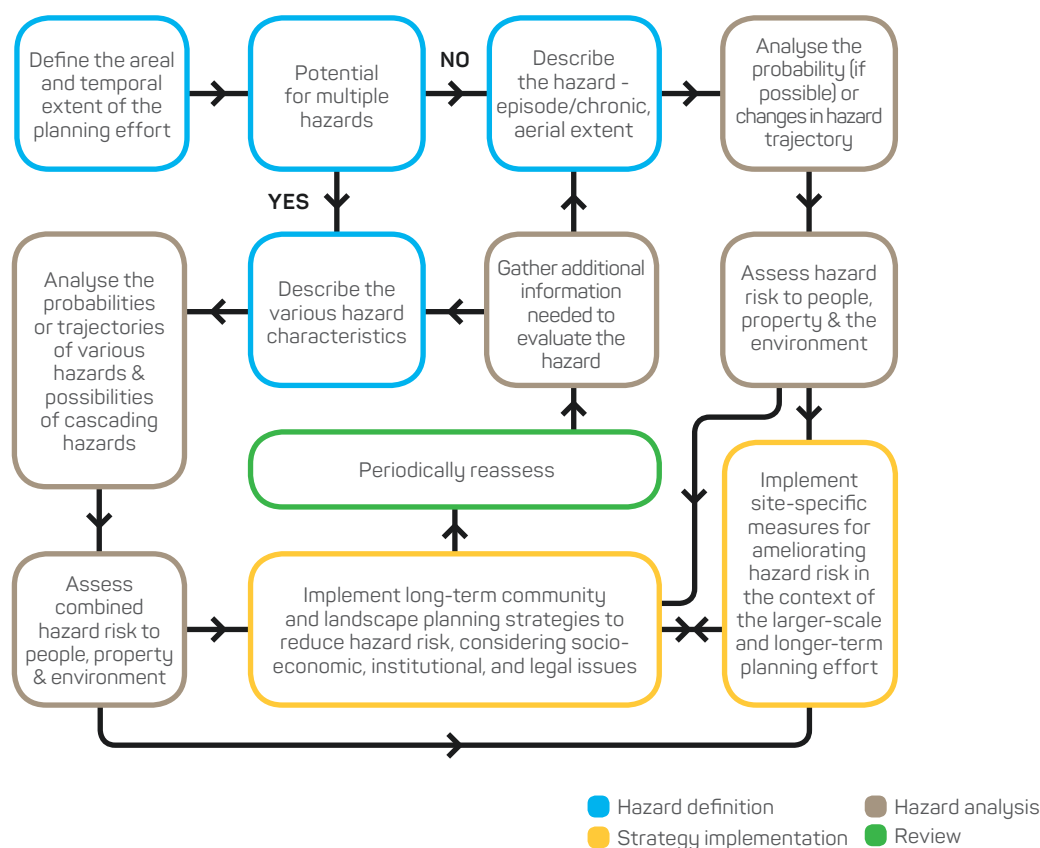


Figure 1: The DAIR framework for initial planning to minimise the effects of natural hazards.

Source: Sidle, Gomi & Gallina (2017)

to be embedded in sectoral risk reduction planning and urban development processes with a combined 'all vulnerabilities' and 'all resiliences' approach (Kelman, Gaillard & Mercer 2015). DRR and CCA integration moves beyond contemporary vulnerability and resilience strategies, merging into a single approach focused on simultaneous and common goals (O'Brien *et al.* 2008, Kelman, Gaillard & Mercer 2015). Despite the convergence of these phenomena, there remains a psychological blockage of their respective commonalities (Thomalla *et al.* 2006). This blockage may prevent hazard risk mitigation due to the uncertainties of climate change itself, future climate predictions and uncertainty of local climate variability (e.g. Deser *et al.* 2012). Cumulative climate-related hazard risks are likely to increase, making DRR and CCA key policy goals (Forino *et al.* 2014).

There is little current evidence of integration of DRR and CCA at local levels (Forino *et al.* 2014). However, it is anticipated that as experience with both DRR and CCA strategies grow, recognition that these two fields share a common focus and purpose will likely increase, reducing the vulnerability of communities, building community resilience to natural hazards and contributing to sustainable development (Forino *et al.* 2014, Thomalla *et al.* 2006). Rather than implementing CCA as a policy independent from DRR, as recently seen in the Australian context due to institutional constraints (Handmer *et al.* 2014), there is benefit in recognising that climate change is magnifying existing disaster risks and brings a range of emerging cascading hazards.

Climate change impacts on coastal hazards

Geophysical, hydrological and meteorological hazards affect the Sunshine Coast; some are episodic and others are chronic. Here we identify key hazards and climate influences that may impact on Sunshine Coast low-elevation sites under low-to-mid (RCP4.5¹) and high (RCP8.5) greenhouse gas emission scenarios. It is suggested that the DAIR framework can enhance understanding and reconciliation of the gaps in the DRR-CCA relationship for some of the most important hazards.

Temperature patterns and heatwaves

Increases in temperature are the most direct evidence of climate change. The longest continuous record of temperature and rainfall for the Sunshine Coast is from the Nambour weather station. Records from 1965 to 2017 show no significant trends in the maximum temperatures, while the annual mean of all daily maximum temperatures exhibit a very weak increase ($r=0.38$) over the 53-year period. As such, better climate data are needed to quantify temperature trends in this region.

Minimum temperatures are expected to increase by between 0.7°C to 1.3°C by 2030, with a further increase

of 1.2°C to 2.4°C under a RCP4.5 scenario, or 2.7°C to 4.7°C by the year 2100 under the high emissions RCP8.5 scenario (CSIRO and BOM 2016). The annual average number of days less than 2°C is also expected to decrease to near zero and the days above 35°C are expected to more than double by 2030 (CSIRO and BOM 2016, Sunshine Coast Council 2014).

Directly associated with temperature increases are heatwave hazards. Heatwaves pose the highest risk to life in Australia, accounting for more fatalities than all other natural hazards (Loridan 2016). Between 1844 and 2010, heatwaves accounted for at least 5332 deaths in Australia. Heatwave events are becoming more frequent, hotter, and longer across most of Australia, including the south-east corner of Queensland. The effects of more heatwave days include pressures on human health, crop and livestock losses, and higher energy consumption used for cooling and reduced productivity (NCCARF 2015).

Heatwaves inflict heavy financial losses. The heatwave in southeast Australia in 2009 cost an estimated \$800 million due to power outages and disruptions to road and rail transport systems (Chhetri *et al.* 2012). Evidence shows that electricity supply will come under increasing pressure, resulting in blackouts that affect telecommunications, transport, health services and vulnerable people dependent on power and communication systems. Heatwave-related deaths in Australia are predicted to reach 1250 by 2070, and up to 8628 deaths by 2100 (Bi *et al.* 2011). Between 1910 and 2015, Australia experienced an increasing trend of extreme heatwave (greater than 35°C) days (Figure 2).

Using the DAIR framework the temporal increase in heatwaves can be described as a chronic trend. Local implementation efforts to cope and adapt to heatwave events are required. Coupling knowledge from climate science and urban heat island effects with the design of heat stress resistance into the built environment presents a promising pathway for community heatwave management (Hatvani-Kovacs *et al.* 2016).

Bushfire

Closely associated with warming trends are increased risks of fire frequency and intensity (Grose *et al.* 2014). Bushfires are prevalent in south-east Queensland and the most severe fire weather typically occurs during spring and summer (CSIRO and BOM 2015). Increased temperatures, higher evaporation rates, lower average rainfall, low humidity and strong winds exacerbate bushfire conditions. In addition, high rainfall during summer and spring increases biomass, thus increasing risks of bushfire during an ensuing period of extended dry weather (Leavesley *et al.* 2017).

¹ Representative Concentration Pathways (RCPs) are greenhouse gas trajectories adopted by the IPCC for the Fifth Assessment Report in 2014. They describe four possible climate future scenarios – RCP2.6, RCP4.5, RCP6.0 and RCP8.5

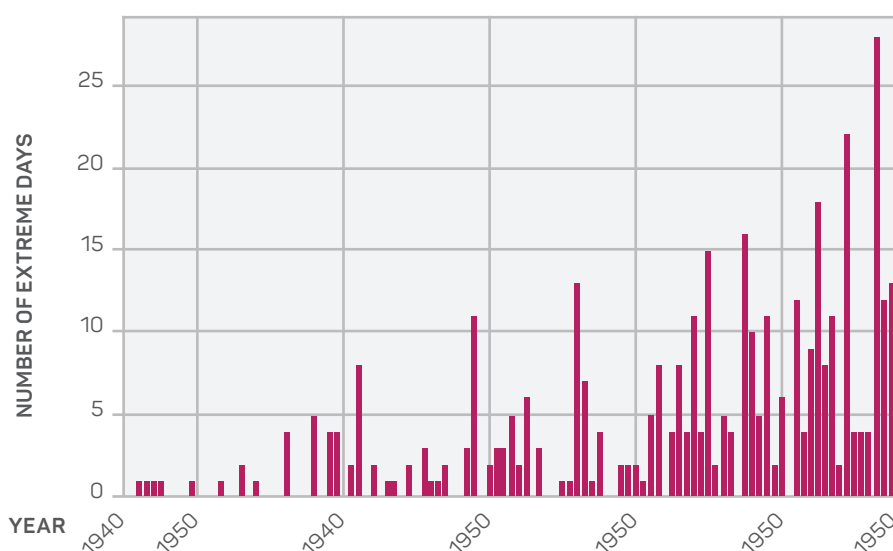


Figure 2: The increasing number of extreme heatwave days > 35°C from 1910 to 2015.

Source: CSIRO and BOM (2016)

The number of days with a severe fire danger rating is expected to increase by 13 per cent by 2090 under a RCP4.5 climate model, or 30 per cent under a RCP8.5 climate model. Extreme-rated fire danger days are expected to increase by 15-65 per cent by 2020 and could increase by 100-300 per cent by 2050 if future climate progresses at the RCP8.5 rate (Lucas 2007). It should be noted that these predictions need to be adjusted for localised peri-urban vegetation management and annual rainfall patterns.

While bushfire is an episodic hazard, increases in bushfire risk due to climate change will be gradual. This risk is complicated by urban encroachment into areas that are prone to bushfire. Mitigating fire risk in peri-urban areas includes using planned and controlled burns, maintaining fire breaks, removing excess vegetation and the readiness of fire crews (Leavesley *et al.* 2017). Zoning ordinances to restrict development in areas of high fire risk are also effective control measures for built environments (Hughes & Mercer 2009) along with the use of fire-resistant materials in construction.

Rainfall and flooding

Heavy rainfall can result in flash flooding, typically in smaller catchments of the Sunshine Coast, due to the hilly topography. Flash flooding is a significant threat due to the water depth and flow velocity, as well as short warning times associated with these floods. It is predicted that the frequency and magnitude of flash floods will increase with climate change and that historical flood time series data is not reliable for future flood estimates (Rahman *et al.* 2010). Flood estimates need to account for infrastructure that influences storm run-off, as well as for local climate variability (Rahman *et al.* 2010). Failure to consider climate change in flood frequency calculations may result in incorrect design storms calculations for water infrastructure. The

limited river flow and rainfall records for the Sunshine Coast compromise the assessment of risk trajectories associated with flood hazards and may be the weakest link in predicting extreme rainfall and run-off events for the region.

Climate models project variability in rainfall to range from an annual increase of 17 per cent to a decrease of 30 per cent by 2070. The 'best estimate' of projected rainfall change indicates an annual decrease under all emission scenarios (Sunshine Coast Council 2014). This is consistent with the modest declines in annual rainfall along the Sunshine Coast in recent years. Annual rainfall records for Nambour since 1953 exhibit a very weak declining trend ($r = -0.06$) from 1953 to 2017 (Figure 3). The subtropical ridge that lies in the mid-latitudes is expected to strengthen and move south by 2.5 degrees over the next century. This could decrease rainfall in the cooler months (Grose *et al.* 2015). These rainfall projections are also influenced by atmosphere and ocean climate systems, such as the El Niño-Southern Oscillation and the Madden-Julian Oscillation.

The DAIR framework can help coastal communities plan for and adapt to effects of climate change on flood hazards by defining the potential spatial extent of planned urban expansion and the possibility of multiple hazards (e.g. streambank erosion, interactions between fluvial and coastal hazards). Flooding is a typical episodic hazard that will be influenced by chronic climate change-driven alterations in precipitation and sea-level rise. Hazard probability assessment is compromised by poor data records; thus impacts of climate change on flooding are typically estimated. This weakness lends uncertainty to decisions about implementation of flood adaptation and mitigation measures (Figure 1). Recent implementation of the Sunshine Coast Disaster Hub facilitates regional mitigation by providing real-time information on flood inundation patterns, road closures, dam overflows, and power issues (Gallina 2017).

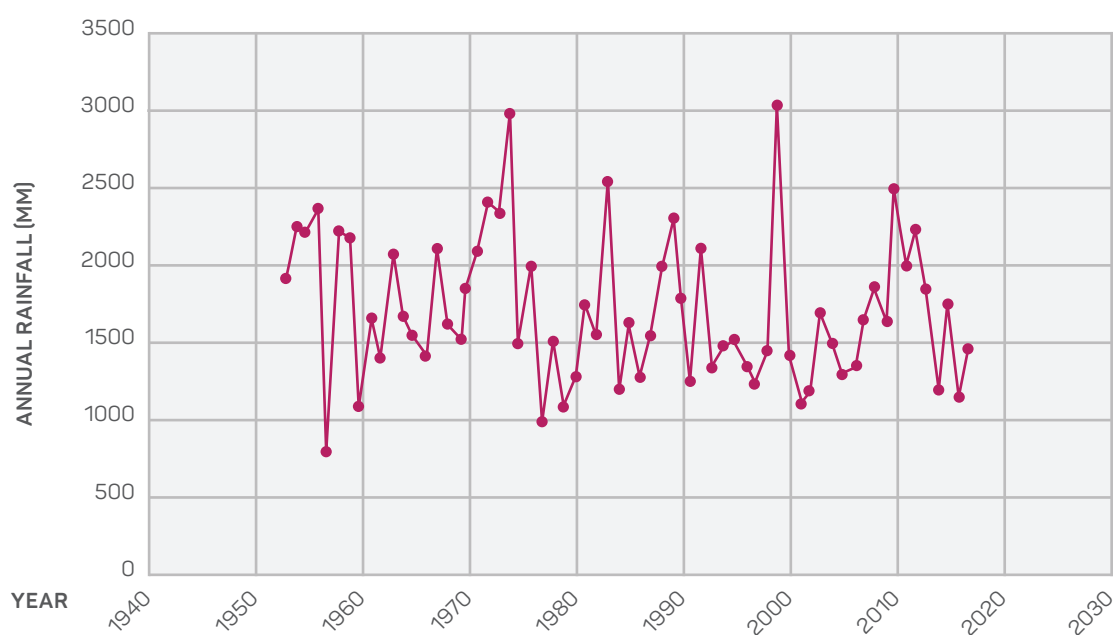


Figure 3: Mean annual rainfall time series from the Nambour weather stations in south-east Queensland (available data from 1953 to 2017).

Sea-level rise

Ongoing sea-level rise associated with climate change is one of the most chronic and widespread hazards and affects other episodic (e.g. coastal flooding) and chronic (e.g. coastal erosion) hazards (Sidle, Gomi & Gallina 2017). The Sunshine Coast sea level is expected to continue to rise with very high confidence (Dowdy *et al.* 2015). A sea-level rise of 88 cm by 2090 has been estimated using climate model scenarios simulated under the international Coupled Model Inter-comparison Project Phase 5 (CMIP5) (CSIRO 2016). Allowances for increased sea levels is required for a broad range of land-use and planning purposes. It is envisaged that future extreme tides and storm surges will be progressively affected by these increases and changes in storm dynamics (CSIRO 2016). The allowance of 88 cm as a likely sea-level rise provides guidance for sustainable living, future urban development planning, and DRR and adaptation activities. Projected sea-level changes for 2016, 2030 and 2090, relative to the baseline period 1986–2005 and the corresponding extreme sea-level allowance for Mooloolaba on the Sunshine Coast, are shown for low-mid and high emission scenarios (Table 1). These sea levels are the median and 5th to 95th percentile range.

Storm surges, cyclones and coastal erosion

Higher storm surges and larger spring tides are predicted in coastal zones with increased risk of low-elevation flooding as a consequence of sea-level rise. The predicted increase in mean sea level is expected to result in an associated increase in tidal extremes such as storm surges and king tides. The frequency of these events is also expected to increase tenfold for every 0.2 metres of sea-level rise (Hunter 2010). Coastline infrastructure, foreshores and populations will become increasingly vulnerable to the impacts of mean sea-level

rise. A potential 10 per cent increase in cyclone intensity and frequency, including a southward shift in cyclone tracks, may further increase storm tide levels along the coastline (Queensland Government 2011) due to influences such as the tidal phase, wave set-up, onshore wind force and local bathymetric effects.

Tropical cyclone winds and storm surges are historically the second most damaging natural hazard in Queensland (CSIRO and BOM 2017). Records show 207 known impacts from tropical cyclones along the east coast of Queensland since 1858. Based on CSIRO models (2030 to 2070), the number of tropical cyclones is expected to decline by nine per cent. However, an increase in individual cyclone severity and longevity is projected, potentially lasting several days to a week (Abbs, McInnes & Rafter 2008). The Queensland Government (DERM 2009) estimates an increase in cyclone intensity of 10 per cent by 2100 and forecasts that cyclones may tend to track southwards as global temperatures continue to increase. Cyclone tracking paths may also increase the one per cent annual exceedance probability of storm tide levels; global averages of tropical cyclones may increase 2–11 per cent by 2100 due to warming trends (Knutson *et al.* 2010).

Eastern Australia experiences large numbers of extra-tropical cyclones known as east coast lows (Dowdy *et al.* 2013). A high proportion of heavy rains occurring on the east coast is associated with east coast lows. Increasing greenhouse emissions will lead to fewer east coast lows late in the century, which is consistent with the observed trend of reduced activity in eastern Australia since 1890 (Alexander *et al.* 2011). East coast lows are now occurring in an atmosphere that has about seven per cent more water vapour compared to 50 years ago, increasing the risk of more intense east coast low events.

Table 1: Mooloolaba sea-level rise projections.

Source: CSIRO (2016)

Emissions	2016		2030		2090	
	Sea Level (cm)	Allowance (cm)	Sea Level (cm)	Allowance (cm)	Sea Level (cm)	Allowance (cm)
Low-mid	7.2 (4.6 to 9.4)	8.0	14.0 (13.9 to 14.3)	14.0	62.3 (59.9 to 65.9)	62.0
High	7.2 (4.7 to 9.8)	8.0	14.5 (14.3 to 14.7)	15.0	88.0 (84.3 to 93.4)	88.0

Coastal erosion is closely linked to sea-level rise, storm surge, storm tide inundation and cyclone activity. These interactions have the potential to impact on populations and built environments along the coastline. Sea-level rise together with the increased frequency of storm surges will result in increased risks for low-elevation coastal populations and the built environment (CSIRO 2016). Events that influence coastal processes, such as severe storms, tropical cyclones and east coast lows, may increase the overall wave regime and coastal erosion processes (Low Choy *et al.* 2010), adding further pressures on low-elevation coastal sites. The added risk of a southward shift in the subtropical ridge towards the Sunshine Coast would have a major impact on coastal foreshores (Climate Change in Australia 2015). Any increase in high magnitude storm waves from tropical cyclones, ex-tropical cyclones and east coast lows will reduce the natural defence mechanisms of the coastal zone (Goodwin, Mortlock & Browning 2016), possibly resulting in planform recession, which may further impact on the coastal built environment. The management of coastal erosion and the impact on coastal locations requires effective coastal hazard adaptation strategies (Low Choy *et al.* 2010). The DAIR framework (Figure 1) can help guide management decisions by defining the interactions of chronic sea-level rise with storm surge, cyclone and coastal erosion hazards; assessing probabilities of the respective hazards (including cumulative probabilities) and implementing effective planning and adaptation activities to reduce hazard risk (Sidle, Gomi & Gallina 2017).



King tides along Australia's east coast are natural events that happen twice a year. By 2060 to 2070, Australia could experience tides of at least this magnitude every month due to climate-change sea-level rise.

Image: Bruce Miller, CSIRO, www.scienceimage.csiro.au/image/10726

Conclusion

The convergence of DRR and CCA strategies suggest that long-term planning and extended engagement across all sectors and spatial scales are needed to support anticipated climate change-induced natural hazard scenarios. The DAIR conceptual model can be used to help bridge DRR and CCA and frame long-range planning decisions associated with coastal hazards affected by climate change. A major impediment for hazard risk assessment is the relatively short climate and sea-level records in south-east Queensland. The relatively short period of recorded disasters and climate

data have perpetuated a culture of disaster response rather than mitigation, as noted in the Brisbane River catchment (Sidle, Gomi & Gallina 2017). As such, innovations like the Sunshine Coast Disaster Hub (Gallina 2017) that provides real-time advice and information, together with improved data collection and analysis at local levels, are needed to support coastal populations, future land-use planning and infrastructure design. Without anticipatory hazard reduction plans and actions, risk for populations and assets that are exposed to coastal hazards will increase significantly in the coming decades.

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About the authors

John Gallina was the coordinator of Disaster Management Infrastructure Services with the Sunshine Coast Council. He led assessments for climate change adaptation and disaster risk management. He was heavily engaged in fire management in Queensland and was pursuing a PhD at the time of his death in September 2017.

Professor Roy C. Sidle is a Professor of Geography and Director of the Sustainability Research Centre at the University of the Sunshine Coast. He is a hydrogeomorphologist with research interests in natural hazards, catchment processes and environmental sciences.

Vale John Gallina

It is with sadness that we mark the passing of John Gallina in 2017.

Many people know John because of his exemplary leadership in disaster prevention with the Sunshine Coast Council and his interactions and work with various University of the Sunshine Coast programs. John had a passion for disaster prevention and took great pride in seeing his work put into action to benefit lives and livelihoods in the region.

John was pursuing his PhD with Professor Roy Sidle and co-supervisor, Professor Tim Smith at the University of the Sunshine Coast. His family and friends will miss John, his gentle manner, his tasteful humour and his energy and devotion to the hazards profession.



John Gallina with colleague Shirley Hall at the 2016 Resilient Australia Awards.

ABSTRACT

Flood levees are a commonly used method of flood protection. Previous research has proposed the concept of the 'levee paradox' to describe the situation whereby the construction of levees leads to a lowered community awareness of the risks of flooding and increased development in the 'protected' area. The consequences of this are the risks of larger losses in less frequent but deeper floods when levees overtop or fail. This paper uses the recent history of flooding and levee construction to investigate the 'levee paradox' through a study of flood preparedness and floodplain development in Lismore, NSW.

Flood levee influences on community preparedness: a paradox?

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Introduction

Flooding is Australia's second most deadly natural hazard after extreme heat and excluding disease epidemics (Coates *et al.* 2014). Floods are also destructive to the built environment and have caused approximately \$5.2 billion in insurance losses between 1967 and 2013 (Productivity Commission 2014). Engineering works in the form of flood levees (also known as stopbanks and dykes) are commonly used to reduce the frequency of flood damage. Smith (1998) suggested their popularity as a mitigation measure stems from their highly visible appearance, the perception that their protection is effective and that they are largely funded by governments rather than private individuals.

Levees are built to reduce flood damage and increase the time available for communities to evacuate. Unless constructed to the height of the Probable Maximum Flood (PMF), a flood with an Annual Return Interval (ARI) of around 10,000 years, levees will ultimately be overtopped. Levees may also fail by other means, such as seepage and piping. It is impracticable to construct levees to protect against all magnitudes of flooding.

Previous research suggested that following the construction of a flood levee, a community may incorrectly believe itself to be 'flood free' and, because of the subsequent reduction in flood frequency, awareness of the potential damage from flooding may diminish. This situation is made worse as new residents move into the area without having experienced a flood before. Collectively, these factors can lead to increased development on the floodplain behind the levee and reduced community preparedness; ultimately amplifying flood damages when they inevitably occur (Keys 2016; Smith 1998, 2002, 2003; Tobin 1995; Maddocks *et al.* 2007). This effect has been referred to as the 'levee paradox' (Smith 2002, 2003), the 'levee effect' (Tobin 1995) and the 'safe development paradox' (Burby 2006). Moreover, the 'levee paradox' may lead to a cycle of levee raising where communities demand higher levees be built after each levee failure to maintain an illusion of complete flood protection (Keys 2016, Wenger 2015, Smith 1998).

To date, there has been limited research to support the levee paradox hypothesis. Keys (2016) explored the concept in the city of Maitland, NSW and suggested that increased development in the area may have resulted from an unrealistic perception regarding the protection offered by the city's levees. In a similar vein, Pfister (2002), following flooding in Grafton, NSW in

2001 suggested that the town's levee, built 30 years previously, may have contributed to a poor evacuation response and a low community appreciation of the flood threat. Vince and Atkins (2009) described how Launceston City Council in Tasmania voted to ease planning restrictions for an area protected by levees in order to permit further development in the floodplain. That decision was rescinded after the federal and state governments threatened to withdraw funding.

In the US, Baldassarre and colleagues (2013) outlined how levees have been used to transform previously frequently flooded rural areas or wetlands into rarely flooded urbanised areas, thus setting up the potential for catastrophic flood events. Burby (2006) states that the damage resulting from Hurricane Katrina had been amplified by increased development of flood-prone lands behind levees.

Direct flood experience has been identified as a key determinant of increased community risk perception (Wachinger *et al.* 2013). It is also an important factor in influencing preparedness behaviours (Bubeck *et al.* 2012, Molino & Gissing 2005) and for reducing flood damage (Smith 1998). Smith (1998) suggested that smaller, more frequent flooding is important to maintain a community's skills in managing the effects of flooding. This implies that levee construction may have the effect of reducing such skills.

To examine the 'levee paradox' notion, a study of flood preparedness and floodplain development in Lismore, NSW was undertaken. The study took advantage of recent flood history and levee construction. This paper provides an overview of the study and proposes suggestions for further research.

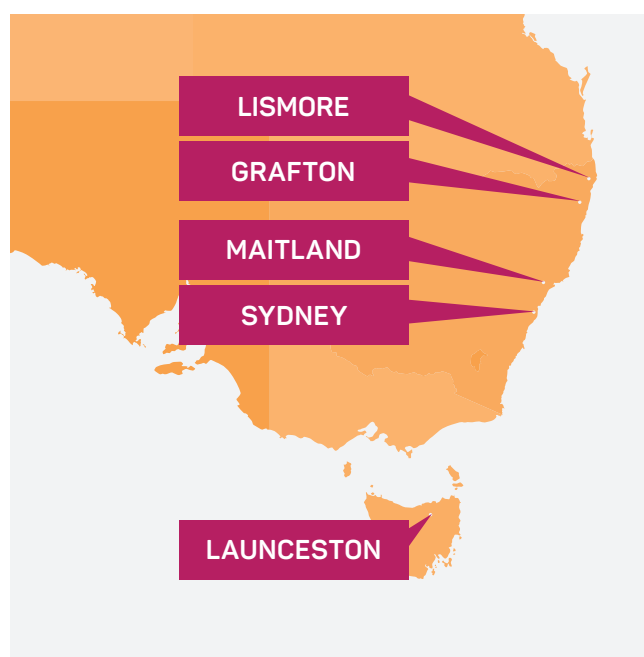


Figure 1: Location of Lismore in NSW.

Flooding in Lismore, NSW

Lismore is located in the NSW North Coast region (Figure 1) at the junction of the Wilsons River and Leycester Creek. The area has a rich history of flooding since it was first settled in the 19th century (e.g. Figure 2). At the time of writing, the Central Business District (CBD) comprised some 400 businesses and acts as a major regional centre for north-east NSW.

The community is known for its 'flood culture'. Previous studies have found that the community is well prepared for flooding (Gissing 2003, Smith 1981). Following flooding in 1974, Smith (1981) found that previous flood experience and flood warnings had resulted in relatively low damage. Some 26 per cent of businesses had been previously flooded more than five times (Smith *et al.* 1979).

After the CBD was flooded in 2001, it was again identified that businesses had avoided major losses as a consequence of preparedness measures undertaken and activated once flood warnings were received. These included mitigation measures such as raising shop fittings and equipment, use of mezzanine floors and implementing a Flood Action Plan (Gissing & Leigh 2001).

In 2005, a levee was constructed at the cost of \$21 million to protect the CBD from flooding up to the 1-in-10-year ARI event (Moorhouse *et al.* 2014). At the time of design, it was also intended to provide an additional three to four hours for businesses to evacuate (Lismore City Council 2002).

In 2014, Lismore City Council adopted an updated Floodplain Risk Management Plan that provided an overview of measures to manage the residual flood risk. These measures include land-use planning controls, flood warning systems, emergency management and community education and awareness activities (Lismore City Council 2014).

The CBD levee overtopped for the first time in March 2017, flooding the CBD. This was almost 12 years since it was constructed and 16 years since the Lismore CBD was last flooded from the Wilsons River. As of August 2017, it was reported that one in six businesses had not reopened (Murphy 2017).

Community education and awareness efforts have involved collaboration between the NSW State Emergency Service (SES) and Lismore City Council to inform business owners using brochures, signs, websites and public meetings. Messages encouraged businesses to develop and maintain a Flood Action Plan. Information provided addressed the flood threat, the efficacy of preparedness measures and how to implement them.

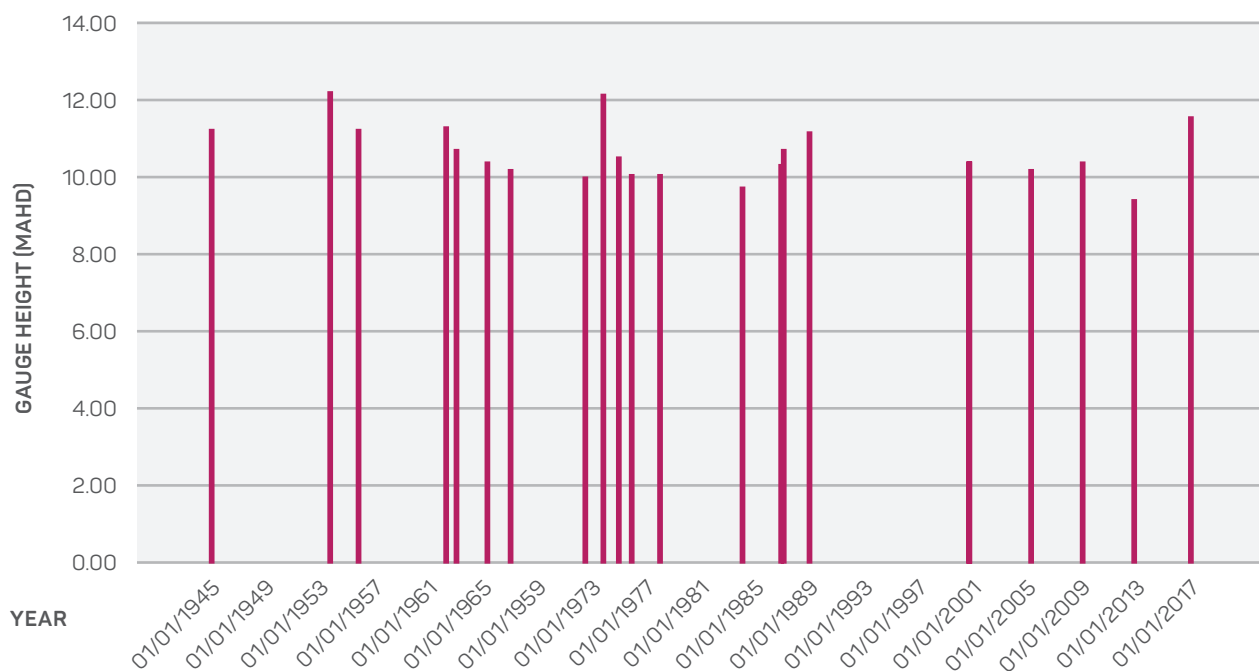


Figure 2: Occurrence of major floods recorded at the Lismore Rowing Club gauge.

Source: Bureau of Meteorology

Methodology

Preparedness survey of businesses

A telephone survey of business owners in the Lismore CBD was undertaken in November 2016 and February 2017. It used a structured questionnaire containing open and closed questions to draw out information about levels of flood preparedness and perceptions of flood risk. Respondents were targeted based on the location of their business operations within the flood-prone area of the CBD. In total, 50 responses, out of an estimated 400 flood-prone businesses, were collected from different business categories. Survey results were compared with a previous study of flood preparedness in Lismore (Gissing 2003) to determine if any changes in flood preparedness had occurred since the flood levee was built in 2005. Following flooding in March 2017, a question regarding perceptions of flood preparedness was included in a wider community survey with 15 Lismore businesses responding (Haynes *et al.* 2017).

The survey and methodology were approved by the Macquarie University Ethics Committee.

Assessment of floodplain development

For an assessment of the extent of development in areas protected by the levee, various planning documents including the Lismore City Council Floodplain Risk Management Plan and Local Environmental Plans were reviewed. Interviews were conducted with a key government officer and a local flood consultant about development controls in the Lismore CBD.

Results

Impacts on business preparedness

Over 70 per cent of businesses surveyed had operated in the Lismore CBD for more than 10 years with 56 per cent of respondents reporting they had previously experienced flooding. Flooding of the Wilson River that they recalled were those in 1954, 1974, 1984, 1987, 1989 and 2001.

Prior to the April 2017 flood, almost all respondents (95 per cent) were aware of the Lismore CBD levee. Respondent perceptions regarding how often they would expect to be flooded in the future varied from never to once every year. Forty-three per cent believed correctly that they would be flooded on average once every 10 years and 22 per cent believed once every five years. Thirty-two per cent overestimated the protection offered by the levee believing they would be flooded less than once in every 10 years on average (note: the overtopping ARI of the levee is 10 years).

Following the April 2017 flood, the additional survey of 15 businesses found that 14 of the 15 believed that the community was less prepared since the construction of the levee. Some of the businesses surveyed prior to the flooding acknowledged they had been lucky not to have experienced flooding and acknowledged the value of SES and council efforts to educate communities:

We're massively lucky that we haven't had any big floods for so long, new business owners don't really know what to expect.

I went to an SES meeting for business owners about a year ago about floods and learnt a lot, I think it should be mandatory to go to things like that and listen to what people who have had to deal with full-on floods have to say.

Some held unrealistic beliefs about the protection offered by the levee:

A flood would now have to be of biblical proportions with all the work done on the levee.

The levee protects us from floods so we haven't had to deal with any since it was built. I wouldn't expect to be flooded in the near future.

Others felt that:

The levee gives a sense of false security, people aren't really packing up any more when we get flood warnings. In the future when a big flood comes, people might lose a lot.

The majority of people (75 per cent) believed that the levee allowed more time for people to evacuate from the CBD in a flood event. Concerns were expressed, however, that new business operators who lacked flood experience would not know what to do when a flood occurred.

Regarding flood preparedness, the majority of respondents believed that since the construction of the levee it was still necessary to be prepared for floods with only nine per cent of respondents believing it to be unnecessary. However, 34 per cent of respondents believed it is less important to be prepared now than was the case before the levee was constructed. Thirty-one per cent of respondents invoked the threat of global warming to mean that it was even more important to be prepared for worse floods.

Eighty per cent of respondents had developed a Flood Action Plan. The completion of plans varied when compared with flood experience. Businesses that had

experienced flooding were 10 per cent more likely to have a Flood Action Plan than businesses without prior flood experience. Of those businesses that had developed plans, many had had them in place for some time with respondents stating: 'since moving in' and 'forever'. Only 37 per cent of respondents had documented their Flood Action Plan. This means it would be difficult for any employee unfamiliar with the business to effectively respond to flooding. The majority of plans (63 per cent) had not been updated in the last two years.

Reasons provided by respondents for developing a Flood Action Plan varied:

It is better to be safe and with the history of Lismore flooding we need to be prepared. However, the levee should stop this considerably from happening again.

Realising how quickly you have to act and it is better to do things in a controlled manner.

Everyone knows Lismore has a history of flooding. Spoke to locals who said not as bad as what it used to be.

Floodwater nearly breaching the levee and nothing in place in case the store was going underwater.

Reasons provided for not developing a Flood Action Plan were also varied including the following:

Do not have the skills and experience to prepare a Flood Action Plan.

Laziness and having too much faith in the levee. Having a mezzanine level [means it is] to easily raise stock.

People being new to the area.

A Flood Action Plan contains a variety of actions as shown in Figure 3. The most popular actions were to keep backups of important records (82 per cent), to have methods in place for raising stock and equipment (76 per

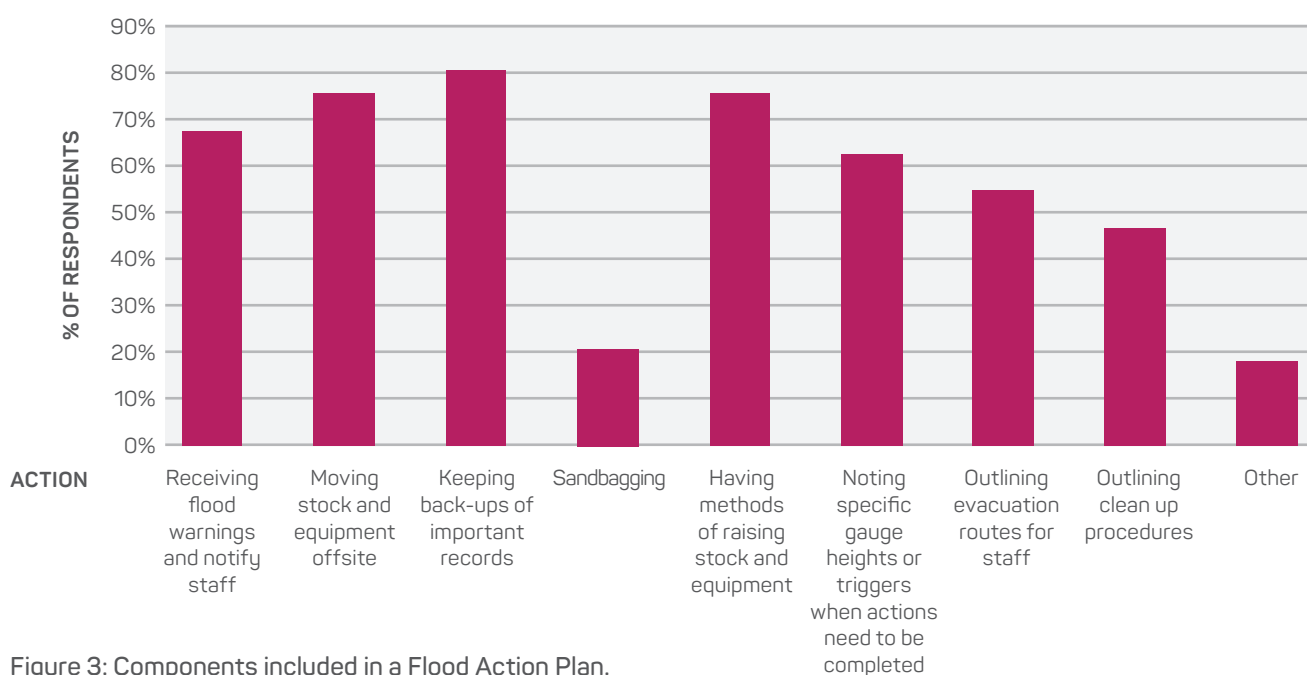


Figure 3: Components included in a Flood Action Plan.

cent), moving stock and equipment (76 per cent) and how warnings will be received and staff notified (68 per cent).

The majority of businesses (58 per cent) did not train staff on the implementation of the Flood Action Plan. Thirteen per cent of respondents who did use simulations or exercises.

The majority of businesses either did not have flood insurance cover (56 per cent) or were unsure if they did (31 per cent). Those who did not have flood insurance believed it was not available to them or that it would be too expensive.

Impacts on floodplain development

Lismore City Council administers land-use planning controls for the floodplain. Overall principles for development are listed in the Lismore Local Environmental Plan (Lismore City Council 2012) and include:

Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

- a. is compatible with the flood hazard of the land, and*
- b. is not likely to significantly adversely affect flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties, and*
- c. incorporates appropriate measures to manage risk to life from flood, and*
- d. is not likely to significantly adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses, and*
- e. is not likely to result in unsustainable social and economic costs to the community as a consequence of flooding.*

Specific proposed controls applying to development in the CBD as outlined in the Lismore Floodplain Risk Management Plan (Lismore City Council 2014) also include:

- a. An equivalent of 25 per cent of gross floor area of the building to be at or above the Flood Planning Level*
- b. A risk analysis report prepared by a structural engineer certifying that the design criteria adopted for the building will withstand the impact of flood waters and debris up to the 1-in-500 year flood ARI event.*

Such controls do not prohibit development within the flood-prone areas of the CBD, however, they attempt to manage the flood risk in line with a merits-based approach. This accounts for social, economic and environmental factors, as well as flooding (NSW Government 2005).

Over recent years, there has been new developments in the CBD such as a four-story commercial office on land that had remained undeveloped for some 50 years. Lismore City Council is actively encouraging development in the CBD through revitalisation of

infrastructure and allowing renovation of vacant second story office sites into living areas (Lismore City Council 2012). Though development is encouraged there does not appear to be a large demand by businesses to invest. This is most likely due to the flood risk. The council's primary motivation for encouraging development has been to improve economic activity in the town. This has not been explicitly linked to levels of protection afforded by the levee (Newman 2017).

Floor-level controls applied to new development will provide for some flood protection in excess of that offered by the CBD levee. However, increases in the population density of the CBD may reduce the benefits offered by the levee in terms of increasing evacuation time if the number of new residents is not considered in planning evacuation route capacity. There is also potential for increased risk of death or injury due to the increased number of people living and working behind the levee.

Discussion and conclusion

The construction of the levee in 2005 has had some impact on the perception of flood risk. This is evidenced by the number of respondents who believed the levee provides more protection than is allowed for in its design. In addition, respondents believed it is now less important to be prepared for floods than prior to the construction of the levee.

In 2002, Gissing (2003) undertook a similar study in Lismore by way of a face-to-face, structured survey of which 73 questionnaires were completed. In comparison to the 80 per cent of businesses that identified as having a Flood Action Plan in the 2017 study, Gissing (2003) found that almost all Lismore businesses in 2002 had a Flood Action Plan (97 per cent). This comparison may imply a decline in flood preparedness by business operators following construction of the levee; a decline that may have been worse in the absence of flood education programs offered by the NSW SES and Lismore City Council.

Though decisions to encourage development behind the levee were purportedly not explicitly linked to the flood protection offered, increased development will increase the risks posed by flooding. This study demonstrated the tensions that exist between maintaining prosperous sustainable communities and managing floodplain development to reduce future flood damages. This tension exists regardless of the construction of flood mitigation.

This study demonstrated the need to consider the social implications in the assessment of flood mitigation benefits and the importance of educational programs to sustain community flood preparedness. Such actions must be supported by risk-based land-use planning controls, emergency evacuation plans and flood warning systems. Only through such holistic approaches to floodplain risk management will the full benefits of flood levees be realised in reducing flood damage.

This paper presents the results of a single case study. Further work is required to establish a firm

empirical basis for the 'levee paradox' and how its manifestation might vary in different communities and with different forms of mitigation. It is speculated that similar influences to the 'flood paradox' on community preparedness could follow other mitigation interventions and preventive strategies used to control other hazards, such as the use of prescribed burning to reduce bushfire risk.

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ABSTRACT

In 2015, the Australasian Fire and Emergency Service Authorities Council (AFAC) commissioned a review of the evidence base to establish the rationale for capabilities central to effective incident management. The review focused on the capabilities required for senior AIMS Level 3¹ Incident Management Team roles. Results were used to inform standards for the AFAC Emergency Management Professionalisation Scheme. The review considered the human factors and emergency management literature as well as research conducted through the Bushfire CRC. Analysis and synthesis of the evidence identified three broad capabilities, each with three sub-capabilities important in incident management. The three categories were to model leadership and teamwork, to think and plan strategically and demonstrate self-awareness. This article outlines the evidence base and the capabilities developed through this review and contributes to the evidence base for incident management capability. Guidance on what will be needed in continuing professional development program is provided.

Evidence to support incident management team capability

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Introduction

There is increasing attention in the emergency management literature on the capabilities required of people managing emergency incidents (e.g. Flin & Slaven 1995, Hayes & Omodei 2011). Incident management team (IMT) members use complex sets of capabilities in often very challenging situations and environments. To develop standards for an Emergency Management Professionalisation Scheme (EMPS), AFAC commissioned a review of the evidence base to update and articulate the rationale for capabilities central to effective incident management. This article provides a summary of the evidence identified to inform the capabilities developed through this review.²

Central themes from the literature were considered, for example, high reliability organisations (Weick, Sutcliffe & Obstfeld 1999) and naturalistic decision-making (Orasanu & Connolly 1993). In addition, work undertaken through the Bushfire CRC and Bushfire & Natural Hazards CRC was studied (e.g. Hayes & Omodei 2011, Owen 2014) along with synthesis of that research work over a ten-year period (e.g. Ferguson *et al.* 2015). Finally, findings from industry initiatives including the Victorian Incident Management Team Training Project (IMTTP 2014) were reviewed.

The list of competencies provided by Hayes and Omodei (2011) relied on data collected in 2008–2009. As that list is now over eight years old, it contains some limitations and gaps. Emergency management in Australia has been influenced by significant events since that data collection, such as the Black Saturday bushfires in 2009 that resulted in a Royal Commission that initiated significant changes in the roles responsibilities of incident management (e.g. information sharing and sense-making).

This study updates the work of Hayes and Omodei (2011) by adding recent research and identifies new capability requirements (e.g. consequence management). The framework discussed in this paper also introduces concepts not covered in previous discussions of competencies, for example, the role of leadership in coaching and creating conducive team environments, sense-making and 'coping ugly' (Brooks 2014), the latter being a term used to describe a continuum of dynamic control between operational excellence at one end and luck at the other.

¹ AIMS is the Australasian Inter-service Incident Management System. Level 3 incidents are considered the most demanding type to manage and are described as high impact, high consequence and complex events.

² The full document is available at www.emps.org.au/Public/Publications/About_the_Scheme/Public/Publications/About_the_Scheme.aspx.

Previous work in describing competencies (Flin & Slaven 1995, Hayes & Omodei 2011) used a technical skills, teamwork and personal competency framework. Although this is a useful way of considering capabilities, the approach can lead to the aggregation of detailed behaviours under three high-level categories of team, technical and personal. It may therefore compartmentalise, and thus constrain, a view of the competencies used. In addition, categories such as personal attributes run the risk of emphasising personality traits rather than behaviours.

This approach is a more holistic one aligned with human resource development literature (Nagarajan & Prabhu 2015) that focuses on the activities people actually do. Moreover, application of multiple interdependent capabilities is called for because their applications in practice often overlap. For example, sense-making and planning may be considered the respective front and back end of decision-making (Mosier & Fischer 2010).

The term 'capability' is preferred to 'competency' to avoid confusion with how the term is defined in the vocational education and training domain. For the purposes of this paper, a capability refers to the cluster of behaviours expected from emergency management personnel to succeed in achieving objectives.

Background

The EMPS is an Australasian program to credential emergency management practitioners' skills, abilities and experience and support ongoing professional development. During 2015, the EMPS steering group developed a set of initial guidelines and draft capabilities for the scheme. As the work of the steering group progressed, AFAC recognised that an independent review of the capabilities included in version one and literature review would help ensure that EMPS was underpinned by a sound evidence base. To achieve this AFAC commissioned a small team of emergency management practitioners and researchers to review the initial capabilities identified, to ensure alignment with the literature and to realign the capabilities where necessary.

Method

The research approach was to consider the key activities and processes that are central to incident management. The literature was used to develop behavioural indicators for each of the sub-capabilities (e.g. Hayes & Omodei 2011, IMTTP 2014, CFA-DSE 2006, AFAC 2007). Search terms used to identify the literature to be reviewed included 'capability' 'performance' and 'emergency or incident management'. Databases searched included those drawn from the organisational development (Ebsco-Host) psychology and human factors (Psych-Lit) domains. Where the published research literature identified improvements in performance, these elements were turned into an indicator of behaviour (e.g.

self-management, see McLennan *et al.* 2014, IMTTP 2014).

The draft capabilities and descriptors were subsequently reviewed by 30 experienced incident management personnel. These personnel were either currently in operational incident management roles at Level 3, or were working at regional or state levels in supervising others and had a minimum of 20 years' experience in IMTs. In addition, representation came from all states and territories in Australia and included personnel from rural fire, urban fire, state emergency services and land management agencies. Interviews were between 30 and 90 minutes in duration. The interview process resulted in some activities and behaviours being amalgamated and others were set aside.

Overview of the capabilities

IMT members use complex sets of capabilities in often very challenging situations and environments. These capabilities require the sophisticated use of team, technical and personal elements for critical incident management activities such as sense-making, decision-making and consequence management.

The review identified three broad capabilities, each with three sub-capabilities important in incident management:

- Models leadership and teamwork - the ability to act with integrity, influence others and facilitate team efforts towards achieving common goals.
- Thinks and plans strategically - the consideration of multiple perspectives and scenarios to engage in strategic planning and consequence management.
- Demonstrates self-awareness - monitoring stress and fatigue, display resilience and agility and reflect and adjust to feedback.

A summary of the three core incident management capabilities and the respective subcapabilities developed for the EMPS are shown in Figure 1. It is important to note that these are the broad capabilities to work effectively in an IMT. A particular IMT context will require specific hazard knowledge and technical capabilities.

A set of 54 behavioural indicators was developed to support the operationalisation of the capability framework. These indicators highlight the types of observable behaviours associated with each capability and help explain the various actions and behaviours required for each of the capabilities. Table 1 provides two examples of these behavioural indicators. It should be noted that these behavioural indicators are not exhaustive. A complete set can be found online at www.emps.org.au/Public/Publications/About_the_Scheme/Public/Publications/About_the_Scheme.aspx

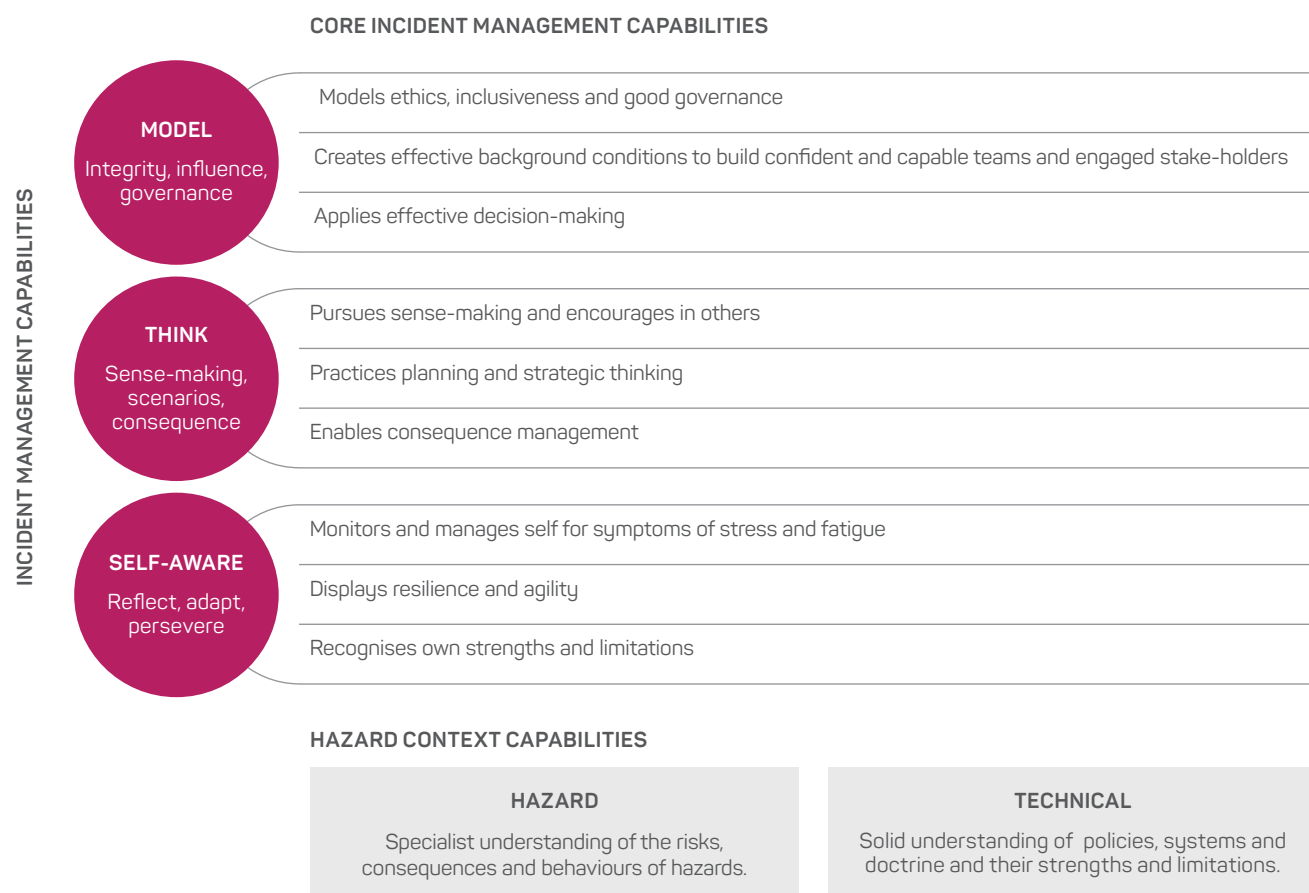


Figure 1: Core incident management capabilities.

Model leadership and teamwork

Models ethics, inclusiveness and good governance

Organisations require personnel to operate in an ethical manner and to ensure good governance. The requirement to be ethical is a common feature for professional-body membership (Friedman 2012). The International Association of Emergency Managers recognises the importance of ethical behaviour, requiring its members to adhere to a code of ethics emphasising respect, commitment and professionalism (Canton 2007).

Closely aligned with ethical behaviour is the requirement for incident management personnel to ensure good governance of the systems, processes, resources and people for which they are responsible. Over recent years increasing interdependence between social, technical and infrastructure systems has required incident managers to collaborate beyond traditional emergency service organisations (Owen 2014). This type of collaboration requires incident managers to model more inclusive behaviours, enabling all stakeholders to speak up and contribute. Organisational, cultural and political constraints and expectations (Canton-Thompson *et al.* 2008) also mean that IMT leaders must demonstrate a high-level of political acumen and judgement in their decision-making (CFA-DSE 2006).

Creates effective background conditions to build confident and capable teams and engage stakeholders

This capability focuses on the role senior IMT members play in creating a supportive environment where individuals and teams are able to function well and work effectively. Creating a suitable team environment enables and encourages participation. Modelling appropriate behaviours helps to set norms that support high standards of team performance (Sundstrom *et al.* 2000, Hayes 2014) and to shape a supportive team environment (a psychological 'safe' space) where members will speak up and offer constructive comment (Edmondson 1999).

Leadership plays an important role in shaping team activities and thus in harnessing the best use of team resources (Hayes 2014). Although there is often a focus on the 'leader', the creation of a suitable team climate helps other members to also undertake and share leadership.

Research by Owen (2014) highlighted the important role that leaders play in providing coaching and feedback to team members and that this led to improved team performance in simulations.

Applies effective decision-making

Decision-making is fundamental to the management of emergencies. A synthesis of the research indicated that effective decision makers are able to:

- effectively use metacognition to regulate their thinking and monitor metacognition in others (Frye & Wearing 2014, McLennan *et al.* 2007)
- apply various styles of decision-making depending on the context (Lauder & Perry 2014, Flin, O'Connor & Crichton 2008)
- take into account the available time, resources, degree of ambiguity, options available, and the number and degree of risks associated with the

options (Brooks 2014) and the impact of fatigue and stress (Omodei 2012).

It is important to note that the capabilities outlined here are closely interrelated, for example, sense-making, planning and strategic thinking, consequence management, and self-monitoring/management support effective decision-making. A key observation from the literature is that decision-making is entwined with

Table 1: Examples of behavioural indicators for capabilities and sub-capabilities.

Capabilities and subcapability	Behavioural indicators
Models ethics, inclusiveness and good governance.	<ul style="list-style-type: none"> acts in accordance with the (EMPS) Code of Ethics and Standards of Professional Conduct treats others with respect applies governance processes and procedures for the greater good displays courage to make difficult decisions.
Creates effective background conditions to build confident and capable teams and engaged stakeholders.	<ul style="list-style-type: none"> creates a collaborative team climate (e.g. communicates in a way that is open, direct, measured and approachable) pursues honest and open input and feedback responds promptly and constructively to questions and concerns raised monitors team member capability and addressing any dysfunctional behaviour or gaps.
Applies effective decision-making.	<ul style="list-style-type: none"> employs timely decision-making that can be assessed as likely to be reasonable at a given point in time uses decision-making styles appropriate to the context and that demonstrates flexibility (e.g. balances the need for speed, thoroughness and inclusiveness with the time available) outlines clearly the triggers that would require a decision change clearly communicates decisions made to ensure intent is achieved.
Pursues sense-making and encourages in others.	<ul style="list-style-type: none"> establishes mechanisms for testing and improving situational awareness identifies knowledge gaps, uncertainty, threats and emerging issues so that these can be managed seeks alternative opinions and perspectives including contra-indicators projects possible outcomes based on information and intelligence gathered, weighing up difference sources of credibility.
Practices planning and strategic thinking.	<ul style="list-style-type: none"> predicts options that reflect the information gathered through sense-making and evaluation explains the assumptions on which plans are based and the triggers for reassessing plans acts quickly to adjust the strategy as the context changes demonstrates creativity and flexibility in adapting plans to improvise in novel situations.
Enables consequence management.	<ul style="list-style-type: none"> identifies those who are potentially affected by the incident anticipates what might go wrong and any unintended adverse effects explains contingency planning for adverse effects matches communication styles to the audience.
Monitors and manages self for symptoms of stress and fatigue.	<ul style="list-style-type: none"> maintains focus and remains grounded when under pressure uses coping mechanisms to manage suboptimal conditions self-regulates emotions when under pressure in challenging circumstances monitors self-behaviour and any impact on others.
Displays resilience and agility.	<ul style="list-style-type: none"> cope with flux, the unexpected and incomplete information recovers quickly from setbacks and perseveres to get things done despite difficulties remains flexible when faced with suboptimal or novel conditions and improvises in response acts promptly to signs that action is not producing the desired outcomes.
Recognises own strengths and limitations.	<ul style="list-style-type: none"> appreciates limitations and avoids arrogance and hubris accepts feedback or criticism and adjusts appropriately and objectively critically reflects on own performance and takes responsibility seeks opportunities to extend knowledge, skills and experience.

analysis, action and evaluation (Orasanu & Connolly 1993).

People in complex situations often ‘think a little, act a little, and then evaluate the outcomes and think and act some more’ (Orasanu & Connolly 1993, p. 19).

In reporting some of the challenges that can arise between meeting operational and political needs in a crisis, Bosomworth, Owen and Curnin (2016) found that one challenge is political involvement in management of significant events. While it is recognised that in times of emergency or crisis, political leaders are expected to be informed and show visible leadership (Boin & ‘t Hart 2010), participants in this study argued that some political responses are inconsistent, ad-hoc and concerned with ‘messages for the media’ or a political position.

Think and plan strategically

Pursues sense-making and encourages it in others

Sense-making is the act of rationalising or reassessing ongoing activities in order to make meaning of them (Barton & Sutcliffe 2009). Barton and colleagues (2015) noted that sense-making is important to overcome the challenges of uncertain environments, enabling the use of flexible and improvisational approaches.

Practices planning and strategic thinking

The practice of sense-making helps develop cognitive resources for planning and strategic thinking for individuals and teams. This is supported by gaining an awareness of the situation and anticipatory thinking.

Enables consequence management

Consequence management involves the ability to identify and evaluate the consequence to communities of what is happening, and what is likely to happen, as a result of the incident and the proposed actions of responders. In this way, decision-making and implementation leads to the best possible outcome for those affected by the incident.

Demonstrate self-awareness

Monitors and manages self for symptoms of stress and fatigue

A key skill, metacognition, is important in supporting monitoring and management of one’s self. The literature associated with this capability highlights the need for recognition of physiological and cognitive impairment (via fatigue or stress) and the importance of self-management (McLennan *et al.* 2014).

Displays resilience and agility

The incident management environment can be highly demanding. Various projects have highlighted the central role resilience plays in effective incident management (e.g. AFAC 2007, IMTP 2014). The dynamic decision-making environment of incident management requires significant agility and adaptability (Wieck & Sutcliffe 2007).

Recognises own strengths and limitations

Most professional bodies expect that members have self-awareness and can acknowledge their respective strengths and weaknesses (Friedman 2012). Being reflective of one’s strengths and limitations is critical in incident management because personnel acting with arrogance and hubris can be dangerous (Barton & Sutcliffe 2009).

Conclusion

Considering these capabilities as clusters of behaviours underlines the multifaceted nature of the coordination, interpersonal and thinking abilities required to manage complex incidents. Although the focus of this review was on the capabilities required for AIIMS Level 3 IMT roles, the capabilities identified are pertinent to less complex types of incidents.

Given the demanding nature of the capabilities required by senior IMT personnel, emergency services organisations need to consider how to best support their personnel via professional and continuing development. AFAC has considered this issue and has published guidelines on continuing professional development programs as part of the EMPS.

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ABSTRACT

This paper outlines aspects of gender disparity in disasters and emergency management captured in Australian research and the resulting establishment of the Victorian Gender and Disaster (GAD) Taskforce. The achievements and learnings of the collective, collaborative and broad-based GAD Taskforce over its three-year tenure (2014–2016) are discussed. The primary aim of the GAD Taskforce was to reduce the compounding effects of gender on disaster impacts. Its success was due to initial high-level membership, inclusion of women's health and other broad-based organisations, regular well-attended meetings and willingness of members to present a gendered analysis of their organisation. Existence of the GAD Taskforce facilitated access to a critical mass of professionals with gender and disaster expertise. Limitations to achievements of the GAD Taskforce emerged from new members not having decision-making authority and notable gaps in representation from the senior management of emergency management organisations. This paper and other documents can be used by subsequent groups working on gender or diversity to build on the achievements of the Taskforce. It will be important for such new groups to consider the threat to gender equity that 'diversity and inclusion' intrinsically holds.

Victoria's Gender and Disaster Taskforce: a retrospective analysis

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Introduction and background

If not for the Taskforce we wouldn't have the National GEM [Gender and Emergency Management] guidelines, the Lessons in Disaster training package and certainly the attention of the emergency services organisations and the realisation of the necessity to factor gender as the main consideration on the journey to culture change.

GAD Taskforce member 2016

The GAD Taskforce was created for a three-year term in 2014 and was co-chaired by the Victoria Emergency Management Commissioner and the Executive Officer of Women's Health Goulburn North East. It was resourced by Emergency Management Victoria (EMV), the Department of Health and Human Services (DHHS) and the GAD Pod.¹ Over the three years, the Taskforce met 14 times with an average attendance of 18, including local government, women's health, academics, community members and senior managers from the emergency management sector. Emergency sector membership spanned organisations such as Victoria Police, the Country Fire Authority, the Metropolitan Fire Brigade, DHHS, Department of Premier and Cabinet, Department of Environment, Land, Water and Planning (DELWP), Emergency Services Telecommunications Authority (ESTA), the Victorian State Emergency Service, Victoria Red Cross, Save the Children and others.

The aim of the Taskforce was to reduce the compounding effects of gender on disasters. The first two objectives related to transforming the work environments of emergency services organisations to welcome women and discourage harmful masculine stereotypes. These and other objectives relating to embedding a 'gender lens' to organisational culture, systems and the Taskforce itself, is where most of the work was focused. Other

¹ The GAD Pod is an initiative of Women's Health Goulburn North East (WHGNE), Women's Health in the North (WHIN) and Monash University Disaster Resilience Initiative.

aims related to improving gender-specific and diversity-specific support and respect. Three foundation documents were collaboratively written and accepted; a foundational document with aims and objectives, terms of reference and a work plan.

The objectives and work plan were ambitious and a great deal has been achieved. Having completed the initial work plan, a broader Diversity and Inclusion Framework was introduced in Victoria to develop these themes into the future.²

Objectives

The seven objectives were collaboratively developed with input from 11 taskforce members:

1. To transform the work environments and practices of emergency services organisations so that women find working in them to be welcoming and inclusive.
2. To transform the work environments and practices of emergency services organisations so that men feel encouraged to work against harmful, destructive, conscious and unconscious masculine behaviours to self and others, and feel less pressure to engage in them.
3. To improve the gender-specific support that men and women in emergency services organisations and other EM organisations receive after disasters.
4. To achieve the Objectives 1-3 in ways that improve respect for the needs of diverse groups, for example culture, sexuality, age, in relation to how it intersects with the issue of gender.
5. To improve the gender-specific support that men and women, along with boys and girls, throughout the community receive after disasters.
6. To embed a gender lens across culture and systems relating to disasters to improve community outcomes following future disasters.
7. To ensure efficient and responsive Taskforce planning, reflective of gender equity and representative of the principles of the foundation document.

Why gender matters

The need for a body such as the GAD Taskforce became apparent following research on men's experiences of the 2009 Black Saturday bushfire and the Just Ask: Experiences of Men After Disasters conference in 2013 where it was launched (Parkinson & Zara 2016, Zara & Parkinson 2013, Zara *et al.* 2016).³ The research found that men were expected to 'protect and provide' even when this was clearly not possible on Black Saturday and in its aftermath. High expectations of men to cope and not admit any weakness led to reluctance to seek help, and career penalties for those who did.

There is great strength in speaking through the voices of the people most affected. A year earlier, research exposing increased violence against women after Black Saturday was launched to a packed conference: Identifying the Hidden Disaster (Parkinson 2012, 2017; Parkinson Lancaster & Stewart 2011; Parkinson & Zara 2013; Sety 2012). The findings resonated with delegates, with one writing, 'It's time the lid was lifted on this'. At these two conferences—a year apart—research participants spoke eloquently and connected emotionally with those present. The effects on women and men of the worst recorded bushfire in Australia were raw and unsettling and had to be addressed. The GAD Taskforce was an important first step.

Alongside this, understanding of the differential experiences of disaster by women and men had been deepening through an expanding body of research in New Zealand (Houghton 2009a, 2009b) and Australia. Australian research traversed portrayal of women and men in the literature (Findlay 1998), gendered bushfire knowledge, firefighting skills and risk perception (DeLaine *et al.* 2008, Eriksen 2013, Goodman 2010), women's decision-making in bushfires (Proudley 2008) and increasing numbers of women dying in fires (Haynes *et al.* 2010). Financially, women suffer setbacks from disaster more profoundly. They disproportionately bear the responsibility of family and community emotional recovery (Parkinson 2011, Shaw, van Uren & Lang 2013). In the community, cultural norms risk women's lives. Men are seen as head of the household (Alston 2005) and, in an emergency, this affects women's freedom to evacuate (Tyler & Fairbrother 2013).

Gendered analysis of aspects of the emergency management sector are explored in relation to the experiences of female volunteer firefighters (Maleta 2009) and aspiring professional firefighters and leaders (Parkinson, Duncan & Hedger 2015). Also explored are gender-blind policies, data reporting and recovery planning (Hazeleger 2013), the gendering of men in disaster management and responses (Pease 2014, 2016) and male privilege in emergency management (Eriksen 2014). As Eriksen (2014) writes:

Be it in the sizing and cut of uniforms, protective behaviour based on perceived physical weakness, the power dynamics in mixed gender settings, organisational structures that place hours on the fireline as a prerequisite for attendance of training courses that, in turn, are a requirement for being on the fireline in the first place, or (white) masculine privilege hidden in the disguise of 'the norm'; it all contributes to the undermining of confidence and the obscuring of competence.
Eriksen 2014, p. 146

2 Equity and Diversity Framework. At: <https://files-em.em.vic.gov.au/public/EMV-web/Emergency-Management-Diversity-and-Inclusion-Framework.pdf>

3 The foundational research on women and men was conducted by organisations that later became the Gender and Disaster Pod: Women's Health Goulburn North East, Women's Health in the North and Monash University Disaster Resilience Initiative.

In the emergency management workforce, gender disparity is stark. Australia's gender-gap rank among 144 countries is rapidly dropping; now at position 48, down from 24 two years ago (World Economic Forum 2017). There is a persistent pay gap of between 15 and 19 per cent over the past two decades (Workplace Gender Equality Agency 2017).

A recent report provided comprehensive sex-disaggregated employment and volunteer figures for 2014 across emergency organisations in Victoria. Of paid Metropolitan Fire Brigade staff, 90 per cent were men. Of paid Country Fire Authority staff, 71 per cent were men. Of DELWP (and networked organisations, e.g. Parks Victoria), 62 per cent were men. Of CFA volunteers, 79 per cent were men and of Victorian SES volunteers, 70 per cent were men (Parkinson *et al.* 2015). In 2014 at DELWP, men held 72 per cent of accredited fire and emergency roles and 80 per cent of strategic, incident and team leadership roles (*ibid.* p. 4) and 85 per cent of seasonal firefighters in 2014-15 were male (*ibid.* p. 7).

The report found that women have fewer role models and networks than men and face barriers in accessing training and release for deployment. The culture is male, described as 'a boys' club' and 'blokey' (Parkinson *et al.* 2015), echoing previous research (Ainsworth, Batty & Burchielli 2014).

Despite such examples of gender discrimination both within and outside the emergency management sector and differential experiences of disaster by women and men, there was little appreciation of the relevance of gender to disaster when the GAD Taskforce was first established in January 2014.

Gender relations context 2014-2016

The existence of the GAD Taskforce spearheaded gender as an issue for a male-dominated sector. Its successes and its shortcomings reveal much about gender politics at the time. The broader context equally tells this story. Australia had an extremely effective Sex Discrimination Commissioner, Elizabeth Broderick, the Prime Minister announced \$100 million to stop domestic violence, a YouTube clip demanded respect for women in the military from (then) Chief of Army Lt. Gen. David Morrison that went viral with 1.7 million views and the advocacy of Rosie Batty confronted men's violence against women.

During 2014-2016, there was a focus on both gender equality and violence against women in Victoria. VicHealth had earlier noted that a key determinant of violence against women is gender inequality (VicHealth 2011). There was a Royal Commission into Family Violence (Royal Commission into Family Violence 2016), a Victorian Gender Equality Strategy Consultation and a Premier of Victoria who announced a target of 50 per cent of female appointments to government boards and courts (including emergency organisations such as the Country Fire Authority).

The Premier's leadership on issues for lesbian, gay, bisexual, trans and intersex people is another indicator

of a changed environment for equality. Other initiatives include:

- the 'Independent review into sex discrimination and sexual harassment, including predatory behaviour, in Victoria Police' (Victorian Equal Opportunity and Human Rights Commission 2015)
- the formal review and report on the resourcing, operations, management and culture of the Metropolitan Fire and Emergency Services Board and Country Fire Authority (O'Byrne 2015) and the ministerial working group to consider its recommendations
- the Victorian Equal Opportunity and Human Rights Commission 'Independent Equity and Diversity Review of the Country Fire Authority and the Metropolitan Fire Brigade'.

In addition were new equity measures for emergency management organisations. A leading example is the Victorian DELWP that, after initiating a research report into barriers for women in fire and emergency leadership roles (Parkinson, Duncan & Hedger 2015) instigated sustainable and structural gender equity measures (MacDonnell & Parkinson 2016).

Overarching these achievements, the Victorian Government Gender Equality Strategy aims to change attitudes and behaviours to reduce violence against women and achieve gender equality. One approach is to measure progress against 50 per cent targets for women, for example, among executives in the Victorian public sector, among councillors and mayors in local government and in new appointments to paid boards (Victorian Government 2016).

However, 'evidence of progress is not evidence of success' (Summers 2013) and opposition to gender equity measures remains strong. The Metropolitan Fire Brigade's 2015-16 recruitment drive to increase female firefighters to five per cent by June 30 2018 is a case in point (Metropolitan Fire Brigade 2016). Although 293 women applied in 2015-16 with many paying the \$150 cost to sit the exam, only 45 passed the exam and none passed the physical aptitude test. This lack of success by the Metropolitan Fire Brigade against its target for female representation indicates the need to carefully consider what diversity means. There were only three female applicants eligible for the 2017 recruitment course (Personal communication, Metropolitan Fire Brigade 14 December 2016). In contrast, soon after Christine Nixon was appointed as Victorian Police Commissioner in 2001, Victoria Police removed the 'wall and beam' test from pre-entry physical tests as this had prevented women from joining the force (Sugden 2003). Statistics from June 2016 showed 27 per cent of police and 40 per cent of recruits are female (Victoria Police 2016). The positive effects of more female recruits have been recognised, including for the ability of many women to de-escalate violence and for a reduction in corruption (Gutierrez-Garcia & Rodríguez 2016, Metz & Kulik 2008, Schuck & Rabe-Hemp 2007, Van Ewijk 2012).

Although a Victorian-based initiative, this paper has national implications. The achievement of Fire and Rescue NSW of 50 per cent women in their December

2016 graduating class was a historic and significant achievement (Hoh 2016). Equally, it has relevance to the international drive for gender equality in emergency management. The work of the GAD Taskforce shows consistency with international trends in coordinating bodies. For example, the United Nations Global Protection Cluster's *Gender Handbook in Humanitarian Action* (Inter-Agency Standing Committee 2006), the Minimum Standard Commitments to Gender and Diversity in Emergency Programming (International Federation of Red Cross and Red Crescent Societies 2015). GAD Pod initiatives were included in a United Nations publication on *Women's Leadership in Risk-Resilient Development* (Parkinson & Zara 2015).

The 'two steps forward and one back' movement towards gender equality has characterised the past three years.

Lessons

Male privilege not only thrives in Australian society (Pease 2010) but is ingrained in many parts of emergency management organisations. The dominance of men in numbers, in leadership roles and in frontline positions is evidence of this.

The research that highlighted the need for the GAD Taskforce presented the lived experience of men and women in the context of disasters and used participants' own words to describe the damage of stringent gender stereotypes and gender inequality. The narratives were from men and women in the community and from the emergency management sector.

Although recent policy directions appear to favour looking outside organisational functioning to focus on communities, there is much crossover between both groups. The original focus detailed in the first two objectives is still critical; to transform 'work environments and practices ... so that women find working in them to be welcoming and inclusive' and so that 'men feel encouraged to work against harmful, destructive, conscious and unconscious masculine behaviours ... and feel less pressure to engage in them'. Consequently, the principal recommendation would be to keep this important focus.

Key achievements

The GAD Taskforce has a number of achievements:

- Increasing understanding and personal change spoken of by senior men who were members of the GAD Taskforce.
- Influencing changed policies and practices to incorporate gender awareness and reduce gender inequality by participating organisations, e.g. annual review of ESTA policies and training regarding gender equity.
- Success in externally competitive national research funding with sequentially funded projects resulting in

the publication of articles in both the peer reviewed literature and professional literature and a number of book chapters (Enarson & Pease 2016, Parkinson, Zara & Davie 2015, Parkinson & Zara 2015, Parkinson & Zara 2016, Pease 2014).

- Research Report by the GAD Pod, *'Women in Fire and Emergency Leadership Roles: How can we improve the balance?'*⁴ A reference group headed by then CFA Chief Euan Ferguson extended the learnings. This has been followed with 10 workshops with greater than 200 DELWP staff.
- International conference presentations in Yokohama, Tokyo and Copenhagen and numerous national conferences and state and local forums.
- The Annual Claire Zara Memorial Oration on gender and emergency management as part of the Victorian Emergency Management conference with nationally respected speakers, Elizabeth Broderick, David Morrison and Dominic Lane in 2015, Professor S. Caroline Taylor AM in 2016 and Mary Barry in 2017.
- Facilitating and support of key projects including the DHHS and GAD Pod roadmaps resource, the National Gender and Emergency Management Guidelines and the Lessons in Disaster education project with more than 80 middle managers from the emergency management sector.
- Education of GAD Taskforce members by leaders in the field, including Dr Christine Eriksen, Professor Bob Pease, Dr Stephen Fisher, (then) Sex Discrimination Commissioner Elizabeth Broderick and Lt. General David Morrison (rtd.).
- Leaders including Craig Lapsley, Steve Fontana and Adam Fennessy in videos promoting gender equality in the sector.

Enablers of success

Attending meetings gave me space to focus on issues relating to gender and it has changed the way I think about my role in the emergency management sector. The meetings highlighted how far we've still got to go!
GAD Taskforce member 2016

The success of the Taskforce was due in a large part to its senior membership, including the Emergency Management Commissioner as co-chair. The fact that the other co-chair was the Executive Officer of Women's Health Goulburn North East signalled a willingness to share power and recognise gendered expertise. The co-chair arrangement immediately gave the Taskforce credibility and symbolised a different approach, diverging from traditional hierarchy.

The initial funding to the GAD Pod enabled the Roadmaps on the GAD Pod website and the broad-based distribution list for the monthly GAD Communiqué.

⁴ Women in Fire and Emergency Leadership Roles: How can we improve the balance? At: <http://delwp.vic.gov.au/about-us/women-in-fire-and-emergency-leadership>.

The seed funds from DHHS and EMV were augmented by project funding from NDRGS (Natural Disaster Resilience Grants Scheme), DELWP and NEMP (National Emergency Management Projects). Success in submissions to NDRGS and NEMP was greatly facilitated by support letters from the chairs of the GAD Taskforce, representing more than 20 key organisations.

While the GAD Pod led progress towards the objectives through funding from the DHHS and EMV, individual taskforce members and organisations also instigated change. A critical characteristic of the GAD Taskforce was that it resourced members to improve gender awareness in their own contexts and provided an authorising environment to champions of gender equity. GAD Taskforce members commented that their membership gave them the authority and confidence to raise gender issues at the highest levels within their organisation.

Contributors to success:

- The regularity of meetings (14) with five well-attended meetings in each of the first two years gave momentum and quickly built cohesion in the founding group. This was strengthened by equally regular Advisory Group meetings (10).
- A regular 'Around the Table' agenda item prompted members to share their successes in progressing the work plan, thereby creating cross-pollination of strategies.
- Networking between emergency services organisations and across the emergency management sector, local government, academic and non-government sectors was generative of ideas and collaborative action.
- The willingness of emergency services organisations to present a gendered analysis of their organisation. The act of compiling in-house gender statistics drew attention to the facts and stimulated meaningful discussion. One Taskforce member stated she appreciated hearing senior leaders discuss the issue transparently. Another felt more confident to call out sexist behaviours in her workplace.
- The existence of the GAD Taskforce enabled easy access to a critical mass of professionals with gender and disaster expertise. One example was the 'Paper in a Day' led by the Municipal Association of Victoria. It was convened to bring a diverse group together to write up a number of key resources for use by emergency management practitioners. The '16 Days of Activism Statement of Commitment' in 2015 was another way to raise awareness and produce resources effectively. Joint authorship of journal articles and shared conference presentations emerged from the Taskforce.
- Significant projects, like DELWP and the GAD Pod's research into barriers for women in fire and emergency roles, were a direct result of conversations and new connections made through the GAD Taskforce. Inclusion of the Annual Claire Zara Memorial Oration in Victoria's Emergency Management Conference was championed by the GAD Taskforce (especially Metropolitan Fire Brigade

members) and ensures ongoing first-hand connection with the sector. Close collaboration with Monash University through the Taskforce and Advisory Group meetings extended the reach of the gender lens to participants from across Australia's emergency management sector who attended Monash University Disaster Resilience Initiative forums. Organisations made internal changes as a direct result of awareness from GAD Taskforce participation. For example, ESTA established an annual review of gender equity policies and training and compilation of family violence data through Triple Zero calls.

Most of the work in the first years focused on Objectives 1, 2 and 4, which relate to transforming the work environments and practices of emergency services organisations. Objectives 5 and 6 refer particularly to community and culture in disasters.⁵ Key achievements of online training modules and the 1800 RESPECT partnership that developed the ABC community service announcement about violence in disasters on ABC television and radio are wide-reaching and on target. Objective 7 relates to the GAD Taskforce modelling positive change. It sought to do this through diverse membership. Community members, specialist non-government organisations and academics were included along with leaders from the emergency management sector. The original concept was to disrupt the normal hierarchy of emergency management meetings, leading to robust discussion.

A critical component was inclusion of the Gender Dynamics Observation. It began following an early presentation from Taskforce member, Professor Bob Pease, entitled 'Reflecting on Privileged Positions in Gender Inequality'. Within the presentation, it was noted that women were not often heard in workplace organisations, even when part of management teams; that men hear more easily from other men and are less comfortable being led by women or sharing leadership with women; that women have to work really hard to be heard and that being the lone female voice in leadership at senior levels of emergency management is disempowering. Members were keen to replicate the rich discussion that followed this presentation. This regular agenda item provided a unique opportunity to raise and discuss observations of gender inequality. As a result, the meetings reflected the aims of the Taskforce through disrupting usual or typical gendered dynamics and encouraging participants to be aware of unconscious biases and gender disparities in engagement. It became apparent that the terminology and concept of gender was often misunderstood in policy forums. Addressing gender issues required more than just addressing the composition and representation of women and men.

After two years of the gender dynamics documentation system, it was observed that the problem of power imbalances remained present, reinforcing that women can only challenge if they feel men are open-minded and are willing to listen.

⁵ Objectives are available at: <http://www.genderanddisaster.com.au/wp-content/uploads/2016/12/GADT-Workplan-achievements-2014-2016.pdf>.

Barriers to success

Command-and-control organisations are necessarily robust and the extent to which disruption to the status quo was achieved is debatable. Challenging discussion was mostly limited to members outside the hierarchy of emergency management. There were missed opportunities for equally valuing and learning from those with community or gender expertise. A clear example of this was the absence of senior leaders from the emergency management sector at the presentation by Sex Discrimination Commissioner, Elizabeth Broderick and Lt. Gen. David Morrison. The absence of some members of the GAD Taskforce and the loss of key staff with gender expertise or knowledge of this work limited success.

In 2018, membership of the GAD Taskforce became problematic with new members not in senior roles to make decisions on behalf of their organisations. Decisions about criteria for membership were delayed. This began about halfway through the GAD Taskforce, disempowering the group and stalling its progress as a united and focused body. Ongoing problems with teleconferencing meant that rural members stopped phoning in to meetings. This especially limited contributions from community members and those from more distant locations.

Recommendations

An opportunity exists for EMV's Diversity and Inclusion Framework to build on the achievements of the GAD Taskforce and to take the initiative further by learning from the challenges faced over the past three years. In particular, the threat to gender equity that a diversity and inclusion approach intrinsically holds when it omits the word 'gender'. It is important to recognise that gender should be prioritised, as half the population is women and women are part of every 'diverse' or marginalised group. Discrimination against women is socially constructed and must not be secondary to cultural sensitivities. This structural gender discrimination is intersectional and is more complex than 'respect' between individuals. Further, the incorporation of the National GEM Guidelines is expected to progress gender equality in emergency management.

Other recommendations for the Diversity and Inclusion Committee are to:

- include the Gender Dynamics Observation to ensure it goes beyond numbers, airtime and 'respect', to report on the gendered power dynamics observed
- incorporate people who bring specialist expertise in gender
- include community members and pay them to support their attendance
- address membership issues early
- hold regular presentations of gender analyses by leaders of emergency services organisations
- devote time to identifying how change happens. One GAD Taskforce member suggested it has happened over the past three years by:
 - diverse people working together in trusting ways
 - making issues visible
 - connecting with personal emotions.

Conclusion

In an environment where shifting research into practice is challenging, the GAD Taskforce has proven it is possible. Achievements against the work plan is evidence of this. Taskforce members indicated their 'head to heart' change and a deeper understanding of how their day-to-day work influences gender politics.

In reflecting on the three-year tenure, GAD Taskforce members spoke of the challenging nature of addressing gendered issues, particularly in the emergency management sector. Yet equally, they remained hopeful, pointing to incremental steps, sustainable changes and indeed, the leap in awareness by emergency services organisations of the centrality of gender. Unfortunately, this new gender awareness appears to have been accompanied by fear and a shift away from naming it. Issues must be identified and named to be acknowledged and addressed.

No change is achieved without struggle. A founding GAD Taskforce member wrote: 'Until each of us feels personally confronted by the concept of gender, and comes to embrace it, we'll each reinforce gender and disaster problems rather than alleviate them'.

GAD Taskforce member 2015

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The establishment and achievements of the GAD Taskforce would not have happened without the insight, intellect and persistence of Claire Zara. We remember and miss her.

The Foundation document, terms of reference and work plan are available at www.genderanddisaster.com.au/info-hub/gender-disaster-taskforce.

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ABSTRACT

People with physical disabilities are highly vulnerable during natural disasters. The interaction of individual, societal and environmental factors impact on their ability to prepare, evacuate and recover from disaster events. This paper provides a review of the current body of knowledge on the lived experiences of adults with a physical disability in natural disasters. Fifty-seven articles were identified in the primary search, with seven studies selected for review. The small body of research to date indicates that natural disasters present challenges to people with physical disabilities, and have significant negative impacts on their lives. However, there are a number of factors that enhance the resilience of people with physical disabilities. The aim of this integrative review was to describe the current body of knowledge on the lived experiences of adults with a physical disability in natural disasters and to identify gaps in the literature to inform future research.

Experiences of individuals with physical disabilities in natural disasters: an integrative review

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Introduction

People with physical disability are two to four times more likely than the general population to die or sustain injuries during disaster events (Fujii 2012). The risk to this group is greater than the general population due to the effect of impairments (e.g. motor, sensory, cognitive-linguistic) and activity limitations (e.g. mobility and communication) on their ability to prepare, evacuate and recover from disaster events (Rooney & White 2007, World Health Organization 2013, Zakour 2015). People with physical disabilities disproportionately experience poverty, lack of social support and structural exclusion. This increases their vulnerability during disaster events (Smith & Notaro 2009).

Evacuation planning must take into account the specific needs of individuals with physical disabilities. This includes mobility assistance, accessible evacuation shelters and reliable power sources to run equipment such as power wheelchairs and communication devices. Disability inclusive disaster risk reduction (DiDRR), is a relatively new phenomenon. The *Sendai Framework for Disaster Risk Reduction 2015-2030* (UNISDR 2015) is the first international framework to include the needs of people with disabilities.

Research on DiDRR is predominantly from North America and Asia and focuses on disaster preparedness and response (Llewellyn 2016). Encouragingly, DiDRR programs are being implemented in a number of locations in Australia (University of Sydney 2015). However, there is limited research available that investigates the lived experience of people with physical disabilities in natural disasters. This literature review found no studies that explore the lived experience of people with disability within the Australian context.

Method

An integrative approach was used to review the literature on this topic as it allows for examination of the diversity of research methodologies and summarisation of common themes within existing research. A systematic search was completed using the keywords: 'vulnerable population', 'disabled persons', 'disaster victims', 'nervous system diseases', 'neurological disorder',

'stroke', 'cerebrovascular disorders', 'cerebrovascular accident', 'disaster', 'cyclonic storms', 'tropical cyclone', and 'natural disaster' in various combinations. Databases used were Ovid Medline, CINAHL, Scopus and ProQuest.

The search included grey literature and examining reference lists of the articles retrieved. The search was limited to studies written in English using adult participants. No limits on year were applied. Physical disability was defined as neuro-musculoskeletal, sensory or cognitive-linguistic conditions. The review was conducted in three stages; by title, abstract and full text. The inclusion criteria applied was as follows:

- published in English
- studies exploring the experience of people with a physical disability in a natural disaster.

Exclusion criteria included research focused only on the preparedness of people with physical disability in a disaster with no mention of an actual disaster event.

Articles were appraised using the Critical Appraisal Skills Programme (CASP) 2017 critical appraisal checklist. The review process is illustrated using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart. Figure 1 illustrates the approval process.

Results

The seven articles included in the review consisted of four qualitative, two quantitative and one mixed methods study design. Data collection methods consisted of interviews, surveys and standardised psychological tests. Physical disabilities included conditions such as spinal cord injury, cerebral palsy, multiple sclerosis, vision impairment and hearing impairment that were studied individually (Duyan & Karatas 2005, Good, Phibbs & Williamson 2016, Takahashi & Kitamura 2016) or in combination (Fox *et al.* 2010, Gerber, Norwood & Zakour 2010, Rooney & White 2007, Van Willigen *et al.* 2002). The range of natural disasters included earthquakes, hurricanes, fires, floods, tornadoes and severe storm events that occurred in Turkey, the US, New Zealand and Japan.

Data quality varied across the seven articles with some reporting potential sampling bias (Fox *et al.* 2010, Rooney & White 2007, Takahashi & Kitamura 2016) or a small sample size (Duyan & Karatas 2005). Experiences of people with physical disabilities and disability organisation staff were combined in one study (Fox *et al.* 2010), clouding the disability experience of disaster. Research design rigour was only reported by

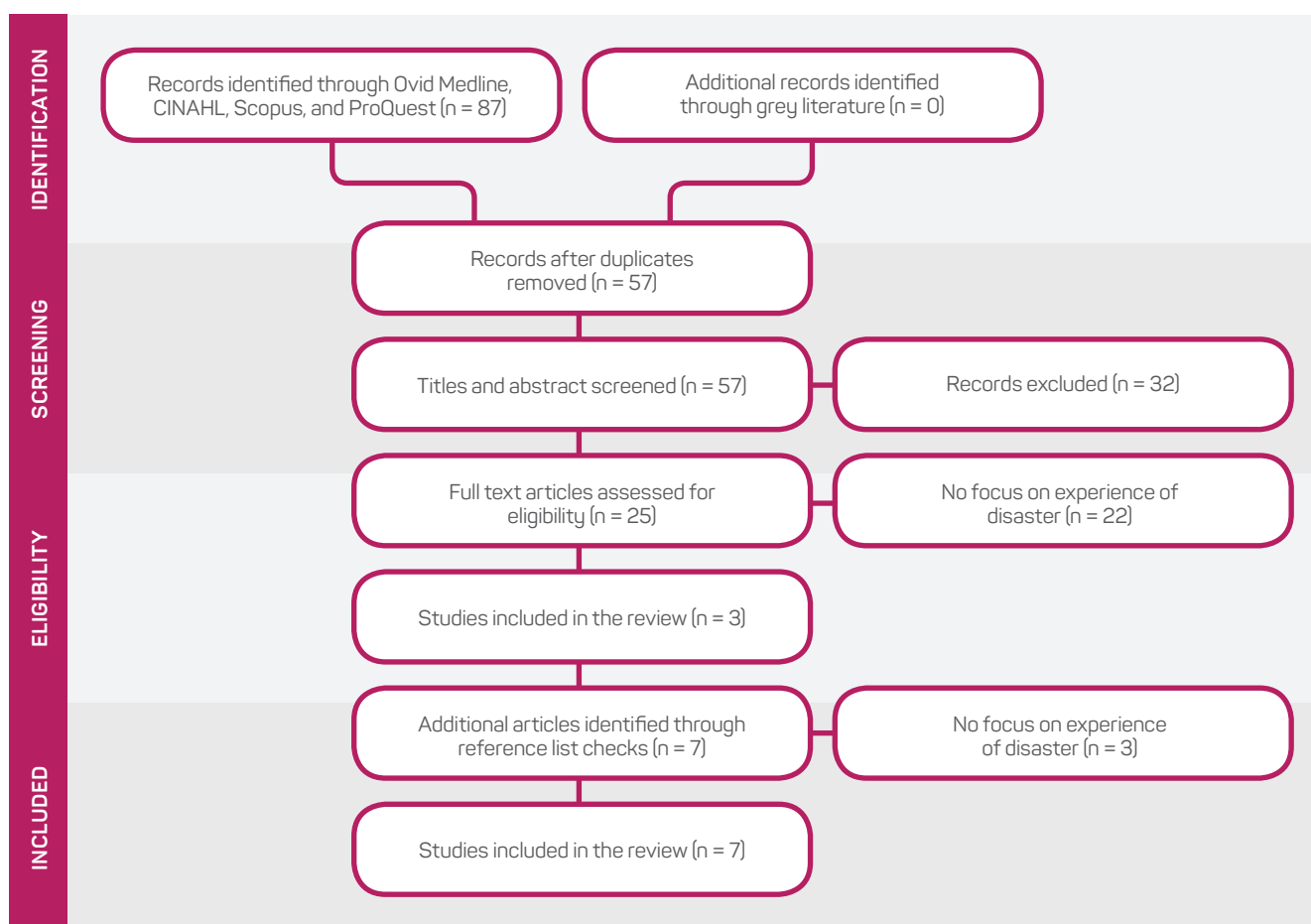


Figure 1: PRISMA flow chart for papers selected for this study.

Source: Adapted from Moher *et al.* 2009.

Fox and colleagues (2010), Rooney and White (2007) and Takahashi and Kitamura (2016). There was potential recall bias for all studies reviewed. Table 1 provides a summary of the articles used in this study.

Three overarching themes were identified across the studies in relation to the experience of people with disabilities during natural disaster events. Themes were:

- challenges faced by people with physical disabilities
- impacts of natural disasters on people with physical disabilities
- factors that enhance resilience to disaster events.

The challenges faced by people with physical disabilities in natural disasters

People with physical disabilities are less likely to evacuate from their home and wait longer to do so due to a lack of accessible transport and concerns that evacuation shelters will not accommodate their needs (Gerber, Norwood & Zakour 2010, Rooney & White 2007, Takahashi & Kitamura 2016, Van Willigen *et al.* 2002). Potential loss of independence in an evacuation shelter is particularly pertinent for those with visual impairments. These people express concerns about the safety of guide dogs, needing assistance with reading, writing, orientation and mobility in an unfamiliar environment. They also may experience difficulty accessing their support community due to changes in the physical environment from structural damage and debris (Good, Phibbs & Williamson 2016). This can cause disruption of routines and lead to isolation when medical care, the supermarket and family and friend's homes cannot be accessed (Good, Phibbs & Williamson 2016).

Lack of support to prepare, evacuate and recover from a disaster event is a recurrent theme across the literature reviewed. Absence of family support is a disadvantage and, for some, their social network may be other people with disabilities who may not be able to assist in an emergency (Fox *et al.* 2010). A lack of social support can exacerbate isolation and trauma, and recovery from an event can be slowed (Good, Phibbs & Williamson 2016). For those requiring personal carers, absence of their caregiver during a disaster event, whether sheltering in place or in an evacuation centre, presents significant challenges (Takahashi & Kitamura 2016).

A lack of communication from authorities poses a threat to people with physical disabilities during natural disasters. Disaster relief personnel need training in accessibility issues and to have a good knowledge of accessible evacuation options. Emergency announcements need to be accessible to those with vision or hearing impairment (Rooney & White 2007, Van Willigen *et al.* 2002). While radio broadcasts are regarded as the most accessible sources of information during a disaster, visually impaired people in Christchurch reported that radio broadcasts were of poor quality as misinformation was spread in the wake of the earthquake in 2011. This caused significant fear (Good, Phibbs & Williamson 2016).

The ability to manage one's own health condition is a significant challenge during and after a natural disaster (Fox *et al.* 2010, Good, Phibbs & Williamson 2016, Takahashi & Kitamura 2016). For people with cervical SCI for example, the ability to manage urinary and faecal control and pressure injuries while in an evacuation centre may be difficult. Regulating body temperature without air conditioning during a power outage or difficulty accessing medications cause significant anxiety (Takahashi & Kitamura 2016).

Impacts of natural disasters on people with physical disabilities

People with physical disabilities have reduced ability to prepare, evacuate and recover from disaster events. Experiences of decreased self-esteem, increased anxiety, emotional trauma and diminished personal safety are common (Good, Phibbs & Williamson 2016, Rooney & White 2007, Duyan & Karatas 2005). A lack of evacuation planning can result in people with physical disabilities being left behind during an evacuation, resulting in significant emotional trauma and potential loss of life (Fox *et al.* 2010, Rooney & White 2007). Additionally, property damage may prolong the recovery process and have negative effects on standards of living for people with disabilities. Studies by Van Willigen and colleagues (2002) showed that property damage was 50 per cent more likely for households with a disabled member following hurricanes in the US. The financial burden of this was almost four times that of other households. The study indicated that the consistently lower incomes of people with disabilities represents a significant barrier to recovery after disaster events.

Factors that enhance resilience to disaster events

Factors reported to enhance the resilience of people with physical disabilities to natural disaster events include disaster preparedness by individuals, communities and organisations (Fox *et al.* 2010, Gerber, Norwood & Zakour 2010, Rooney & White 2007, Takahashi & Kitamura 2016, Van Willigen *et al.* 2002). Preparedness measures include storing necessary items such as food, water, information devices, medications and essential items for a caregiver. Having an evacuation plan, pre-registration for emergency assistance, self-assessment of needs during a disaster and knowledge of a safe and accessible place to evacuate to, greatly improves preparedness. Having strong personal networks also helps with preparedness, evacuation and recovery post-disaster. This includes family, friends, disability organisations and specialised transport networks for people with a disability. For those with severe physical disability and high-care needs, having reliable caregivers during a disaster greatly reduces their vulnerability (Takahashi & Kitamura 2016).

Resilience through adaptation was also a common theme. People adapt during a disaster by doing the best they can with the resources they have available (Fox *et al.* 2010, Good, Phibbs & Williamson 2016, Takahashi & Kitamura 2016). They also learn from previous disaster

Table 1: Experiences of people with physical disabilities during natural disasters.

Title/Author/Year	Research design	Participants	Summary of findings
Effects of the 1999 earthquake on the completely blind living in and outside Marmara, Turkey. Duyan & Karatas 2005.	Quantitative-socio-demographic features as control variables. Self-esteem and state and trait anxiety measured as dependent variables.	Convenience sample: 66 from the earthquake region and 109 from the non-earthquake region.	Self-esteem scores were lower and trait anxiety scores higher for blind persons living in the earthquake region. Results persisted when socio-demographic characteristics were controlled for. Suggests the need to enhance self-esteem, minimise material losses and strengthen social supports.
The psychosocial impact of Hurricane Katrina on persons with disabilities and Independent Living Centre staff living on the American Gulf Coast. Fox, White & Rooney 2010.	Qualitative semi-structured interviews. Hermeneutic data analysis.	56 survivors of Hurricane Katrina – people with disabilities or those working with them.	Six major themes (faith, incredulousness, blaming others or oneself, family, adaptation and resiliency, and work and professional responsibility) help to explain the resilience of people with disabilities in adapting to disasters. Embracing universality of design and inclusiveness in disaster risk reduction at all government levels will improve the resilience of this vulnerable population.
Disasters, evacuations and persons with disabilities: an assessment of key issues facing individuals and households. Gerber, Norwood & Zakour 2010.	Mixed methods. Telephone and mail surveys. Statistical analysis of quantitative data. Coding of qualitative data.	1162 people with disabilities and their household members evacuated due to a natural disaster.	Greater financial and other resources needed to support evacuation of people with disabilities. Greater preparedness support needed for those with hearing impairments and households with high rates of disability. Preparedness, response and recovery improved by increasing access to social networks.
Disoriented and immobile: the experiences of people with visual impairments during and after the Christchurch, New Zealand, 2010 and 2011 earthquakes. Good, Phibbs & Williamson 2016.	Qualitative semi-structured interviews. Thematic analysis.	12 after the 2010-2011 earthquakes, seven original participants after catastrophic February 2011 earthquake. The Blind Foundation staff.	Themes reflected concerns (e.g. support, orientation, evacuation centres), resiliency, disbelief, recovery, the need to be with others, erosion of security and the need to move on. Older visually impaired persons have increased vulnerability. Improved disaster preparedness needed by individuals, families, communities and agencies.
Narrative analysis of a disaster preparedness and emergency response survey from persons with mobility impairments. Rooney & White 2007.	Qualitative online survey. Thematic analysis.	People with mobility impairment who experienced a natural or man-made disaster.	Disaster survival improved by preparedness measures, strong personal networks and help from first responders. Post-disaster challenges include clean up, emotional trauma and lack of accessibility. This population have much to contribute to disaster planning and education of disabled peers.
Disaster anxiety and self-assistance behaviours among persons with cervical cord injury in Japan: a qualitative study. Takahashi & Kitamura 2016.	Qualitative semi-structured interviews. Thematic analysis.	16 Tokyo residents with cervical SCI, with an interest in disaster preparedness.	All expressed anxiety about managing their health during a disaster. Importance is placed on disaster preparedness (i.e. storing needed items, staying in a safe place, having reliable caregivers). Experience of travelling and information from peers would likely improve disaster preparedness and resilience.
Riding out the storm: experiences of the physically disabled during Hurricanes Bonnie, Dennis and Floyd. Van Willigen, Edwards, Edwards & Hessee 2002.	Quantitative: Phone surveys, in-depth interviews, focus groups.	942 households (ten with a disabled person, 15 SCI association members, emergency personnel).	Households with a disabled member: lower evacuation rates, waited longer to evacuate, cited transport and lack of shelter as the barriers to evacuation, and were 50% more likely to sustain property damage. Financial burden four times that of households without a disabled member. These impacts may prolong the recovery process and have ongoing negative effects on the standard of living of households with a disabled member.

experiences and improve personal preparedness using checklists and inventories, learning how to best access necessary information, using community networks, and coping with hardship (Fox *et al.* 2010, Good, Phibbs & Williamson 2016). Sharing disaster stories and the lessons learnt with others was identified as a positive way to cope with the experience and provide meaningful help to others (Good, Phibbs & Williamson 2016).

Social capital refers to the connections between an individual's personal networks and social resources. It is an important factor in enhancing resilience of people with disabilities (Fox *et al.* 2010). When communities adapt resources and services to help people with disabilities (e.g. community organisations providing carer support, accessible transport and accessible building design) and people with disabilities strengthen personal networks through greater participation in community organisations and activities, social capital is increased (Fox *et al.* 2010). Investing in social capital is critical to improving preparedness and increases the likelihood that people recover in a resilient fashion after a disaster. Rooney and White (2007) suggest that social capital can be enhanced by the inclusion of survivors of disaster events in disaster planning and policy development. Their valuable knowledge and experience will help to identify the needs of people with disabilities in future disaster events. The literature reviewed does not report on the level of inclusiveness of people with physical disabilities in disaster planning and response activities.

Discussion

The results of the review show there are limited studies into the disability perspective of disaster events and these studies are based on events that occurred outside of Australia.

Throughout the literature, a key finding was that people with physical disabilities face challenges during natural disasters due to individual, societal and environmental factors such as loss of independence, lack of evacuation support and difficulties managing their health conditions. These challenges negatively affect preparedness, evacuation and recovery from these events. The long-term effects of natural disasters are felt through emotional trauma and the financial burden of property damage that can prolong recovery and decrease standards of living for this vulnerable group.

Encouragingly, the literature highlights factors that enhance resilience to disaster events with a strong focus on strengthening support networks, adaptation and disaster preparedness. Participants attest to the empowerment felt as a result of educating their peers on lessons learnt from their experience. There is a call to include people with disabilities in disaster planning to take advantage of their knowledge of how to accommodate their special needs. While the *Sendai Framework for Disaster Risk Reduction 2015-2030* (UNISDR 2015) promotes active involvement of people with disabilities and their organisations in disaster

planning and policy development, there is no clear indication in the more recent literature reviewed that this level of inclusion is occurring. A greater focus on disability inclusiveness and investment in social capital within disaster-prone communities will enable greater participation in society and help to build resilience to future disasters.

Despite cyclones, floods and bushfires frequently affecting Australia, the experience of people with physical disabilities in natural disasters in this country is yet to be investigated. There is a need to examine the effects of these events on people with physical disabilities within the context of Australian communities and organisational supports. Future research should focus on the disability experience of Australian natural disasters, the level of inclusion of people with physical disabilities in disaster risk reduction activities and the development of interventions to enhance the resilience of this population. This will provide an evidence base for DiDRR policy, planning and implementation in Australia.

Limitations

Despite extensive searching, it is possible that a study on the experiences of individuals with a physical disability in natural disasters may have been omitted. Disaster research is a multidisciplinary field and studies are published in a variety of journals. Studies in languages other than English were not accessed for this review.

Conclusion

This review of the experiences of people with physical disabilities during natural disasters worldwide has revealed a number of valuable findings. It highlights the unique challenges faced by people with physical disabilities and the serious impact of natural disasters on their lives. Importantly, it also identifies factors that enhance the resilience of this population to natural disaster events. People with physical disabilities who have experienced disaster events can make a valuable contribution when included in disaster planning and response activities as well as through education of their peers. This review suggests that research to investigate the experiences of people with physical disabilities in disasters within Australia is needed to effectively inform implementation of DiDRR activities.

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ABSTRACT

The Triple Zero Kids' Challenge is an online, interactive safety game and a mobile application. It provides young children in Australia with essential information on how to identify and report legitimate emergencies by calling Triple Zero (000). As a companion resource, the Triple Kids' Challenge Teacher's Guide provides educators of lower-primary school students with a series of structured learning activities to consolidate and extend the key messages of the online game. To ensure that the learning activities in the guide are both feasible and appropriate for the target age group, a formative evaluation was conducted with lower-primary students and their teachers. This paper reports on the results of the evaluation and highlights the importance of formative evaluation to the development of safety education programs for children. While the evaluation indicated that the learning activities were feasible and appropriate for lower-primary school students, it also identified the need for numerous modifications and improvements that have been incorporated into a revised 2017 version of the guide.

A formative evaluation of the Triple Zero Kids' Challenge Teacher's Guide

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Introduction

Triple Zero (000) is Australia's emergency number for requesting urgent assistance from police, fire or ambulance services. When an emergency situation is life-threatening or time-critical, calling Triple Zero facilitates the rapid dispatch of the appropriate emergency service. Given that young children are sometimes the sole bystanders during an emergency situation, educating them on the effective and responsible use of the Triple Zero emergency number is an essential component of inclusive community safety. While scholarly research on children's use of Triple Zero is scarce, the annual Junior Triple Zero Hero Awards provide many examples where children as young as four years old have saved lives by calling Triple Zero (Emergency Services Telecommunications Authority 2017). Through the delivery of quality education programs that effectively teach young children how to use the Triple Zero emergency number, there is the potential for more lives to be saved.

Identifying a distinct gap in the provision of Triple Zero education for Australian children aged between four and seven years, the Triple Zero Awareness Working Group (TZAAG)¹ developed the Triple Zero Kids' Challenge. The Triple Zero Kids' Challenge is an interactive online game and mobile application (app) that provides children with the knowledge and skills they need to identify and report legitimate emergencies by calling Triple Zero (TZAAG 2017). To further support children's learning, the TZAAG developed the Triple Zero Kids' Challenge Teacher's Guide that consists of structured learning activities to consolidate and extend the key messages of the online game (TZAAG 2017). While the learning activities directly address the serious topics of major accidents, medical emergencies, fires and serious crimes, they are designed to be enjoyable and engaging for young children. Taken together, the learning activities cover all of the key concepts and procedures involved in calling Triple Zero, including the kinds of situations that constitute legitimate emergencies, the correct number to dial, the information to provide to operator and the consequences for making hoax calls.

Classroom delivery of the core learning activities in the Teacher's Guide takes approximately six to eight hours and, for this reason, every activity has been

¹ The TZAAG is a national body that represents emergency call-taking agencies in Australia. The TZAAG develops and administers programs and activities to enhance community awareness of Triple Zero (000).

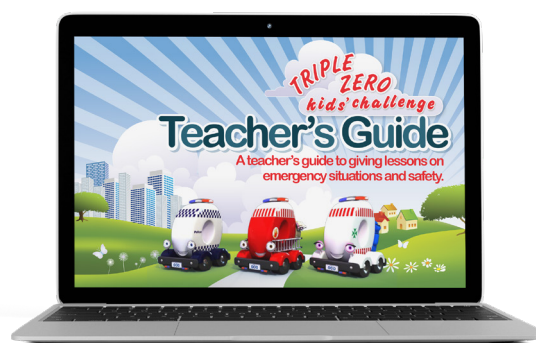
Table 1: Alignment to the Health and Physical Education component of The Australian Curriculum.

Year level	Learning strand	Content description
Foundation	Personal, social and community health.	<p>Being healthy, safe and active:</p> <ul style="list-style-type: none"> Identify people and demonstrate protective behaviours that help keep themselves safe and healthy. <p>Contributing to healthy, active communities:</p> <ul style="list-style-type: none"> Identify actions that promote health, safety and wellbeing.
Years 1 and 2	Personal, social and community health.	<p>Being healthy, safe and active:</p> <ul style="list-style-type: none"> Practises strategies they can use when they need help with a task, problem or situation. Recognise situations and opportunities to promote health, safety and wellbeing. <p>Communicating and interacting for health and wellbeing:</p> <ul style="list-style-type: none"> Examine health messages and how they relate to health decisions and behaviours.

designed to align directly with the Health and Physical Education component of *The Australian Curriculum* (ACARA 2017) (see Table 1).

To ensure that the learning activities in the Teacher's Guide were feasible and acceptable for lower-primary students, the design process incorporated a formative evaluation. Formative evaluation is undertaken during the design of a new program or when an existing program is implemented in a new context (International Federation of Red Cross and Red Crescent Societies 2011). It allows for modifications to be made to the program before full implementation begins and maximises the likelihood that the program will succeed (Administration for Children and Families 2010). In the context of emergency education, formative evaluation is especially important because poorly designed learning activities can have life or death consequences. Indeed, recent research has demonstrated that emergency education programs can unintentionally increase risk by creating confusion or reinforcing misconceptions about appropriate emergency response procedures (see Johnston *et al.* 2014 for examples from the context of children's earthquake education). Despite this, emergency education programs for children are rarely subjected to formative evaluation during the design phase (Towers *et al.* 2016).

For the development of the Teacher's Guide, a formative evaluation was especially important because empirical research that could be applied to the design of the learning activities was distinctly lacking. While various organisations around the world have developed programs and resources for educating children about their



The Triple Zero Kid's Challenge Teacher's Guide can be downloaded from the website (<http://kids.triplezero.gov.au/>).

national emergency call service, an extensive search of the literature located only four published program evaluations. Two of these evaluations (Jones 1980, Rosenbaum, Creedon & Drabman 1981), both conducted in the USA, found that children aged between four and five years could be effectively trained to make an emergency call. However, the content validity of those studies has been eroded by dramatic advancements in telecommunications over the last several decades (i.e. from the demise of rotary dial landlines and rise of smart phone technology). Two more recent evaluations, one conducted in Australia (Wilks *et al.* 2016) and one conducted in the USA (Morgenstern *et al.* 2007), were both focused on programs for children aged between 11 and 13 years. However, results in both studies indicated negligible program effects because the child participants already knew how to make an emergency call.

This paper presents the findings of the formative evaluation of the Triple Zero Kids' Challenge Teacher's Guide. In doing so, it demonstrates the fundamental importance of formative evaluation to the design of quality safety education programs for children. Given the lack of any relevant recent research in this area, it also addresses a significant gap in the literature and provides a foundation for future evaluations of program effectiveness.

Methods

The evaluation of the Teacher's Guide was conducted in a primary school in the south-eastern region of metropolitan Melbourne. Three Foundation Year teachers were provided with a pilot version of the Teacher's Guide and asked to deliver the lessons during class time. Upon completion of the lessons, students from each class were invited to volunteer for an interview. Of the 60 students who were invited to participate, 22 students (11 male and 11 female) returned a consent form that had been signed by their parent or guardian and were included in the evaluation. All student volunteers were aged between five and six years.

The evaluation employed a predominantly qualitative approach to data collection. While formative evaluation

can involve quantitative or qualitative methods, it lends itself strongly to the latter (George & Cowan 2004). In contrast to quantitative or experimental approaches, a qualitative approach allows for the emergence of unexpected outcomes and processes, which increases opportunities for program modification and improvement (Patton 2014). A qualitative approach is particularly important for understanding how young children are interpreting key safety concepts and provides a strong basis for redesigning learning activities that directly address common misconceptions and knowledge gaps (Johnson *et al.* 2014, Towers 2015).

Interviews with the children mostly involved semi-structured open-ended questions that allowed them to articulate their knowledge from their own perspectives. However, to supplement the qualitative data and provide a quantitative indication of the accuracy of children's knowledge, several structured closed-ended questions were included. To help create a relaxed environment in which the children felt comfortable communicating their perspectives in their own words, they were interviewed in pairs or groups of three (Eder & Fingerson 2002).

The three classroom teachers (all female) who delivered the lessons were invited to provide feedback on the Teacher's Guide via open-ended questions in a written survey. This survey asked the teachers to identify the key strengths and weaknesses of the learning activities and share their perceptions of student learning, engagement and enjoyment. The survey sought teacher recommendations for improving the structure and content of the guide.

Approval for the evaluation was granted by the RMIT Human Research Ethics Committee and the Victorian Department of Education.

Results and discussion

Children's knowledge and skills

If children are to be competent and responsible users of the Triple Zero emergency call service they need to correctly identify legitimate emergencies when they occur. The Teacher's Guide includes learning activities aimed at increasing children's knowledge and skills in this area. To assess the viability of these activities, the children were asked to describe an emergency. They responded with various examples of legitimate emergencies, including major accidents, medical emergencies, fires and serious crime. Box 1 provides a selection of representative responses.

Box 1: Children's descriptions of what constitutes an emergency.*

Claire: *When somebody crashes. When there is a robber.*

Harry: *When there is a fire.*

Amy: *When someone crashes into something.*

Simon: *If someone's house is on fire or when someone gets hurt and has to go to the ambulance.*

Kate: *When a fire happens or when someone's lying on the ground and they can't breathe.*

Ryan: *Somebody is stealing or there is a robber.*

Kate: *When a thief is trying to steal your money. That is very dangerous because someone might try to steal from your house.*

Tim: *Fire. Or when somebody can't breathe.*

Erin: *When there is car crash.*

Tanya: *Like when somebody's being a robber and they're taking some stuff. If somebody is hurt real bad like if they fall out of tree. Or if a fire is somewhere.*

Sally: *It's when someone is in trouble.*

Interviewer: *What kind of trouble?*

Sally: *When there is a fire.*

Chris: *When there is a car crash. Or a robber.*

* All interviewee names are pseudonyms.

To explore the children's knowledge of what constitutes an emergency, they were presented with a series of pictures depicting a range of emergency scenarios, including medical emergencies (e.g. a man collapsed and he can't be woken up), fires (e.g. a fire in the kitchen can't be extinguished) and serious crimes (e.g. a robbery taking place next door).² For each scenario, the children were asked to judge whether the scenario depicted was an emergency. Children judged correctly with a high degree of accuracy (98 per cent of responses were correct). Moreover, when asked what should be done in the event of such an emergency, all children responded with 'call triple zero'.

The Teacher's Guide also contains activities designed to help children distinguish between 'big accidents' that constitute legitimate medical emergencies and 'small accidents' that constitute minor injuries that can be adequately treated at home. To assess the viability of those activities, children were asked to describe the difference between a 'big accident' and a 'small accident'. In their responses, some children made the distinction by providing examples of each, while other children made

² Pictures of the emergency scenarios were taken from the Triple Zero Kids Challenge Teacher's Guide and the online games.

the distinction by suggesting the appropriate level of response. Box 2 provides a selection of representative responses.

Box 2: Children's descriptions of 'big accidents' and 'small accidents'.

Interviewer: *What is a big accident?*

Sally: *When you fall over and get cut a little, it's not a big accident.*

Chris: *Well, when someone just fell over and hurts their knee is a small accident. When a fire catches the whole house is a big accident.*

Harry: *When there is a big accident, you call triple zero.*

Interviewer: *And what if it is a small accident?*

Claire: *Just put a band-aid on it.*

Kate: *For a big accident you call triple zero, but for a small accident you don't.*

To explore the extent to which the children could distinguish between 'big accidents' and 'small accidents', they were presented with a series of scenarios that were representative of each (e.g. 'Dad has fallen off the roof and he can't move', 'The boy has fallen off his skateboard and scraped his knee'). For each scenario, the children were asked to identify whether it was a 'big accident' or a 'small accident'. They were able to do this with a high degree of accuracy (98 per cent of responses were correct). When prompted, the children were able to correctly identify that a 'big accident' would require a call to Triple Zero, whereas a small accident would not.

must quickly identify this as a medical emergency and call Triple Zero. Second, if a child can make an accurate assessment and relay it to the Triple Zero operator, the call can be triaged more effectively. When asked to explain the meaning of 'unconscious' most children accurately identified the two key signs that are:

- the person is not awake
- the person cannot be woken up.

Box 3 provides a selection representative responses.

Box 3: Children's explanations of the meaning of 'unconscious'.

Tanya: *[It's] When you are breathing but you can't move.*

Carol: *He can't move and he can't wake up.*

Damien: *Unconscious means he's breathing but not moving. You can try to wake him up, but he will not wake up and you will have to call Triple Zero for an ambulance to make them feel better and wake them up.*

Chris: *It means they are quiet and asleep and they can't move.*

Sally: *And you can't wake them up.*

Chris: *And if you want to wake them up you'll have to try to move their shoulder and call them by their name.*

Of note, two children suggested that if someone is awake and cannot breathe, they are unconscious. In light of this finding, the Teacher's Guide was revised so that teachers are made aware of the potential for children to misunderstand the meaning of unconscious.

While the children could identify the scenarios that require a call to Triple Zero with a high degree of accuracy, the interviews revealed some confusion concerning the actual number that should be input into the phone. When asked to dial Triple Zero into the keypad of a toy phone, all of the children entered the correct number of zeros (three). However, when asked to verbally recite the number, at least three children responded incorrectly with 'zero zero'. The Teacher's Guide was revised so that teachers are aware to consistently reinforce that the Triple Zero emergency number includes three zeros.

A further issue was revealed when one child said they would be able to call Triple Zero because they knew the password for their parent's mobile phone. While it is possible to call Triple Zero without unlocking the keypad or keying-in a personal identification number, this had not been made explicit in the pilot version of the Teacher's Guide. Indeed, a subsequent scan of various educational resources from other countries found that this issue is frequently overlooked. Given that 5.78 million Australians (about 31 per cent) have no fixed landline at home



Lesson four of the guide is about big and small accidents.

The Teacher's Guide also includes activities for teaching children how to determine whether or not someone is unconscious. It does so for two reasons. First, if a child is alone with a parent or guardian who is unconscious they

(Australian Communications and Media Authority 2016), it is increasingly likely that if a child needs to call Triple Zero, they will need to do so from a mobile phone. Hence, the Teacher's Guide was modified to provide specific advice on how to call Triple Zero from a locked mobile phone.

Teaching young children how to call Triple Zero comes with a risk that they will test out their newly acquired knowledge by making nuisance or hoax calls. Hoax calls place a significant burden on the emergency call service. People making falsified, mischievous or hoax calls can face significant fines or prison sentences. Given that children are responsible for a significant proportion of hoax calls, the Teacher's Guide has a full lesson devoted to this topic. While only a few children were familiar with the term 'hoax call', when asked what would happen if someone called Triple Zero in the absence of a real emergency, all children demonstrated a clear understanding of the serious repercussions for both the caller and the emergency services. Box 4 provides a selection of representative responses.

Box 4: Children's knowledge of the repercussions of hoax calls.

Interviewer: *Do you know what a Triple Zero hoax call is?*

Claire and Harry: *No*

Interviewer: *What if someone calls Triple Zero, but there is not really an emergency?*

Harry: *They will get into trouble from the police, or from their mum and dad.*

Interviewer: *Why?*

Harry: *Because they were tricking the police.*

Claire: *And the kids were also tricking their mum and dad.*

Interviewer: *What happens if somebody does that?*

Harry: *They are going to get into big trouble from the police.*

Interviewer: *Do you know what a Triple Zero hoax call is?*

Amy: *You are tricking someone and you are pretending that there is an emergency but actually there is not.*

Interviewer: *What happens if someone does that?*

Amy: *They might get taken away.*

Interviewer: *By who?*

Amy: *The police.*

Interviewer: *Why?*

Amy: *Because they did a bad thing and it wasted the police's time and the other peoples. They can't get other peoples' call who really need help.*

In the event of a legitimate emergency, children need to understand the circumstances under which they

should call Triple Zero: namely, when no other adults or older siblings are present. The Teacher's Guide explicitly addresses this by teaching children that the first step in an emergency is to check if an adult or an older sibling is available to help. Most children demonstrated a clear understanding of the circumstances under which they should make the call themselves. Only one child exhibited some confusion when he stated 'But we're still kids, and kids are not allowed to call Triple Zero until Grade 1'. Box 5 provides a selection of representative responses.

Box 5: Children's knowledge of the circumstances under which a child should call Triple Zero.

Interviewer: *What should you do if there is an emergency?*

Damien: *Call zero zero zero.*

Interviewer: *If you are with a grown-up who should call Triple Zero?*

Damien: *The grown-up.*

Interviewer: *If you are all by yourself who should call Triple Zero?*

Damien: *You have to ring it yourself.*

Interviewer: *What should you do if there is an emergency?*

Rose: *Zero zero zero, Triple Zero.*

Interviewer: *If you are with grownups, who should call Triple Zero?*

Krissy: *Your mum or your dad.*

Interviewer: *If you are by yourself who should call Triple Zero?*

Krissy: *Yourself.*

Interviewer: *What should you do when there is an emergency?*

Claire: *Call zero zero zero.*

Interviewer: *If you are with grownups who should call Triple Zero?*

Claire and Harry: *Grownups!*

Interviewer: *And if you are by yourself and no grownups around who should call Triple Zero?*

Claire and Harry: *You!*

When calling Triple Zero, the caller needs to provide the operator with several pieces of key information. In the first instance, they must be able to inform the operator of which emergency service they require; police, fire or ambulance. The Teacher's Guide includes activities designed to increase children's knowledge of which emergency service to ask for. In the interviews, when asked which emergency service they would ask for in the event of fire, a medical emergency or a serious crime, all of the children responded correctly with 'fire brigade', 'ambulance' and 'police', respectively. Additionally, throughout the interview, when presented with various

types of emergency scenarios, the children correctly identified which emergency service would be required. They did so with a high degree of accuracy (97 per cent of responses were correct).

When calling Triple Zero, the caller also needs to inform the Triple Zero operator of the precise location of the emergency, including the state, town and street address. It is also helpful if the caller can provide the phone number they are calling from. The pilot version of the Teacher's Guide included a 'My Phone Number and Address' card for children to take home and complete with their parents or guardians as a homework activity. However, the interviews revealed that this approach had been largely ineffective. While 13 of the 22 children interviewed knew what town they lived in, only five knew their full street address. Furthermore, only one child knew which state they lived in and only one child could recite their phone number. These findings indicated that relegating this learning to a homework activity represented a significant gap in the Teacher's Guide. This lesson has been revised to include class-based activities to help children learn their state, town, street address and phone number.



Calling Triple Zero (000) from mobile phones does not require the phone to be unlocked.

Teacher feedback

The teachers judged the Teacher's Guide and associated lessons to be of a high quality. They felt the lessons were well structured and that the learning objectives were clear. They also reported that the content was age-appropriate and the learning activities were easy for the children to understand. When asked about their perceptions of student learning, the teachers reported that the activities in the Teacher's Guide had been highly effective in building children's knowledge

of what constitutes an emergency and how to respond appropriately. Box 6 provides a selection of representative responses. Teachers also reported a high level of student engagement in the learning activities. They attributed this to the interactive, game-based approaches, which were described as being 'highly enjoyable for the children'. Providing further evidence of student engagement, one teacher reported that 'the children often asked to do the program'.

Box 6: Teacher's perceptions of student learning.

Teacher 1: Students were able to highlight exactly what an emergency was and what processes to take during an emergency – including calling Triple Zero.

Teacher 2: Students developed a greater understanding of what constitutes an emergency and what the options are for getting assistance during an emergency.

Teacher 3: Students definitely learnt about when to call in case of an emergency and who to call – police, fire, ambulance.

The teachers strongly agreed that the learning objectives and activities in the Teacher's Guide align with the Health and Physical Education component of *The Australian Curriculum* and they cited this as a key strength. Specifically, the Health and Physical Education curriculum for Foundation Year, Grade 1 and Grade 2 includes a learning strand on personal, social and community health, which is largely focused on identifying and responding to emergencies (ACARA 2017). The teachers explained that this direct alignment is essential because an overcrowded curriculum significantly constrains opportunities for the delivery of stand-alone programs. While the pilot version of the Teacher's Guide had included an extensive table detailing the links across *The Australian Curriculum*, it was hidden away at the back of the resource. In an attempt to promote increased uptake, the introductory message at the beginning of the Teacher's Guide was revised to ensure that the direct link to the health and physical education curriculum is readily apparent to teachers.

The teachers also identified the use of information and communication technology (ICT) (i.e. the online game scenarios) as a key strength. Moreover, they identified a valuable approach to integrating ICT for enhanced lesson delivery. In the pilot version of the Teacher's Guide, teachers were encouraged to prepare their students for each lesson by encouraging them to play the corresponding online game. However, the teachers employed an alternative approach. They commenced each lesson by presenting the corresponding online game scenario to the whole class via an electronic whiteboard. In classrooms where there is limited access to computers or other digital devices, or when there isn't time for every student to play the corresponding

online game before each lesson, this approach would ensure that students can view the online game scenario before embarking on the related learning activities. Subsequently, the Teacher's Guide was revised to inform other teachers of this approach to enhance lesson delivery.

Conclusion

The purpose of this formative evaluation was to determine the feasibility and acceptability of the learning activities in the Triple Zero Kid's Challenge Teacher's Guide. For the most part, the findings suggest that the learning activities provide children with the information and skills they need to correctly identify and report legitimate emergencies by calling Triple Zero. The findings also identified the need for important modifications and improvements, which have been integrated into a revised version of the guide.

While the pilot version of the guide was informed by existing research evidence and the input of technical experts from the TZAWG, the input provided by children and teachers was fundamental to the development of a quality resource. Based on this experience, emergency services agencies are strongly encouraged to incorporate formative evaluation into the design of emergency education programs for children.

While the methodological approach taken in this study has effectively established the feasibility and appropriateness of the learning activities contained in the Teacher's Guide, future research should establish their effectiveness through the adoption of a repeated measures, pre-test post-test design with a control group. By providing insight into how children are interpreting and applying the key concepts and procedures conveyed in the guide, the results of this formative evaluation provide a useful basis for a rigorous, evidence-based approach to such work.

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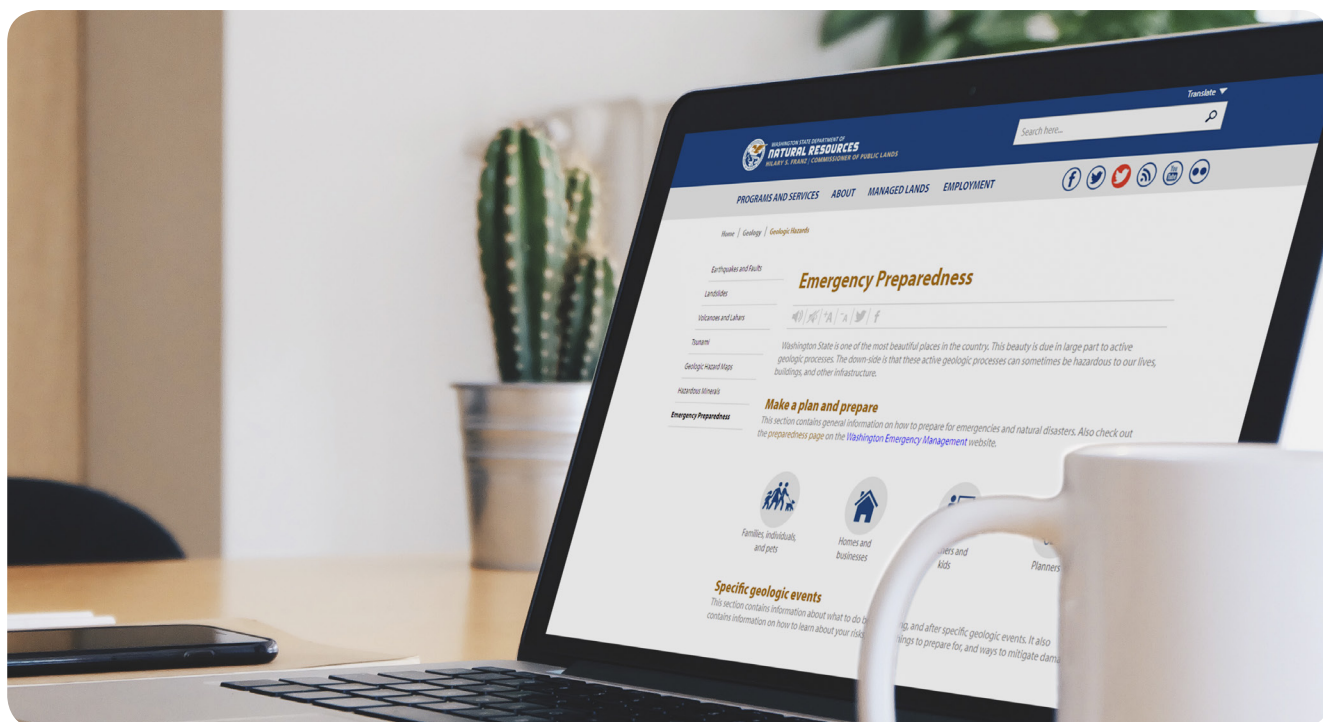
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Preparedness on the go

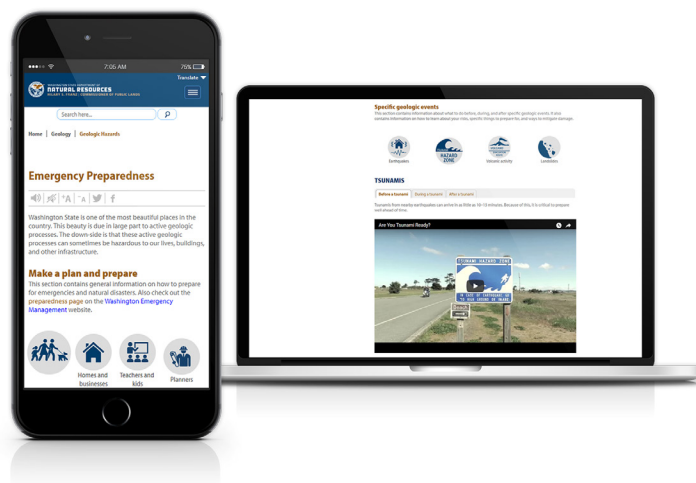
The US Federal Emergency Management Agency says, 'preparedness is everyone's job' and the Washington State Department of Natural Resources has information on its website that can help individuals and communities better prepare for an emergency.

The website provides user friendly information that educates and prepares communities on how to mitigate against earthquakes, volcanoes, tsunamis and landslides. Families, pet owners and schools can read about what action they can take to best prepare for these emergencies by reading the clear messages on the website.

The website allows users to select a geologic hazard and learn about the critical information and actions to take before, during and after an emergency. There is also a video that encourages people to create a two-week preparedness plan and pack a kit of essentials.

The department manages 12,000 square kilometres across several terrains where natural hazards are prominent.

Department preparedness website: www.dnr.wa.gov/programs-and-services/geology/geologic-hazards/emergency-preparedness.





2018 Lessons Management Forum



When and where

Tuesday 14 and Wednesday 15 August, 2018
Melbourne, Victoria

About the forum

- Day 1 – Sharing lessons

The program will cover presentations on insights and lessons identified from experiences in an operational context from a range of jurisdictions and organisations. This may include outcomes from debriefs and outcomes from significant events.

- Day 2 – Implementing lessons

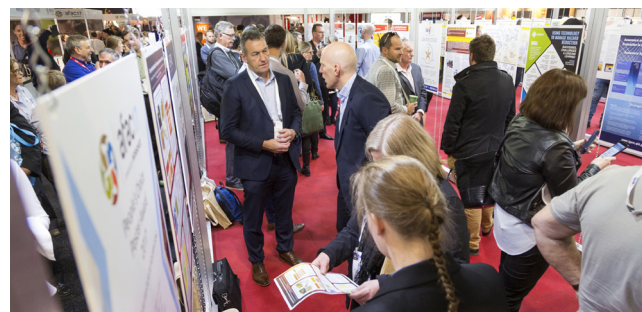
The second day will focus on the different approaches taken by organisations in managing lessons. This may include development of frameworks, governance and processes.

- Workshops

In addition to the presentations, attendees have the opportunity to register for breakout workshop sessions in the afternoons on both days. The topics for these workshops will be promoted when available.

A joint AIDR and AFAC event

2018 Australian Disaster Resilience Conference



When and where

Thursday 6 and Friday 7 September, 2018
Perth, Western Australia

About the conference

The inaugural Australian Disaster Resilience Conference will run concurrently with AFAC18 powered by INTERSCHUTZ, Australasia's largest emergency management conference and exhibition.

The program theme "The rise of resilience: from the individual to the global" a number of sub-themes which include:

- Measuring and assessing disaster resilience
- New directions in resilience thinking
- Enhancing recovery through greater community resilience
- Education
- Activities and case studies
- Human behaviour to animals

The Bushfire and Natural Hazards CRC Research Forum precedes the Conference and focuses on the science that is making an impact across the sector. The Research Forum provides a valuable addition to the Australian Disaster Resilience Conference program.