Australian Government
National Emergency Management Agency

Australian Institute for Disaster Resilience

Australian Journal of Emergency Management

VOLUME 38 NO. 3 JULY 2023 ISSN: 1324 1540

SUPPORTING A DISASTER RESILIENT AUSTRALIA

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, Australian Institute for Disaster Resilience or its partners.

Aboriginal and Torres Strait Islander peoples are advised that this publication may contain images of deceased people.

Publisher

The *Australian Journal of Emergency Management* is published by the Australian Institute for Disaster Resilience with financial assistance from the Australian Government. The journal is published online at www.knowledge.aidr.org.au.

Production

Design, typesetting and production: Emily Fraser
Print and distribution: Valiant Press

Cover image: Flooding in Warwick, Queensland, 2022.
Image: Queensland Fire and Emergency Services.

Peer reviewers

The AJEM Editorial Committee recognises the efforts of researchers and practitioners who serve as peer reviewers of articles submitted to the journal. Peer reviewers play an essential role in ensuring the quality of research published. Their contribution is critical to the success of the journal and, more importantly, to the field of emergency management and disaster resilience.

Circulation

Approximate circulation (print and electronic): 5500.

Submissions

The *Australian Journal of Emergency Management* welcomes submissions for News and Views and Research articles. The Contributors' Guidelines are available at knowledge.aidr.org.au/ajem. The guidelines provide word limits for articles. Submissions exceeding those limits will be returned to authors. Articles are to be submitted as a Word file. High resolution photographs, graphs and tables should be submitted in their original software applications as separate files.

Research articles must contain an abstract, university ethics statement as appropriate and a short biographical paragraph about each author. A Copyright Release form and the Editorial Policy are available on the website. Authors should familiarise themselves with the journal before making a submission. Contributions should be forwarded electronically to ajem_editor@aidr.org.au. All research articles are peer reviewed. The *Australian Journal of Emergency Management* is indexed by several indexing organisations.

Subscriptions

Online access to all content is available free. Subscribe to the journal at knowledge.aidr.org.au/ajem.

Print copies can be ordered online at aidr.valiantpress.com.au for $30.00* per edition (includes postage within Australia) or get all 4 editions printed and posted for $100.00* per annum.

*Prices are in AUD and exclude GST.

Contact us

Mail: Australian Journal of Emergency Management
Australian Institute for Disaster Resilience

Level 1, 340 Albert Street
East Melbourne Victoria 3002

Email: enquiries@aidr.org.au

Phone: +61 3 9419 2388

Contents

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

Foreword

John Price

Deputy Chief Executive

National Emergency Management Agency, Aotearoa New Zealand

(Māori: Te Rākau Whakamarumaru)

Nāku te rourou nāu te rourou ka ora ai te iwi
With your basket and my basket, we will sustain everyone.

This foreword is a chance to introduce myself to the wider emergency management whānau/family in Australasia. I'm looking forward to working together to tackle the challenges ahead.

It's in this spirit that I chose to start with the whakataukī (proverb) above. In te ao Māori, or the Māori-world view, whakataukī are used to convey the wisdom, values and common sense of tangata whenua (people of the land). This whakataukī reminds us that, as emergency leaders and as communities, we are stronger when we work together.

I began my, role at Aotearoa New Zealand's National Emergency Management Agency (Te Rākau Whakamarumaru) (NEMA) just after severe weather events in Auckland and Cyclone Gabrielle had ravaged large parts of the North Island, which had led to a declaration of a State of National Emergency. In my 36 years on emergency service, I have seen some extremes of what humankind and Mother Nature can do. Importantly, I have also seen the very best that human beings can do for one another.

In NEMA's public education materials, we highlight how important it is to check on neighbours during an emergency and to work together to make us all stronger. Being connected in the community is the key to readiness, response and recovery. As our nearest neighbour, Aotearoa New Zealand greatly values its close ties with Australia. This is why we are so thankful for Australia's support during the Canterbury Earthquakes and Cyclone Gabrielle (among many other events) and we were happy to assist during the 2022 floods in Queensland and New South Wales, and the fires earlier this year.

Aotearoa New Zealand is a wonderful country, but one with many hazards of nature such as earthquakes, volcanoes, tsunamis, landslides, floods and severe weather events. A catastrophic event is not a matter of if, but when. So a major focus for NEMA is to plan for the worst and hope for the best.

Aotearoa New Zealand and Australia have a long history of serving and working together. The ANZAC spirit is something we value and will grow as we face the growing challenges that nature throws our way. Both countries are dealing with the effects of climate change as the frequency of severe weather events increases at a seemingly bewildering rate. The phrase 'the new normal' is being used a lot.

In September 2022, Aotearoa New Zealand signed an emergency management Memorandum of Co-operation with Australia. The memorandum reflected the long-standing relationship, the similarity in structures and perhaps most importantly, the similar challenges the countries face. This strengthened relationship allows us to share insights and lessons as well as offer resource support and personnel when it's needed. And it will be needed.

During Cyclone Gabrielle, we welcomed an American delegation (under our Memorandum with FEMA completed in 2022) and a group of emergency managers from Fiji. The support meant so much and it emphasised that we're all part of the same whole; working with our communities to keep them safe in the face of sometimes awe-inspiring forces. In 'peacetime' we will continue to build relationships so we are stronger in response.

NEMA is undertaking a comprehensive after-action review, which will take in observations from our staff and from our partners and stakeholders across government and beyond. It has reinforced why operational readiness is crucial to NEMA. I am proud of our Cyclone Gabrielle response, but an event of this size has tested our thinking and processes in real time. This was a major event for Aotearoa New Zealand but it was also a long way off the type of catastrophic event that would cause thousands of fatalities and impact on our economy and the wellbeing of our country.

If we are living in a new normal, then the lessons we learn and the opportunities we identify together will shape the next response, the one after, and the one after that. But if we work together and share our 'baskets', we will indeed be stronger.

In emergency management, we are the few selected to serve the many. We belong to an honourable profession that is dedicated to community safety. We have a duty to serve and protect our fellow human beings together. The words 'kia kaha' mean stand strong. We must all stand strong together in the knowledge that we can and do make a difference in our communities every day.

Vale Douglas Paton

Its with great sadness that we learned that Professor Douglas Paton passed away at the end of April 2023. Douglas was no stranger to these pages, having had many influential papers in the *Australian Journal of Emergency Management* (AJEM).

Douglas was a Professor of Psychology, most recently with Charles Darwin University, although he also had undergraduate studies in Geology. It was combining these 2 inquiries into natural processes that lead him to be a world leader in helping us understand how we need to understand the mind as the barrier and enabler to people getting prepared for, coping with and recovering from disaster events. He was really the first person to realise that it is the human brain that gets in the way of making decisions about getting prepared, and he was able to explain it in a way that we could all understand.

We can't underestimate his impact and influence on how we go about the complex beasts of preparedness and resilience building. Not only in Australia, but globally. We now know, thanks to Douglas, that it is so much more than a pamphlet from someone in a uniform telling them they should get prepared.

He was widely published, with 24 books and about 200 peer-reviewed papers and chapters with over 260 collaborators from across the world. Douglas was a global technical adviser to the United Nations and the World Health Organization, working in Africa, Indonesia, Taiwan and remote indigenous communities. He was a researcher without peer, being in the Stanford University/Elsevier BV list of the top 2% of researchers cited.

He set up the Australasian Centre for Resilience Implementation for Sustainable Communities at Charles Darwin University, furthering a focus on community resilience, psychosocial resilience, and psychological empowerment, particularly in the context of drought.

He was a wonderful person who was very generous with his time to Australian Red Cross at the beginning of its preparedness journey in 2008. When doing a literature review to ensure the Red Cross preparedness approach was well grounded, I came across a paper in a 2005 AJEM, 'When good intentions turn bad: promoting natural hazard preparedness' (Paton, Smith & Johnston 2005[1]). In that paper was a line about sense of community being an important predictor of preparedness behaviour. With that, the fourth step of the Red Cross Emergency Rediplan, 'Know your Neighbours' was born. A paper on this approach is published in this edition of the AJEM where there are many references to Douglas's work. This paper is dedicated to his memory.

I remember the first time I met Douglas over dinner and my colleague, Jacqui Pringle, asked him 'how long does this all take?'. In his soft Scottish brogue, in the noisy restaurant, we heard '18 something' and we both thought 18 months. I think Douglas was somewhat aghast at our blasé attitude. 'Oh, 18 months, that's doable,' I flippantly said. He replied, 'No, John, 18 years. It's generational change we need'. It dawned on me then the complexity of the issues we face in emergency management and risk reduction sector. We have been fortunate to have Douglas and his immense intellect guiding us along the way.

To honour Douglas, and have him continue to guide our important work, his family and colleagues have established a Douglas Paton Memorial Scholarship[2] at the Massey University Joint Centres for Disaster Research.

We have lost a titan. RIP Douglas.

John Richardson

On behalf of Australian Red Cross, Australian Institute for Disaster Resilience, colleagues, peers, colleagues, students and friends of Douglas Paton.

1. Paton, Smith & Johnston 2005, *When good intentions turn bad: promoting natural hazard preparedness'. Australian Journal of Emergency Management, vol. 20, no. 1, pp.25–30. At: https://ajem.infoservices.com.au/items/AJEM-20-01-05.*
2. Douglas Paton Memorial Scholarship, at https://foundation.massey.ac.nz/donate-online.

Australian Defence Force refocus of resources will leave a gap in response and recovery

Stephen Alexander

Bucephalus Consulting

The Defence Strategic Review 2023[1] identified that the Australian Defence Force (ADF) must focus on its core responsibility, warfighting, if it is to be ready for any future conflict. Where does this leave Australia's states and territories when it comes to the unique capabilities and scale that the ADF offers at the time of a major disaster?

In early 2023, the Department of Defence released the strategic review, which, among other things, highlighted that 'Defence is not structured or appropriately equipped to act as a domestic disaster recovery agency concurrently with its core function, in any sustainable way'.[2]

Over many decades, the Department of Defence has contributed to supporting the emergency and disaster response by states and territories as well as recovery activities. These have included the evacuation of Darwin's population following Cyclone Tracy in 1974 to the New South Wales fires and floods in 2019 and 2022. The 2009 Defence White Paper[3] states that disaster response tasks are among the highest priorities of the ADF.

So, what has changed in the last decade since the 2009 Defence White Paper?

The warning time in which the ADF might be engaged in conflict has shortened significantly. Thus, the urgency to meet an escalated military threat with a fulsome capability and warfighting skills has increased significantly. In short, the ADF must focus on its primary role of defending Australia from armed threats.

The outlook for emergency resources in the years ahead

There is no doubt that Australia may be exposed to severe natural high-risk events in the coming decade. The Royal Commission into National Natural Disaster Arrangements includes statements identifying:

> *…a drying trend across much of the southern half of Australia, particularly in the south west and particularly in the winter months.*[4]
>
> *Observed changes that are being influenced by background climate trends include increased frequency of heatwaves and record high temperatures, longer fire seasons with more extreme fire danger days, increase in marine heatwaves, and reduced annual average rainfall in some regions.*[5]

As the likelihood and magnitude of emergencies and disasters increases, Australia's combined and available national resources for major response and recovery (ADF and state and territory resources) is on the decrease.

Australian Defence Force support during response and recovery phases

The ADF can considerably bolster state and territory response and recovery activities during a major event. This can be broadly summed up into 2 types of support; capability and scale.

Capability

The range of war fighting and support capabilities of the ADF has utility in the short-term response phase and the longer-term recovery phase. These capabilities are operated by highly skilled personnel and are not readily accessible in the general

An Army aircrewman is thanked by residents as they arrive at RAAF Base Amberley, near Brisbane.

Image: Department of Defence

community or industry sector. Such capabilities include examples like heavy-lift helicopters and aircraft, smaller helicopters able to operate in very low-visibility flying conditions and vessels that can move stores across beaches. All have a war fighting role and are constantly in training to maintain skills for a range of military options that the Australian Government may call on. It's effectively an insurance policy that covers many eventualities, but once committed, take considerable time to regenerate.

An example of this unique capability that cannot be matched in the commercial or emergency services sector is the use of Army Aviation MRH90 helicopters, which were used during the South East Queensland floods in February 2022. Here, 13 residents were rescued during very low visibility weather from rooftops and vehicles.[6] Other examples include ADF heavy-lift aircraft used in Western Australia during floods in the Kimberly in January 2023.[7]

Scale

The ADF provides a readily accessible, low-skilled manual labour force option for the Australian Government to support recovery phase activities. On 7 February 2009, the day following the Black Saturday fires, the ADF had established a Joint Task Force to mobilise personnel to support emergency services agencies. Within 48 hours, 450 personnel were deployed around Victoria. At one point during the operation, up to 800 ADF personnel, mainly from the 4th Brigade Army Reserve[8], were assisting in clean-up tasks.

We have seen this scale of deployments replicated during the floods in New South Wales in 2022, where 'more than 4,000 ADF personnel and assets deployed rapidly from across the country to help the communities of northern New South Wales'.[9]

How emergency services fill the capability and scale gap left by ADF

The Australian Government's greatest responsibility is to the safety and security of people in Australia and Australians overseas. Thus, to suggest that the ADF will no longer provide its capability and scale during a major response and recovery event may be erroneous. However, with competing challenges of meeting preparedness requirements for conflict, a responsibility which cannot be divested by the ADF, supporting the states and territories for what might be foreseeable and increasing disaster events will be a challenge. The 'insurance policy' that ADF resources provides is being stretched.

As the ADF mobilises to meet threats of conflict, the states and territories must also mobilise to meet emerging preparedness and response activities for their high-risk threats. One way to reduce these is by becoming better resilient to these events, not only in the physical infrastructure, but also from a community cohesiveness perspective. While most states and territories are engaged in building this resilience, it is questionable as to whether this will address the potential absence of ADF support at the time of a major event.

Capability

Achieving the response and recovery capability that the ADF has previously provided at the time of a major disaster event is arguably a funding problem. There is a cost to maintaining a heavy-lift aircraft capability as there is a cost for maintaining helicopters that can operate to rescue citizens in low-visibility events. In many cases, these costs are prohibitive to a state and territory jurisdiction. However, we are seeing these capabilities emerging in emergency services organisations to conduct day-to-day activities. For example, the growing proliferation of rescue helicopters. Arguably, as states and territories acquire these capabilities for their day-to-day operations and their skills and equipment evolve, these might outstrip the ADF capability in its ability to operate in the localised response phase of a major event. Also, as state and territory capabilities develop, they are better connected and coordinated into the response systems such as a single statewide, computer-aided dispatch system. This provides better coordination outside the day-to-day events.

While some of these unique capabilities are beyond the budget of most state and territory governments, there may be an argument for a national and shared capability separate from the ADF. The aerial firefighting capability is a reasonable model for this shared resource, albeit still principally funded by the states and territories.

Scale

Not a disaster goes by where the cry of 'Where's the Army?' does not go out. Achieving scale to respond to these events by the community is a cultural problem. While much has been written about the reasons for the declining rate of volunteerism in Australia (from 23% in 2001 to 14.3% in 2020[10]) much has also been written about ways to increase emergency services volunteerism where skills, commitment and participation in high-risk activities are prevalent. Most would argue that this cannot be resolved by remuneration alone. Leadership, belonging and community connection are keys to retaining and expanding emergency service volunteers.[11] Unlike solutions of the capability gap problem, responses within communities must be localised and from the community.

Conclusion

As we move ahead, states and territories could respond in 3 ways to the ADF's potential absence from major disaster responses. States and territories could build resilience so as to reduce the effects on communities of disaster events, thus decreasing the need for response capability and recovery scale. States and territories could continue to improve and integrate unique response capabilities into the day-to-day operations of their emergency services organisations while considering a national shared response capability. States and territories could work to reverse the degradation of volunteerism to provide local community-scale labour force ready for recovery following a major disaster event.

The next decade is likely to see the Australian Government challenged with balancing the security needs of the country with the safety needs brought on by disaster events. It is time to understand the gaps and to act.

Endnotes

1. Defence Strategic Review 2023, At: https://www.defence.gov.au/about/reviews-inquiries/defence-strategic-review.

2. Commonwealth of Australia, *National Security: Defence Strategic Review, 2003, p. 41.*

3. Australian Government Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030, Defence White Paper 2009, p.13. At: www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/rp/rp1516/DefendAust/2009.*

4. Commonwealth of Australia, *Natural Disaster Royal Commission into Natural Disaster Arrangements, Chapter 2, Paragraph 2.20. At: https://naturaldisaster.royalcommission.gov.au/.*

5. Commonwealth of Australia, *Natural Disaster Royal Commission into Natural Disaster Arrangements, Chapter 2, Paragraph 2.21. At: https://naturaldisaster.royalcommission.gov.au/.*

6. Australian Defence Force 2022, *Army to the rescue, at www.defence.gov.au/news-events/news/2022-02-27/army-aircrews-rescue [1 June 2023].*

7. Asia-Pacific Defence Reporter 2022, *ADF draws down on flood assistance as troops return to home units, At: https://asiapacificdefencereporter.com/adf-draws-down-on-flood-assistance-as-troops-return-to-home-units/ [1 June 2023].*

8. Fetchik J 2012, *'Left and right of arc': The legal position of the Australian Defence Force in domestic disaster response using the 2009 'Black Saturday' Victorian bushfires as a case study. Australian Journal of Emergency Management, vol. 27, no. 2, pp.31-36. At: https://ajem.infoservices.com.au/items/AJEM-27-02-08.*

9. Asia-Pacific Defence Reporter 2022, *ADF draws down on flood assistance as troops return to home units, At: https://asiapacificdefencereporter.com/adf-draws-down-on-flood-assistance-as-troops-return-to-home-units/ [1 June 2023].*

10. Zhu R 1010, *The Decline of Formal Volunteering in Australia (2001–2020): Insights from the HILDA [Household, Income and Labour Dynamics in Australia] Survey, p.6.*

11. Tsai A, Newstead T & Lewis G 2022, *Emergency Volunteering: Leading Engagement and Retention. At: www.volunteeringaustralia.org/wp-content/uploads/VRP_Emergency-volunteering-Leading-engagement-and-retention.pdf.*

Improving decision-making for resilience investment

Melinda Morris

Climate-KIC Australia

Investing in disaster and climate resilience is crucial to avoid losses, withstand disaster impacts and harness the benefits that can positively influence communities and businesses.

The Resilient Futures Investment Roundtable (previously the Resilience Valuation Initiative) is a cross-sector collaboration between public, private, not-for-profit and research organisations seeking to improve the way resilience investment decisions are made. The Roundtable aims to enhance decision-making processes for resilience investment by building capability across sectors to use tools and methodologies that take a systemic approach to quantify the wide-ranging economic, social, environmental and governance benefits of resilience-building interventions.

A traditional cost-benefit analysis approach tends to focus on avoided costs and losses, failing to capture the broader and long-term co-benefits of resilience. These co-benefits include reducing supply chain disruptions during and after disasters, safeguarding biodiversity and strengthening community. By considering a broad range of benefits beyond financial aspects, decision-makers can make informed and sustainable choices that recognise the interdependencies and interconnectedness of various systems and sectors. This approach enables decisions that address complex challenges, foster synergistic efforts and avoid duplication. It also allows for the integration of diverse perspectives and values, creating space for the interest and needs of stakeholders with varying backgrounds.

The Roundtable serves as a collaborative platform that brings together stakeholders to build capability and test and strengthen systemic approaches to value the costs and benefits of resilience. It is also developing resources and guidance to help organisations improve the way that decisions are made about when, where and how to invest in resilience.

Roundtable members have established a shared understanding of what a robust resilience valuation approach entails. A robust approach adopts a broad, systemic and whole-of-life perspective considering interdependencies and externalities, while being functional and reliable. An analysis of available tools and methodologies highlighted a scarcity of approaches aligning with the Roundtable's definition of a systemic approach. This process revealed that organisations face challenges navigating the extensive range of tools and methodologies available for resilience valuation and can often lack the necessary expertise and resources to effectively use tools to integrate resilience valuation into decision-making processes. This underscored the need to enhance capability across all sectors and to identify and use tools for resilience valuation that enable a systemic approach.

To meet this need, the Roundtable provides a forum for cross-sector capacity building, knowledge sharing and identifying opportunities for collaborative partnerships on complex challenges. Members are also working to develop guidance materials, practice cases, supporting resources and learning opportunities. These resources are being designed to enable organisations to understand valuing resilience and access examples of organisations that are using tools to improve decisions.

The Roundtable has partnered with the Australian Institute for Disaster Resilience to share 4 short case studies that show how the value of resilience is being incorporated into investment decision-making. Through these real-world examples, organisations from different sectors showcase their approaches to improve their understanding of climate and disaster risk and the value that can flow from projects to manage risk and build resilience.

Read more about it at www.knowledge.aidr.org.au/resources/resilient-futures-roundtable.

Data driving accountability on diversity and inclusion

Stephanie Andrade

AFAC

Cassie Lindsey

Champions of Change Coalition

Within the sector, AFAC members have identified the need to create diverse, safe and inclusive workforces, that are representative of the communities we support.

NSW State Emergency Service Commissioner and AFAC President, Carlene York APM, said 'We need the best people throughout all our emergency service organisations – and by definition, the best people include a rich variety of backgrounds and perspectives that build strong and effective teams.'

A key focus area for the fire and emergency sector is gender equity. In support of this, the Champions of Change Fire and Emergency Group was established in 2017 with support from AFAC as the National Council for fire and emergency services. Convened by former Victorian Equal Opportunity and Human Rights Commissioner, Kristen Hilton, the group includes chief executives, commissioners and chief fire officers and other senior leaders representing member agencies responsible for fire, emergency and land management services across Australia and New Zealand who lead 126,000 employees and volunteers.

Taking action on the 5-year 2022 Progress Report

In March 2023, the group's annual progress report was released. This year, in addition to case studies showcasing examples of the initiatives being undertaken by agencies, the report looked at progress made towards women's equal representation in the sector in the 5 years since the group formed.

Overall, the data in the report shows that representation of women in the sector is increasing, particularly in senior leadership. While there is opportunity to accelerate this change, the data suggests that overall, the leadership and initiatives in the case studies are having a positive impact on gender equity.

Convenor of the Champions of Change Fire and Emergency Group, Kristen Hilton, said, 'Sustained commitment to gender equality across the Fire and Emergency Group has driven important progress over the past 5 years. Key to this is doing more to make our workplaces free from discrimination and harassment and creating environments that are truly inclusive.'

The data also highlighted areas where further attention is needed. As a sector, there has been a positive shift in women's representation in frontline service delivery overall, but conversely, women's representation in some frontline leader roles has decreased. These numbers highlight the need to accelerate progress overall and take action to understand and address the drivers of decreases in frontline leader representation.

It is also important to note that this data doesn't include the gender diversity of the extensive volunteer community that is an important part of the workforce and contributor to the shared culture experienced by those working in this sector. This has highlighted an opportunity to consider how best to capture and report on this data.

Data highlights

Overall:

- 26.5% women's representation in the sector, up from 22.5% in 2018.
- 33.0% women's representation in senior executive roles, up from 26.9% in 2018.
- 37.6% women's representation in general manager roles, up from 25.6% in 2018.

Frontline:

- 21.0% women's representation in frontline service delivery, up from 9.6% in 2018.
- 8.4% women's representation in frontline service delivery general manager roles, down from 16.5% in 2018.
- 10.6% women's representation in frontline service delivery senior manager roles, down from 18.6% in 2018.

Champions response and actions

Following the release of the progress report, the Fire and Emergency Group will leverage the progress that has been made so far and consider opportunities to accelerate the pace of change and address areas of regression.

AFAC CEO, Rob Webb, said 'While we know that sustainable change takes time, it is important to reflect on the progress that has been made towards gender equality in our sector. We must now use this momentum and generate even more as we strive to enable inclusive, equitable organisations.'

The group will focus on growing the talent pool and fostering safe and inclusive workplace cultures as part of the Champions of Change work plan. One of the key actions taken following the report was to bring together stakeholders to identify, share and commit to bold ideas for action to drive gender equity. In June, Champions of Change Coalition and AFAC brought together champions, their implementation leaders (who make up the AFAC Diversity and Inclusion Collaboration Group) and influencers from their agencies and organisations who drive change in a series of state-based workshops. In addition to providing visibility and accountability for action, these workshops also supported cross-industry collaboration and sharing of knowledge.

As an opportunity identified from the workshops, AFAC will work with Champions of Change to facilitate 'Listen and Learn' sessions for members, where agencies that have tackled specific gender equity challenges will share their process and practical learnings with peers.

The Champions of Change Coalition has also supported champions and their implementation leads to build knowledge on gender equity best practise. In May, Simone Cusack of Ambulance Victoria was invited to speak to industry leaders on the cultural change program she had overseen in her role as Executive Director, Equality and Workforce Reform. In June, champions attended a session on psychological safety with Professor Amy Edmonson, Novartis Professor of Leadership and Management at Harvard Business School. Champions of Change Coalition also facilitated a session for members on the new positive duty laws supporting psychologically safe workplaces, with a focus on sexual harassment and discrimination.

Next steps

The Fire and Emergency Group will track progress against each identified action, share actions and learnings and identify areas for collaborative initiatives supporting growth of the talent pool and creating safe, inclusive workplace cultures. This collaborative work is supported by AFAC through its Collaboration Network.

The Champions of Change Fire and Emergency Group 2022 Progress Report is available at: https://championsofchangecoalition.org/resource/champions-of-change-fire-and-emergency-2022-progress-report/.

The benefits of sharing emergency response resources

Neale Sutton

Humanihut

When emergency strikes it can sometimes overwhelm local emergency services organisations. An extreme event might quickly consume the available resources, leaving responders with less than they need to manage the situation.

In a large-scale emergency, where there is demand across the country that exceeds the resources of a state or local jurisdiction, it is important to be able to access the resources of other jurisdictions as well as a national, centralised fleet of equipment. This was a recommendation in the *Independent Review into South Australia's 2019-20 Bushfire Season*[1] (Recommendation 7).

This article discusses the financial benefits and efficiencies of sharing emergency services resources during times of crisis, with a focus on Australian examples.

Cost savings

Australian states and territories are projected to spend more than $1.5 billion (combined from state and territory budget statements 2021–22) on emergency service preparedness and response annually in the coming years. The Australian Government has established the Disaster Ready Fund that will provide up to $1 billion over the coming 5 years to help communities improve preparedness for their localised high-risk hazards. This is in addition to the $213 million cost to the Australian Government over 2019 to 2022 in activating the Australian Defence Force (ADF) to assist in disaster responses. This reliance needs to be reviewed in the coming years.

The Australian Government's recent Defence Strategic Review 2023[2] recommended the ADF work with states and territories to develop 'national resilience and response measures for adverse climate change … without the need of ADF support except in the most extreme emergencies'. The review points out that the ADF should be the 'force of last resort' for domestic aid except in extreme circumstances.

There is also a role for the private sector to provide expertise and savings. Companies like Humanihut[3] can be an effective and financially efficient way to supply and maintain extra resources. Instead of every jurisdiction maintaining a capability for every eventuality, which is wasteful if not needed or properly used, a commercial organisation can provide a surge capacity in the form of infrastructure and personnel as and when it is needed.

Improved response times

One of the most significant benefits of sharing emergency services resources is the decreased response times. In Australia, response times can vary depending on the location. Rural and remote areas often face challenges due to limited resources and long distances. By sharing resources, emergency responders can arrive at the scene faster and provide essential services sooner.

For example, in Western Australia, the Department of Fire and Emergency Services has a resource-sharing program called Quick Response Teams. These teams consist of firefighters who can travel to areas experiencing bushfires or other emergencies. By sharing resources between different regions the department can mobilise teams promptly, thus reducing response times and potentially saving lives.

Increased availability of specialised equipment

During emergencies, specialised equipment such as ambulances, fire trucks and rescue vehicles might reach their operational capacity. By sharing resources, emergency responders can access specialised equipment that may not be available

Portable shower, toilets and accomodation were set up in Barmera to provide temporary accommodation for local residents displaced by flooding.

Image: Neale Sutton

locally. This is particularly relevant in Australia, where events like bushfires, floods and cyclones frequently occur and can put a strain on emergency services organisations.

The bushfires in Victoria in 2009 are a prime example. The bushfires resulted in devastating loss of life and property. During the response, neighbouring states of New South Wales and South Australia, shared their firefighting aircraft and personnel. This collaborative effort significantly increased the access to aerial firefighting resources and enabled an effective allocation of resources to the bushfires.

Also, in 2022, portable showers, toilets and accommodation facilities were set up in Deniliquin, New South Wales, to accommodate the NSW Rural Fire Service that were on the ground in response to the flooding in the region. Humanihut could quickly supply and set-up the facilities used by the teams to support the shared response during the floods.

Another example was is December 2022, when, at the request of the South Australian Government Department of Housing, Humanihut moved infrastructure to the Riverland town of Barmera, to provide temporary accommodation for local residents displaced by flooding of the Murray River.

Improved coordination

Sharing emergency response resources can also improve coordination between emergency services agencies. During an emergency, multiple agencies may need to work together to provide a consolidated response. By sharing resources, agencies can work efficiently. This coordination is crucial for seamless emergency response operations.

In Australia, the National Resource Sharing Centre[4] (NRSC) is a central hub for coordinating the sharing of resources during emergencies. The NRSC plays a communication and coordination role that enables emergency services agencies across the country to share information and resources in real-time. This streamlined approach enhances the coordination for responding agencies.

Increased capacity

Sharing resources can also increase the overall capacity of the emergency response. By sharing resources, emergency services agencies can increase their capacity and potentially improve their capability to respond. This is particularly important during large-scale events where multiple emergencies may be occurring simultaneously.

The floods that affected South East Queensland and New South Wales in 2011 highlight the need for increased capacity through resource sharing. Emergency services agencies from Victoria and South Australia deployed personnel, equipment and resources to assist in the response and recovery efforts. This collaboration increased the overall capacity of localised emergency services agencies to deal with the widespread flooding and to provide aid to affected communities.

Collaborative training and knowledge sharing

Sharing resources also facilitates collaborative training and sharing of knowledge. When emergency services agencies share resources, they can also exchange valuable expertise and practices. This collaboration builds a collective knowledge and skills base of emergency responders. This can improve effective and efficient response efforts.

The Australian Maritime Safety Authority[5] has established a Joint Rescue Coordination Centre[6] that coordinates search and rescue operations across Australia's vast maritime areas. Through the centre, different emergency services agencies share resources, conduct joint training exercises and exchange knowledge on maritime emergency response. This shared training and knowledge provides a coordinated response to Australia's maritime incidents.

Community resilience and support

Sharing resources fosters community resilience and support. When neighbouring regions or states assist each other it sends a powerful message of solidarity and support to affected communities. This support can strengthen community morale and may help to alleviate the burden on local emergency services personnel.

In the aftermath of the bushfires that ravaged parts of New South Wales in the summer of 2019–20, emergency services agencies from various states as well as the Australian Capital Territory joined forces to provide assistance. Firefighters, paramedics and emergency-trained volunteers travelled from other regions to support the affected communities. This collaboration provided essential resources and capacity and brought hope and comfort to local communities.

Role of the private sector

Private sector organisations are being called on and should be used as part of emergency response situations. Their resources and expertise provide additional support and bring additional (and sometimes specialised) infrastructure and skills to the response and recovery.

The Global Development Research Centre[7] provides 4 areas where the private sector can contribute in emergency management. These are resource mobilisation, infrastructure and logistics, expertise and technology and preparedness planning.

There is significant knowledge and resources in the private sector that is ready and available that can provide a surge capacity when required. Many of these organisations have ex-personnel from within emergency services organisations who can contribute their knowledge and experience.

Conclusion

In the Australian context, sharing emergency services resources is highly beneficial. It can reduce response times, increase the availability of specialised equipment, can save costs, enhances coordination, increases overall capacity, promotes collaborative training and knowledge sharing and can foster community resilience and support.

Bringing in private sector organisations that can support emergency management operations allows emergency services responders to focus on their role and resourcing. The added benefit comes from having access to surge capacity from private sectors organisations.

Examples from Australia demonstrate the positive effect of resource sharing, whether it be through quick-response teams, sharing accommodation, optimising ambulance allocation, coordinating resources through a centralised platform or undertaking joint training exercises. The private sector can, and should, provide their specialist infrastructure and skills to help manage the financial consequences of preparedness, response and recovery.

Australia's emergency management sector and its partners will continue to develop and strengthen resource sharing. This can enhance its collective ability to respond effectively to reduce risks and respond to emergencies that threaten communities.

Endnotes

1. Government of South Australia 2020, *Independent Review into South Australia's 2019-20 Bushfire Season. At: https://safecom-files-v8.s3.amazonaws.com/current/docs/Independent%2520Review%2520into%2520SA%2527s%25202019-20%2520Bushfire%2520Season%2520-%2520Web%2520Upload.pdf.*

2. Defence Strategic Review 2023, at www.defence.gov.au/about/reviews-inquiries/defence-strategic-review.

3. Humanhut website, at www.humanihut.com.

4. National Resource Sharing Centre, at www.afac.com.au/initiative/nrsc.

5. Australian Maritime Safety Authority, at www.amsa.gov.au.

6. AMSA Joint Rescue Coordination Centre, at www.amsa.gov.au/amsa-joint-rescue-coordination-centre.

7. Global Development Research Centre, at www.gdrc.org.

Better mental health care for the local communities in Queensland

Yi Zhai

Mental Health Professionals' Network

Sam Sun

MSAMHS Disaster Flood Team

In January 2023, the Mental Health Professionals' Network[1] (MHPN) in partnership with the Metro South Addiction and Mental Health Services[2] (MSAMHS) Disaster Flood Team, established the Metro South Disaster Mental Health Recovery Network.

The MHPN's aims are to update and share knowledge and skills of professionals and frontline workers from different local services and sectors relating to disaster recovery and preparation in the mental health context. Following devastating floods in South East Queensland in 2022, the Metro South practitioner community (covering south of Brisbane, Redland, Logan and east of Scenic Rim local government areas) welcomed the development of the Metro South Disaster Mental Health Recovery Network as it allowed it to make connections and access peer support and professional development.

The mental health perspective

The first network meeting was held in February with the theme: Disaster from a mental health perspective, with Dr David Lie as guest speaker. Dr Lie was the Clinical Director with MSAMHS and provided psychiatric consultation to the MSAMHS Disaster Flood Team. Dr Lie examined the following topics in his presentation:

- What is a disaster from a mental health perspective?
- What are the common psychosocial and psychiatric consequences?
- How do these differ from reactions to stress and trauma outside of the disaster context?
- Who is most at risk?
- What can we learn from disasters in terms of innovative approaches to mental health care?

This meeting brought together 18 people including social workers, art therapist, nurses, psychologist, disability services worker, relationship counsellor/ family therapist and emergency services workers.

Supporting babies and young children

The network's second meeting was held in May 2023 with a theme: Birdie's Tree – Supporting babies and young children through natural disasters and disruptive events. This had a family-oriented focus and was presented by Dr Andrea Baldwin, Psychologist and Service Development Leader at the Queensland Centre for Perinatal and Infant Mental Health.

Expectant and new parents, babies and young children can be vulnerable during times of disasters and disruptive events like floods, fires, cyclones, heatwaves and pandemics. The early years are a critical period for brain development when the foundations are laid for lifelong social emotional wellbeing. Supporting young people's mental health through the preparedness, response and recovery phases of disaster events is still a new area of research and practice. This meeting provided insight into the work led by the Queensland Centre for Perinatal and Infant Mental Health and Birdie's Tree.

This session reviewed research evidence on the short- and long-term effects of disaster events on young children's mental health and wellbeing, risk and protective factors and 'what helps'. The hands-on care model and resources were also introduced to meeting participants.

The session covered:

Dr Andrea Baldwin led the family-oriented second network session.

Image: MSAMHS

Logan practitioners attended the Birdie's Tree – Supporting babies and young children through natural disasters and disruptive events meeting.

Image: MSAMHS

- the Birdie's Tree stepped care model, from mental health promotion and prevention through intervention to trauma treatment
- Birdie's Tree's resources including 11 storybooks, the Fun with Birdie activity book, Relaxing with Birdie mindful movement routine, therapeutic games, toys, puppets and other resources
- ways of using the Birdie's Tree resources with parents and caregivers, children, families and communities.

At the meeting's conclusion, Birdie's Tree kits (books, puppets and print resources) were gifted to participants. Twenty-five people attended, including recurring attendees and new network members. A diverse range of practice areas was represented such as art psychotherapy, social work, nursing, carer/support work, education, psychology, disability services, relationship counselling/family therapy, community engagement, service integration and emergency services.

Moving forward

Over 5 months, the network grew to connect 64 local practitioners, providing a space for them to network, learn and share resources and experiences. The network will meet quarterly in Logan Central and cover issues determined by its coordinator and members. Establishing a recovery-focused mental health network is a first as MHPN helps frontline workers and mental health professionals to improve the mental health care response. The valuable skills and experience learnt are a useful toolkit for future preparedness, response and recovery across the country.

More information about the network is at www.mhpn.org.au/members#/Network/91332.

Acknowledgments

Sincere thanks is extended to Kate Hoppe from Mental Health Professionals' Network for her support, feedback and advice.

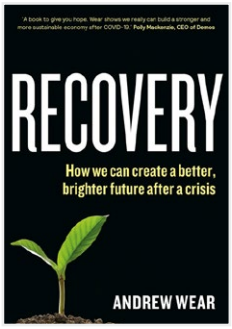
The MSAMHS Disaster Flood Team is jointly funded by the Australian Government and the Queensland Government under the DRFA – Category C, as a response to the southeast Queensland 2021–22 rainfall and flood event.

Endnotes

1. Mental Health Professionals' Network, at www.mhpn.org.au.

2. Metro South Addiction and Mental Health Services, at www.health.qld.gov.au/__data/assets/pdf_file/0024/444471/metrosouth-mental-facilities.pdf.

Recovery: How we can create a better, brighter future after crisis



Author
Andrew Wear

Reviewed by John Richardson

Australian Institute for Disaster Resilience

PUBLISHED BY
Black Inc

ISBN : 9781760643089

Recovery from the COVID-19 pandemic seems to be something that has dropped from the imagination or purview of people. There seems to be a sense that we have thrown off the restrictions and now let's just get on with it. But many people are still recovering; physically, emotionally, economically and existentially. It is very 'old school' thinking, almost akin to 'the bushfires are out, we are done with them, let's just get on with that'. In the emergency management sector we have known for many years that this cannot be the approach.

Part of a recovery manager's or strategist's job is to start thinking about how things will unfold at the time when things are going the way of the pear. Another part of the job is to be able to think over the horizon. Too often this doesn't happen.

Fortunately, author Andrew Wear was doing this as the pandemic unfolded around him, his family and us. It is refreshing to have a new and experienced set of eyes on age-old problems. *Recovery: How we can create a better, brighter future after crisis* is an excellent and timely book, given the various calamities that we have been experiencing. While the book is prompted by the pandemic crisis, with a historian's keen eye, he looks across a range of calamities and tries to find what helps with recovery.

His guidance is very good and although he doesn't draw on Australia's National Principles for Disaster Recovery[1], what he is saying is very similar. I was really pleased to see him put social determinants of health and mental health and community engagement at the centre of his thoughts. This is what really matters.

I was also pleased to see him call for a commission of inquiry. Commissions of inquiry, when conducted properly and openly, are excellent sources of lessons. We should be learning from this event. It isn't the last one we will see and, as the Red Cross World Disasters Report 2022[2] indicated, levels of preparedness for future pandemics are surprisingly low.

My one concern lies with the chapter on 'natural' disasters and the 2004 Indian Ocean earthquake and tsunami, which appeared to read as though rapid rebuilding rates equate with better recovery. We know that people will rebuild at different rates depending on where they are practically and psychologically. However, Wear does reiterate (in the guidance sections) the importance of getting all the policy and assistance settings in place quickly so that people know what they are dealing with. The guidance sections are excellent, each finishing off with 5 steps forward. These are bite-sized guidance notes for the time-poor, harried, overwhelmed recovery manager who just wants to know 'what do I have to do?'.

This book is a very accessible and engaging read and I highly commended it to policy makers, practitioners and people with a keen interest in public policy.

1. National Principles for Disaster Recovery, at www.knowledge.aidr.org.au/resources/national-principles-for-disaster-recovery/.
2. World Disasters Report 2022, at www.redcross.org.au/publications/world-disasters-report-2022/.

Disasters as windows of opportunity: overcoming inertia through experimentation and learning

The argument

Rethinking the use of experimentation in response to emergencies and disasters could drive a step change in sustainability and climate resilience.

Kathryn Davidson

The University of Melbourne

Magnus Moglia

Swinburne University of Technology

Kathryn Davidson is an Associate Professor at the University of Melbourne and works in the field of climate and resilience governance.

Magnus Moglia is an Associate Professor at Swinburne University of Technology. He uses systems science and methods to research sustainability solutions for cities and regions.

To move beyond 'business as usual' climate adaptation plans, we argue, a renewed engagement with the mechanism of 'experimentation', especially in contexts of disasters, is needed. We argue that this could prompt a step change in how learning and systemic change happens, and through this mechanism, provide a catalyst to improve sustainability outcomes and climate resilience.

View

Urgency: We need urgent reform to reduce Australia's risk to high-risk hazards and disasters. This is because Australia is experiencing an accelerated rate and severity of climate-related extreme weather events with associated disasters including floods, droughts, bushfires, heatwaves and storms. The *Royal Commission into National Natural Disaster Arrangements – Report* (Commonwealth of Australia 2020) indicated that, with a rapidly warming climate, exceptional events like the Australian summer bushfires (2019–20) will be more frequent. This is 'now our future' (p.6). The impact of such frequent events will include disruption and huge costs. Recent and repeated storm and flooding events across Australia in 2020–22 alone led to more than $12 billion in insurance claims (Insurance Council of Australia 2022). It is clear to policymakers at all levels of government that the status quo is not an option (Nohrstedt *et al.* 2022).

Baseline: The most recent thinking in climate adaptation research puts the focus on the capacity for decision-making that will consider a growing level of uncertainty and that will enable positive adaptation pathways to be implemented. A key part of the change is to develop and mainstream new solutions, often across sectors, that weren't previously considered. However, the current mechanisms for decision-making and reform are unfortunately not where they need to be; as the mechanisms for learning from disasters still tend to be event-driven, short-term, mitigation-focused, sector-specific and rarely use integrated ideas of sustainability (Yeganeh, McCoy & Schenk 2020; Aguiar *et al.* 2018; Dilling *et al.* 2017). It is essential that we accelerate our understanding of mechanisms that enable us to move into sustainable pathways within the context of frequent, overlapping and ongoing disaster events. Time is of the essence because of the connectedness of the effects of systematic changes and for our social and economic survival (Raymond *et al.* 2020).

New ways of instilling change: To speed up change, we must move beyond current inertia and build novel solutions to drive greater appreciation of the necessity to reduce our exposure to risk and the benefits of change and innovation. Here we suggest the need for innovation for learning that we refer to as Natural Disaster–Induced Sustainability Experimentation (NDISE). NDISE is opportunistic in the sense that it draws on the window of opportunity for change that emerges as a result of disaster events. It draws on the notion of what resilience scholars and social-ecological systems theory refer to as 'radical innovation and reorganisation' (Walker 2020), as per the adaptive cycle of Panarchy (Gunderson & Holling 2002) and that, in general terms, can be referred to as 'bouncing forward'. This potential for reorganisation and change comes about through at least 3 mechanisms, during and often after a crisis:

- Old ways of doing things (paradigms) can be challenged and new ways of doing things can be imagined. This means there is less inertia for change and greater capacity for imagination than there otherwise is.

- Societal systems and their responses often move beyond the norm and from a complex adaptive systems perspective, creating an opportunity for probing and sensing and therefore learning through experimentation in a way that is usually not possible (Kurtz & Snowden 2003).
- Testing new solutions becomes acceptable. Novel experimentation becomes feasible and provides a way of translating insights about systemic solutions and how they can be turned into mainstream practice and/or cross-sectoral reform. This is an important step in order to turn opportunities into lasting change.

Importantly, many of the pathways to resilience depend on an enabling environment of cross-sector governance and learning, co-production, co-design and collective action to bridge the gap between intent and implementation (Moglia *et al.* 2021), which can be based on experimentation (Webb *et al.* 2020). Post-disaster, it is important to capitalise on these opportunities for a paradigm shift.

But how do you 'do' NDISE?

NDISE is different from traditional experimentation. Traditionally, what is referred to as experimentation usually occurs in dedicated pilot programs targeted to address the causes and implications of climate change via innovation learning and building new adaptive capacity based on experience (Castan Broto & Bulkeley 2013). NDISE occurs in a coordinated, hopefully well-prepared yet opportunistic manner, capturing and expanding on emerging insights and directions in a way that builds systemic solutions that go beyond mere resilience but aims for a just and sustainable future. It draws on collaborative partnerships between community, government and the private sectors alike.

So far, however, there are no guidelines for how to 'do' NDISE well, although there is fast-growing and maturing literature on experimentation in the sustainability transitions literature (see Brundiers 2018, Brundiers & Eakin 2018). What we know is that NDISE challenges business-as-usual by testing new ideas and methods and building capacities and paradigms for new ways of doing, thinking and organising; ultimately leading to lasting institutional change. NDISE suggests that all sectors aligned with emergency and disaster management to collectively explore opportunities for change, and to use experimentation as it will help to embed innovative solutions in post-disaster post-disaster activities and investments. Scholars within the field of sustainability transitions studies recently re-visited case studies across academic journals to illuminate the practices and lasting consequences of unplanned experimentation in times of crises (Brundiers & Eakin 2018). Unfortunately, no Australian case studies were identified, nevertheless, they identified examples that include but are not limited to:

- during/after the recurring floods and hurricanes in Soldiers Grove, Kinston (USA), actor groups were forced to experiment with regulatory changes, and this resulted in reforms to federal and state laws promoting renewable energy and natural resource conservation
- after the town of Greenburg (USA) was largely destroyed in an EF 5-strong tornado, responses included experimentation with a novel interagency sustainability-working group. The resulting sustainability master plan that was derived from this collaboration was so impactful that Greenburg received an international award for it.

Similarly, the Christchurch, New Zealand, earthquake was a catalyst for long-term sustainability through efforts to introduce new regulations such as low-emission wood burners; rebuilds using insulation and ground-sourced heat pumps; building better co-governance arrangements among Māori tribal council, city councils, and the central government to permit Māori values to influence land use and urban development plans and the Natural Environment Recovery Program, which was based on a strong notion of sustainability. Through this mechanism, the Christchurch earthquake enabled sustainability shifts that were more innovative than otherwise could have been the case because the disaster 'triggered and accelerated (practices) that were being put off'; further, 'some post-disaster sustainability initiatives leveraged opportunities to build buy-in for their visions' (Brundiers 2018, p.1083).

Broad collaborations are key to success

Public and private sectors alike have long been advocating and implementing novel climate action experiments to demonstrate and contribute to a possible shift towards sustainable practices. Experiments, when built on broad collaborations, usually carry the promise to positively and proactively contributing to systemic change by developing new solutions that are also widely adopted by key actors.

Engaging a broad alliance of actors within these collaborations is also important because it acknowledges the plurality of desires and values, stimulates innovation, mitigates the risk of conflict and allows for diverse interpretations of reality, thereby providing a better chance for more transformative action (Cork *et al.* 2023). What is common across all these experiments is that they tend to leverage the opportunity for momentum and rapid change that arises from wide collaboration not just with governments, but also with civil society and business. However, such existing forms of experimentation rarely engage with disasters.

Planned or unplanned

An important issue when thinking about NDISE is to consider the differences between 2 key types of experimentation: unplanned experimentation and planned experimentation. Unplanned experiments can draw on opportunistic insights as a crisis unfolds and can tap into the creativity and problem-solving that occurs during crises yet may, depending on institutional rules, lack the legitimacy and support required for widespread adoption.

Planned experimentation plays an important role in the way it is designed, organised and how policy and social learning are being monitored and evaluated. Especially in contexts where social capital is high, planned experimentation can deliver new policy

innovations and governance approaches tested/trialled and be part of a larger portfolio of actions or adaptation pathways that provide a crucially important diversity of responses (Werners *et al.* 2021, Walker 2020).

Where to from here?

These examples and insights illustrate how, during emergency events, individuals, communities and organisations collectively recognise the need for new visions and solutions. Such new collectively agreed visions and solutions, may induce lasting behavioural or institutional changes. But knowledge of the entailed experimentation, or learning mechanisms, in crisis, is still limited and therefore opportunities risk being lost.

To maximise the potential for charting new directions using NDISE, we urgently need a better and systematised understanding of its forms, scope, limits, mechanisms and potential. Without this knowledge, we lack the tools to assess whether and how shocks to systems can open alternative pathways that harbour transformative opportunities that allow Australia to live more safely and productively within a sustainable future. Proactive, change-oriented sustainability experiments across the globe have demonstrated their potential and promises for many years. Therefore, we argue that we need to embrace NDISE as an area of focus in both research and policy, to bring it into the context of disasters.

In summary, we advocate for improving our theoretical and practical understanding of emergent processes of improvisation, problem-solving and social momentum and innovation during times of crises and to develop a fine-grain suite of NDISE analysis tools than are currently available. What is needed to support this activity? To begin, we invite a discussion on several questions and welcome new questions into the debate.

- Which factors influence the leveraging of post-disaster opportunities for change actions?
- What opportunities for innovation does a disaster offer?
- What were the main mechanisms of leveraging the opportunities that is, practices and attributes of the change agents?
- If opportunities were leveraged what specific post-disaster adaptations were undertaken?

References

Aguiar FC, Bentz J, Silva JMN, Fonseca AL, Swart R, Santos FD, Penha-Lopes G 2018, *Adaptation to climate change at local level in Europe: An overview. Environmental Science Policy, vol. 86, pp.38–63.*

Brundiers K 2018, *Disasters as opportunities for sustainability: the case of Christchurch, Aotearoa New Zealand, Sustainable Science, vol. 13, pp.1075-1091.*

Brundiers K & Eakin H 2018, *Leveraging post-disaster windows of opportunities for change towards sustainability: A framework, Sustainability, vol. 10, no. 5, p.1390.*

Castan Broto V & Bulkeley H 2013, *Government by experiment? Global cities and the governing of climate change. Transactions of the Institute of British Geographers, vol. 38, pp.361–375.*

Commonwealth of Australia 2020, *Royal Commission into National Natural Disaster Arrangements Report. At: https://naturaldisaster.royalcommission.gov.au/publications/html-report [2 December 2022].*

Cork S, Alexandra C, Alvarez-Romero JG, Bennett EM, Berbés-Blázquez M, Bohensky E, Bok B, Costanza R, Hashimoto S, Hill R, Inayatullah S, Kok K, Kuiper JJ, Moglia M, Pereira L, Peterson G, Weeks R & Wyborn C 2023, *Exploring Alternative Futures in the Anthropocene. Annual Review of Environment and Resources, p.48.*

Dilling L, Pizzi E, Berggren J, Ravikumar A & Andersson K 2017, *Drivers of adaptation: Responses to weather- and climate-related hazards in 60 local governments in the Intermountain Western U.S. Environment and Planning: A Economy & Space, vol. 49,, no. 11, pp.2628–48.*

Gunderson L & Holling CS 2002, *Panarchy: Understanding Transformations in Human and Natural Systems. Island Press.*

Insurance Council of Australia 2022, *Three-year weather bill reaches $12.3 billion. At: https://insurancecouncil.com.au/resource/three-year-weather-bill-reaches-12-3-billion/.*

Kurtz C & Snowden D 2003, *The New Dynamics of Strategy: Sense-making in a Complex-Complicated World. IBM Systems Journal, vol. 42, no. 3, pp.462-483.*

Moglia M, Frantzeskaki N, Newton P, Pineda-Pinto M, Witheridge J, Cook S & Glackin S 2021, *Accelerating a green recovery of cities: Lessons from a scoping review and a proposal for mission-oriented recovery towards post-pandemic urban resilience. Developments in the Built Environment, vol. 7, July 2021, 100052.*

Nohrstedt D, Hileman J, Mazzoleni M, Baldassarre GD & Parker CF 2022, *Exploring disaster impacts on adaptation actions in 4549 cities worldwide. Nature Communications, vol. 13, p.3360.*

Raymond C, Horton R, Zscheischler J, Martius O, AghaKouchak A, Balch J, Bowen SG, Camargo SJ, Hess J, Kornhuber K, Oppenheimer M, Ruane AC, Wahl T & White K 2020, *Understanding and managing connected extreme events. Nature Climate Change, vol. 10, pp.611–621.*

Walker B 2020, *Finding Resilience: Change and Uncertainty in Nature and Society. CSIRO Publishing: Canberra, Australia.*

Webb R, Bai X, Smith MS, Costanza R, Griggs D, Moglia M, Neuman M, Newman P, Newton P, Norman B, Ryan C, Schandl H, Steffen W, Tapper N & Thomson G 2018, *Sustainable urban systems: Co-design and framing for transformation. Ambio, vol. 47, no. 1, pp.57-77.*

Werners S, Wise R, Butler J, Totin E & Vincent K 2021, *Adaptation pathways: A review of approaches and a learning framework. Environmental Science & Policy, vol. 11, pp.266-275.*

Yeganeh AJ, McCoy AP & Schenk T 2020, *Determinants of climate change policy adoption: A meta-analysis. Urban Climate, vol. 31, 100547.*

Responses

Matthew Chesnais

Resilient Communities Mission Lead

Minderoo Foundation Fire & Flood Resilience, Sydney

Minderoo Foundation agrees with the authors on the need to draw on our collective experiences of disaster events to drive innovation and system change. We believe that, by harnessing the collective power of communities, industry, government, philanthropy, emergency services, non-government organisations and the research sector, we can identify the most important resilience-related problems and enable the most effective solutions to be delivered faster.

However, to be truly effective we need to avoid duplication of effort by inventing new tools, frameworks and processes that ultimately seek to achieve the same outcome. Through better coordination, we can harmonise our efforts and reduce the burden on already disaster-fatigued communities. When we do this, we will collectively lift Australia to be the global leader in disaster resilience within a decade.

We are facing unprecedented challenges and change in both the current and future operating environments with a dynamic political, social, economic and policy landscape surrounding disaster risk reduction and resilience. This is being amplified by hazards that are increasing in frequency, intensity and severity due to human-induced climate change. The resulting social, cultural, health, economic, built and natural losses are deepening, and some consequences may last for generations. Compounding this issue is an increasingly harsh reality that governments simply do not have the financial capacity to make everyone resilient, and response agencies are unable to protect everyone.

In this context, innovation is critical, especially where systems and processes are fundamentally broken. The Royal Commission into National Natural Disaster Arrangements[1] highlighted many such examples. However, the luxury of being able to innovate, that is, having the time and resources to come up with and test new technologies and processes, may result in some instances of communities being unprepared for these worsening events because their basic needs are not met.

Arguably, the shift from response and recovery to resilience represents a major and largely unrealised innovation. Our collective but limited resources should be prioritised and targeted to improve and promote rapid system change and a shift to building resilience. We now know that financial resources are more effective if we are better prepared, with research showing an average return of $3.70 against every dollar currently spent in response and recovery (Hugenbusch & Neumann 2016[2]).

Resilience is a shared responsibility and the success of our endeavours will depend on the collective and combined effort of individuals, communities, businesses, non-government and government organisations. When combined, strong, well-connected networks and well-coordinated approaches across the emergency management cycle (and across disaster management arrangements) will provide a primed environment for disaster resilience initiatives to succeed and take effect.

In this context, innovation and experimentation are not necessarily concerned with what is new. We should be focused on reducing complexity, increasing transparency and harmonising tools, frameworks and processes. As such, we advocate for major innovations in disaster resilience:

- A national prioritisation tool (an index) to identify the least resilient communities (at a granular level) to disasters based on a range of core indicators. This can be used to prioritise where resilience and disaster risk reduction funding is best directed. Ideally, it can do so for all community-based disaster and resilience programs; national and state. This must be openly sharable, without restriction and underpinned by the most up-to-date data and information on what communities, assets and ecosystems or environments are, or are not, resilient and sustainable.
- A new, nationally consistent framework that is principles-based and supports communities to lead risk reduction and resilience planning. The outputs of such a framework should support the prioritisation and targeted application of limited resources and funding to communities in need.
- A national effort to connect the significant and largely untapped network of corporate and student volunteers. These networks should work with and through existing community-led organisations and non-government organisations on the ground to help communities and local governments prepare for high-risk hazards, such as fires and floods, before they occur. An example of where this is being achieved is through the Australian Resilience Corps.[3]

The Minderoo Foundation believes that our ability to survive, adapt and thrive, individually and collectively, depends on innovating existing capabilities and capacities that can be adapted as we recover and learn from today's crises events. How effective we are in this pursuit will depend on how we collectively tackle the resilience challenges and opportunities that come next.

1. Royal Commission into National Natural Disaster Arrangements, at https://naturaldisaster.royalcommission.gov.au/.
2. Hugenbusch D & Neumann T 2016, *Cost-benefit analysis of disaster risk reduction. Aktion Deutschland Hilft e.V. www.preventionweb.net/publications/view/50665.*
3. Australian Resilience Coprs, at www.resiliencecorps.org.au/

Dr Mark Crosweller AFSM

Founder and Director

Ethical Intelligence Pty Ltd, Canberra

Rethinking the use of experimentation in response to emergencies and disasters to drive a step change in sustainability and climate science is a novel idea and should be explored further.

Australia's ability to reduce the risks associated with natural hazards has improved immeasurably over the past 100 years. As our urban and regional populations have increased, so too our economies have grown, our technology advanced and our knowledge base increased. This has enabled us to increase our risk treatment effectiveness from low-moderate intensity events at the beginning of the 20th Century through to severe intensity events in 2023. As our capability to treat risks has increased, the consequences (loss of life, economic, social, built and natural impacts) have decreased. We have, however, reached a point where the effectiveness of our capability has reached its limit and the intensity of natural hazard events are increasingly surpassing that capability, producing significant and unacceptable consequences.[1] The recent compounding, cascading and complex disasters that have occurred over the past 4 years are a testament to this effect.

As a sector, we have become relatively competent and confident in our ability to manage the more frequent but less intense disasters. We could say that these disaster events are within the scope of our knowledge, skills, experience and imaginations. We know a lot about them, we are skilled and adept in managing them, many of us have had at least some experience of them, and they tend to play out in a way that is within our capacity to imagine them. Under these circumstances, we tend to maintain the trust and confidence of the communities that we serve.[2]

However, for the intense disasters in the range of severe to catastrophic, the rules change. These disasters are rarer (although increasing in frequency largely driven by the effects of climate change in concert with other factors such as poor land use planning decisions and outcomes) and more intense. They generally exceed our knowledge of their potential cascading effects, surpass our skills in how to effectively manage them, are unique in the experience of many, and exceed our capacity to imagine their manifestation and their effects. When this happens, the trust and confidence of the community is severely eroded and often difficult, if not impossible, to recover at least in the short to medium term.

In these circumstances, there are two key factors that emerge: the need for responsivity and reflexivity.[3] The ability to react to the 'unknown unknowns' in a way that is novel, dynamic, strategic and perhaps most importantly, courageous.[4] The Natural Disaster-Induced Sustainability Experimentation (NDISE) proposed by Kathryn Davidson and Magnus Moglia provides that opportunity.

In my experience, the factors that influence the leveraging of post-disaster opportunities for change actions arise from courageous individuals who tend to 'break rules' or at least 'norms' and pursue novel solutions out of a sense of moral duty, operational urgency and/or political opportunity. The introduction and use of social media during the Queensland floods over 2010 and 2011 by the Queensland Police Service is one celebrated example. The use of predictive fire mapping during the fire season on 2019–20 by the New South Wales Rural Fire Service is another example. These novel solutions often emerge when leaders come to understand that their systems of management have reached their point of limitation, the rules of engagement have changed (in often foreseeable but ignored ways) and the emerging crisis demands innovation and creativity.

With the changing nature of Australian politics in favour of an uncontested policy environment regarding climate change, agencies and organisations are now better placed than the previous 10–15 years to accept the inevitability of climate change influenced natural events. In so doing, they can afford to be more imaginative and creative in how they respond to emerging problems as well as how they reflect on the lessons learnt in preparation for future events. They also have the opportunity to engage in these processes with the communities they serve and protect. In so doing, they are afforded the opportunity to explore interventions that recognise and support the existing and available capabilities of communities to exercise their agency and contribute towards valued solutions.[5]

To achieve this, our collective political, operational and administrative leadership must be prepared to bring to the table their equities of power (such as legislation, regulation and influence), wealth (funding) and resources (people, things and capital) as well as their vast bodies of knowledge to share with communities. This would require a shift towards a participative democratic process; a sharing of responsibility for both problems and solutions.[6] The expertise of governments and their agencies would bring significant benefit to the definition of the problems that are likely to be faced into the future, and the values and preferences of community members would help shape the solutions in response to those problems.[7,8]

Finally, it is important that the change agents are prepared to 'be in relationship' with those they are seeking to serve and protect; that they genuinely understand the vulnerability of themselves and others and the potential for suffering to ensue. They also need to be committed in thought, word and action to alleviate that same vulnerability and suffering, be venturous in that pursuit and remain accountable for their actions.[9]

I would contend that the NDISE approach provides a pathway for such a solution and should be applauded.

1. Crosweller M 2015, *How a change in thinking might change the inevitability in disasters. Australian Journal of Emergency Management, vol. 30, no. 3, pp.48–55.*
2. Crosweller M & Tschakert P 2019, *Climate change and disasters: The ethics of leadership. Wiley Interdisciplinary Reviews: Climate Change, vol. 11, pp.1–18.*
3. Byrne DS & Callaghan G 2014, *Complexity theory and the social sciences : the state of the art, New York, Routledge.*
4. Crosweller M & Tschakert P 2021, *Disaster management and the need for a reinstated social contract of shared responsibility. International Journal of Disaster Risk Reduction, vol. 63, pp.1–13.*
5. Schmidt J 2015, *Intuitively neoliberal? Towards a critical understanding of resilience governance. European Journal of International Relations, vol. 21, pp.402–426.*

6. Stears M 2011, *Everyday Democracy: Taking Centre-Left Politics Beyond the State and the Market. London: Institute for Public Policy Research.*

7. Ostrom E 1999, *Coping with tragedies of the commons. Annual Review of Political Science, vol. 2, pp.493–535.*

8. Ostrom E 2010, *Beyond Markets and States: Polycentric Governance of Complex Economic Systems. The American economic review, vol. 100, pp.641–672.*

9. Crosweller M 2022, *Disaster management and the need for a relational leadership framework founded upon compassion, care, and justice. Climate Risk Management, vol. 35, 100404.*

Milica Duric

Minderoo Foundation Fire & Flood Resilience – Healthy Landscapes

Minderoo Foundation, Sydney

Minderoo Foundation agrees with the authors on the need to speed up change in the way that we respond to and prepare for and get ahead of disaster events by testing new methods, iterating and co-designing solutions with stakeholders across the system.

Rapid experimentation is needed to develop nature-based solutions so we can adapt to a changing climate, and to standardise the way that we measure the effects of land management activities on reducing the fire and flood risk of our most exposed landscapes. In addition to rapid experimentation, co-designing approaches with First Nations communities and other important stakeholders is critical to achieving resilience.

Technological systems such as AI and machine learning allow continuous interaction through a mechanism commonly referred to as 'Human in the Loop' (HITL).[1] ChatGPT uses artificial intelligence to complete tasks, but still requires human input to ensure its outputs are customised and nuanced. When information is linked between systems, better decision-making can occur. So how can we harness both adaptive natural systems with human systems (social, technological and economic) to crack the code for a step change in climate resilience innovation?

Modelled on 'moonshot' programs, Minderoo Foundation Healthy Landscapes mission approach promotes innovative collaboration, with shared risk and reward. Experimentation within an ecosystem of strategic partnerships incorporates different experience and knowledge; opening the door to new solutions that address seemingly impossible problems. This is a time-bound, iterative and continually experimental approach, akin to a disaster resilience lean start-up.

An example of the lean start-up method that has been applied is Minderoo Foundation's partnership with Greening Australia to plant 10,500 alpine ash seedlings throughout Victoria and New South Wales. Through experimentation and a product-development approach, the aim is to develop 'super seeds' that speed up regeneration of a keystone species that normally takes 15–20 years to mature after bushfire loss and is integral to most of Victoria's water supply. This has reduced the risk of extinction as the climate changes and also enabled a better understanding of supply chains, cost and benefit analysis and who the customer is for restoring the Alpine Ash.

The Royal Commission into National Natural Disaster Arrangements[2] highlighted that there are critical gaps in information, making vital decisions about safeguarding the environment a challenge. We need to drive the development of practical solutions that can help standardise the information we have, show science-based outcomes against actions such as hazard risk reduction and represent the value of restored ecosystem services and resilience at a regional scale. Providing this information in a simple and accessible format means it can be used anywhere by land managers. This demonstrates that interoperability between systems such as economics and ecology is possible for sustained investment in climate resilience.

Minderoo is a contributing partner and funder of the Burnett Mary Regional Group Natural Capital Account[3] covering 5.6 million hectares and certified through Accounting for Nature.[4] This experimental pilot set out to demonstrate how actively managing the environmental condition of landscapes can become an investable, risk reduction practice. A complete picture is forming at the local and regional scales as we work in the region to design interventions with traditional owners to protect high-value environmental assets that are most at risk of fire and flood. Soon, we will be able to scientifically evaluate and measure which methods yield optimal risk reduction and biodiversity benefits, while testing new technologies such as earth observation and eDNA[5] to capture the full gamut of ecosystem services. This will contribute to new environmental accounting methods specific for fire and flood management that can be replicated in other hazard prone regions.

Linking our human systems to natural ones provides an opportunity to generate feedback loops and develop a shared language and operating context that will create conditions for better experimentation. Combining information on environmental conditions and ecosystem services with traditional knowledge, natural capital and landscape management practices builds better resilience solutions, no matter the location. This will benefit our most exposed landscapes as well as the surrounding communities that depend on them.

1. Humans in the Loop: The Design of Interactive AI Systems, at https://hai.stanford.edu/news/humans-loop-design-interactive-ai-systems.
2. Royal Commission into National Natural Disaster Arrangements, at https://naturaldisaster.royalcommission.gov.au/.
3. Natural Capital Environmental Accounting Project, at https://bmrg.org.au/portfolio-items/natural-capital-environmental-accounting-project/.
4. Accounting for Nature provides a global certification standard for environmental accounting. See: www.accountingfornature.org/.
5. eDNA biomonitoring is 'environmental DNA' and refers to the DNA that can be extracted from environmental samples (e.g. water, soil, sediment). See https://research.csiro.au/teamcoast/environmental-dna/.

Greg Mullins AO, AFSM

Former Commissioner Fire and Rescue NSW

Founder, Emergency Leaders for Climate Action

As we lick wounds from our worst ever bushfires followed by record-breaking floods through the subsequent triple La Niña, we brace for return of El Niño and its minions: heatwave, drought and fire. After years of escalating disasters driven by climate change, it is time for new approaches that assist local communities to find local solutions. The tendency to centralise resources and decision-making after major disasters is unlikely to meet the climate threat.

Widespread rains are a double-edged sword; temporarily reducing fire danger while promoting prolific growth of grass and bushfire fuels and stopping crucial fuel-reduction burning.

Historically, following every protracted La Niña event, the east coast of Australia immediately burns, with major property losses in 1957, 1977 and 2001–02. A protracted La Niña also fuelled the largest grass fires in Australian history in 1974–75.

So, the big question is: have we learnt from the years of consecutive, compounding disasters, and are we better prepared as a result? The answer depends on your perspective, but every level of government has clearly worked hard to increase response and recovery capabilities and committed record levels of expenditure to better prepare agencies and communities.

The next question is: is it enough? The unfortunate answer, in my opinion, is no.

But before rushing to blame and condemn (an increasingly common reaction from armchair critics and social-media-informed 'experts') we must acknowledge that the intensifying effect of climate change challenges every facet of emergency management. Together with 40 other former chiefs from every fire service in Australia and a number of SES, forestry and national parks agencies that comprise Emergency Leaders for Climate Action, I am immensely relieved that the national dialogue in Australia has finally moved on from whether climate change is happening to what we must now do to address it. Scientists warned for decades that this horror scenario would come and the reality is crushing and frightening. Thankfully, we now have all levels of government accepting the need for simultaneous emissions reduction (though way too slow) and climate adaptation.

So, given this and the additional investment, why would I say that we are ill-prepared?

Unfortunately, the increasing frequency, intensity and geographical spread of extreme weather events are increasingly overwhelming centralised approaches (which nonetheless remain crucial). As an example, the recent *National Defence: Strategic Review 2023*[1] revealed that the Australian Defence Force (ADF) cannot sustain continual diversion of resources from defence of our external borders to cleaning up after disasters within.

So, what can be done to plug the gap that the ADF leaves? Firstly, we must not waste millions on creating new structures and bureaucracies and instead leverage what we already have by building on the volunteer and professional emergency services structures already located within communities. But that is just part of a very complex puzzle and I can't help wonder, is there anything we might learn from the past?

I grew up in a semi-rural area where bushfires were a constant and, at age 12, became a volunteer firefighter like my dad. But back then, the fire brigade and the slow old fire truck were a last resort. Everyone knew how to prepare their homes for fire, did cool burns in winter around property perimeters and helped each other whenever a fire broke out. Before they were buzzwords, our community was resilient and self-sufficient.

Thankfully, today, emergency services personnel are vastly better trained, equipped and organised. However, amid calls for 'new thinking' and 'innovation', I wonder whether we may have inadvertently 'thrown the baby out with the bathwater' when we largely eliminate residents from the PPRR (preparedness, planning, response and recovery) of emergency management.

Following Australia's bushfires during summer 2019–20, the stark reality of the truism 'on a bad day you can't expect a fire truck in every driveway' was truer than ever. The rapidly warming climate is driving extreme weather events that regularly overwhelm formal emergency management structures designed for the threat environment of the 20th Century, particularly in the areas of response and recovery.

Following the horrendous bushfires and floods of recent years when previously reliable firefighting strategies regularly failed, predictions of flood peaks were rendered meaningless and emergency services struggled to cope, encouraging stories emerged from the gloom. Working outside formal structures, groups of farmers using 'slip-on' fire tanks and pumps on the New South Wales South Coast and on Kangaroo Island in South Australia saved many homes. In Lismore, the community 'tinny flotilla' rescued hordes of locals who were clinging desperately to roofs as flood waters swirled.

I think back to my resilient childhood community and reflect on literature explaining how true community resilience comes not from imposed, remote solutions, but from increased local information, autonomy, capability and decision-making. The tinny flotilla, farm fire units, community fire units and Brisbane's 'mud army' all demonstrate community partnering that works. And after 200 years of ignoring our Indigenous brothers' and sisters' knowledge of cultural burning, there is finally a genuine interest to embrace tens of thousands of years of previously discarded wisdom.

As we continue the vital work to strengthen central capabilities, my hope is that we will also embrace the old/new approach of truly empowering communities, because if we do, it will be a force multiplier.

1. Department of Defence 2023, *National Defence Strategic Review 2023. At: https://www.defence.gov.au/about/reviews-inquiries/defence-strategic-review.*

Emeritus Professor Barbara Norman

University of Canberra

Chair Urban Policy Forum, Australian Government

Vice Chair, Director, Australian Coastal Society

Director Urban Climate Change Research Network Oceania Hub, Columbia University, New York

Visiting Research Fellow, Australian National University, Canberra

> **The phrase 'bouncing forward' encapsulates the key arguments behind the need to enable innovation and experimentation as a key response to emergencies and disasters. Implementing 'bouncing forward' at all levels–national, state, territory and local governments, in partnership with the private sector and community groups, will be essential.**

Experimentation and learning with innovation are central to bouncing forward. Demonstration projects funded through partnerships are critical for implementing change. Building back better after disaster events is an opportunity to advance leading practice in the built environment and can be done creatively by addressing several challenges, for example, developing affordable carbon-neutral mixed-use residential precincts. Such projects rely on successful partnerships and ongoing funding to allow for effective implementation, review and learning.

The active participation of First Nations peoples is critical in future land use responses as is the concept of 'working with nature'. Coastal planning is a good case study of what's possible. The Sea Country Plans by Aboriginal Land Councils provide excellent examples of a systems approach to forward planning in taking an integrated approach to environmental management, cultural knowledge and adaptive planning (see Dhimurru Aboriginal Corporation[1]). This approach provides a sustainable and practical example of learning being incorporated into planning responses over many years.

Climate-induced resettlement will be one of the most significant challenges of the 21st Century.[2] As discussed in my book *Urban Planning for Climate Change*[3], the global impact will be immense affecting millions of people by 2050, whether it be due to glacial melt in Alaska, the sinking of Jakarta, the inundation of neighbouring Pacific islands or towns and villages around Australia due to sea-level rise and extreme events. Experimentation and learning in bouncing forward can be a proactive response to working with communities facing serious climate effects soon. The example of the relocation of the Queensland township of Grantham to higher ground following destructive flooding is a positive one involving community leadership and engagement. The establishment of the Queensland Reconstruction Authority was an innovative governance response at the time and that model has been adopted more widely.

Finally, for the above to happen, it will require reform to current governance and legislative arrangements. The Royal Commission into National Natural Disaster Arrangements[4] recommended 'mandatory' consideration of natural disasters in all land use planning. Fortunately, change is beginning to happen with the Australian Government now actively seeking advice and input from experts and the community on these issues. Reinvestment in tools for scenario planning and platforms for innovation will be necessary to enable and support such change. Local governments particularly need the support of other levels of government to work with local communities to develop 'climate resilient plans'.[2,5]

So yes, experimentation and innovation should be encouraged and facilitated in response to natural high-risk hazards and disasters. However, such an innovative approach could be mainstreamed in all land use planning through reform of legislation, policy and dedicated funding programs to provide the foundation for really 'bouncing forward'. There is a great deal of innovation occurring at the local and community level as well as growing awareness that we can do better in planning for emergencies, disasters and climate change. This bodes well for the future. With more active support for these initiatives, collectively, we have the capacity to make a substantial contribution to a more sustainable future.

1. Dhimurru Aboriginal Corporation, at www.dhimurru.com.au/sea-country-management.html.
2. IPCC 2022, Summary for Policy Makers. *In Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press.* At: www.ipcc.ch/report/sixth-assessment-report-working-group-ii/.
3. Norman B 2022, *Urban Planning for Climate Change, Routledge, London.*
4. Royal Commission into National Natural Disaster Arrangements, at https://naturaldisaster.royalcommission.gov.au/.
5. Norman B, Newman P & Steffen W 2021, *Apocalypse now: Australian bushfires and the future of urban settlements. npj Urban Sustain, vol 1, no. 2. doi:10.1038/s42949-020-00013-7*

Dr Russell Wise

Principal Sustainability Economist

CSIRO

> **Davidson and Moglia raise an important question and provide valuable perspectives on disaster recovery that can, and needs to, improve and explores linkages between sustainability and disaster resilience agendas.**

In particular, they propose that disasters are opportunities for sustainability experimentation, innovation, change and renewal. This idea that disruptions (but not disasters per se, as suggested) provide 'windows of opportunity' is not new.[1] The authors give us a timely reminder of this and articulate the urgency and mechanisms for catalysing and enabling transformative changes to prevailing disaster management and development decision-making. This commentary is a response and provides qualifications to their position to stimulate constructive discussion.

Firstly, the authors use the concept of 'natural disasters', which the UNDRR and the Australian Government have been trying to shift away from for years. Disasters are not natural; they are the consequence of human decisions that put people and 'things of value' in areas exposed to natural hazards or make them vulnerable to disaster.[2] This is not a trivial point, as our language and narratives can reinforce or transform our thinking and practices. For example, post-disaster recovery efforts may be both a 'window of opportunity' and reveal or exacerbate the vulnerabilities and social structures that caused them, depending on how the causes of the disaster are framed and who 'captures'

the opportunity. Perhaps the authors could use this as an opportunity to contribute to changing the disaster narrative by altering the acronym 'NDISE' to DISE, that is, disruption-induced sustainability experimentation and removing all uses of 'natural disasters' and highlighting the political-economy dimensions of 'post-disaster windows of opportunity'.

Secondly, although disasters can present opportunities to 'do things differently', we need to take care not to confound post-disaster opportunities for change with post-disaster experimentation. Experimentation is associated with uncertainty and the potential for failure and loss. Expecting traumatised people who have experienced loss and suffering to be resilient and undertake risky experiments is morally and ethically fraught. Experimentation is also unlikely to be effective after disaster events as people tend to be in an instinctively hormonal 'fight or flight' mode and may be unable to activate the strategic and innovative capacities required for transformative change.[3] This hormonal response that prevents executive function can persist for many months following a disaster; even causing chemical and structural changes in the brain (prefrontal cortex) and make it hard to return to a pre-disaster state.[4,5] Disaster events are also more likely to occur in less-developed regions that are already vulnerable and less well-equipped to face both grand societal challenges and, potentially, disaster recovery.[6] Additionally, politics has been a close companion of past disasters and tends to derail attempts to highlight and tackle the systemic causes of exposure and vulnerabilities for short-term personal or political wins.[7]

The size of the disruption matters. Smaller disruptions that are not overwhelming or excessively traumatic can provide situations ripe for experimentation where the intent is to dramatically alter the system. In such situations, people may not be overwhelmed, may be sufficiently frustrated with the causes of their vulnerabilities and may have the state of mind and agency to undertake the difficult tasks of engaging with contested issues and experimenting new ways of doing things. Importantly, however, there will also need to be sufficient levels of the appropriate capabilities, competencies and capacities to draw on to take advantage of the window of opportunity provided by the disruption. Yet, there are growing numbers of reports of severe limitations in appropriate capabilities and capacity.

Concerningly, disruptions caused by natural hazards are becoming more frequent, extreme and intense and their consequences more catastrophic. This is overwhelming every element of our social, natural and infrastructural systems and are threatening to leave communities and governments unable to effectively deliver even basic functions let alone design and drive strategic experiments for transformative change.[8]

So how can this concept of DISE (and the mechanisms for catalysing and enabling transformative changes provided by Davidson and Moglia) be effectively operationalised? In the case of disasters, the experimentation needs to have been done pre-emptively (i.e. before the event) using a range of visualisation and foresighting techniques (art, theatre, virtual reality, storylines of anticipatory histories[9]) to imagine and explore plausible divergent futures[10], identify what society values and is at risk of losing and understand the underlying drivers of values and vulnerabilities and identifying the levers for how to change these.[11] Additionally, the lessons from these 'virtual' experiments need to be acted on to ensure better preparedness for when the opportunities present themselves after a disruption or disaster. In doing so, it is critical to avoid situations where:

- local communities are left to do all the work of recovery and transforming themselves, but instead are supported and enabled by all levels of government
- the window of opportunity is seen as a blank slate rather than an opportunity to build on local efforts and strategies to shape their future (this is a danger where DISE focuses on the immediate disruption at the expense of ignoring what has come before, which has the risk of opportunities being shaped by competing visions and more powerful vested interests)[12]
- experimentation, innovation and learning are not supported or protected for long enough to develop and embed new fairer risk sharing arrangements and novel partnerships/models for funding and financing have been allowed to emerge and embed themselves.

1. Walker B, Carpenter SR, Folke C, Gunderson L, Peterson GD, Scheffer M, Schoon M & Westley FR 2020, *Navigating the chaos of an unfolding global cycle. Ecology and Society, vol. 25, no. 4. doi: 10.5751/ES-12072-250423*
2. Buchtmann M, Wise R, O'Connell D, Crosweller M & Edwards J 2022, *Reforming Australia's approach to hazards and disaster risk: national leadership, systems thinking, and inclusive conversations about vulnerability. Disaster Prevention and Management: An International Journal. doi:10.1108/DPM-08-2022-0168*
3. Arnsten A, Mazure CM & Sinha R 2012, *Everyday Stress Can Shut Down the Brain's Chief Command Center. Scientific American. At: www.scientificamerican.com/article/this-is-your-brain-in-meltdown/.*
4. Makwana N 2019, *Disaster and its impact on mental health: A narrative review. J Family Med Prim Care, vol 8, no. 10, pp 3090–95. At: www.ncbi.nlm.nih.gov/pmc/articles/PMC6857396/.*
5. Bergmann D, Duffey T, Haberstroh S, Jones M, Schroder Y & Gregory JC 2020, *Neurobiological, Psychological, and Relational Effects of Crisis and Trauma, pp.71–90. In Introduction to Crisis and Trauma Counseling, edited by Duffey T & Haberstroh, South American Counselling Association.*
6. Rizzo A, Cappellano F, Pierantoni I & Sargolini M 2022, *Do natural disasters accelerate sustainability transitions? Insights from the Central Italy earthquake. European Planning Studies, vol. 30, no. 11, pp.2224–44. doi:10.1080/09654313.2021.2022104*
7. Crosweller M 2022, *Disaster management and the need for a relational leadership framework founded upon compassion, care, and justice. Climate Risk Management, vol. 35, 100404. doi:10.1016/j.crm.2022.100404*
8. World Economic Forum 2023, *The Global Risks Report, 2023. In partnership with Marsh McLennan and Zurich Insurance Group. At: www.weforum.org/reports/global-risks-report-2023/.*
9. Shaw A, Sheppard S, Burch S, Flanders D, Wiek A, Carmichael J, Robinson J & Cohen S 2009, *Making local futures tangible—Synthesizing, downscaling, and visualizing climate change scenarios for participatory capacity building. Global Environmental Change, vol. 19, no. 4, pp.447–463.* See also Tyszczuk R & Smith J 2018, *Culture and climate change scenarios: the role and potential of the arts and humanities in responding to the '1.5 degrees target'. Current Opinion in Environmental Sustainability, vol. 31, pp.56 –64. doi:10.1016/j.cosust.2017.12.007*
10. Kemp L, Xu C, Depledge J, Gibbins G, Kohler TA, Rockström J, Scheffer M, Schellnhuber HJ, Steffen W & Lenton TM 2022, *Climate Endgame: Exploring catastrophic climate change scenarios. Proceedings of the National Academy of Sciences, vol. 19, no. 34. doi10.1073/pnas.2108146119*
11. O'ConnellD, Wise RM, Doerr V, Grigg N, Williams R, Meharg S, Dunlop M, Meyers J, Edwards J, Osuchowski M & Crosweller M 2018, *Approach, methods and results for co-producing a systems understanding of disaster. Technical Report Supporting the Development of the Australian Vulnerability Profile. CSIRO, Australia. At: https://publications.csiro.au/rpr/download?pid=csiro:EP187363&dsid=DS16. See also: https://knowledge.aidr.org.au/resources/profiling-australias-vulnerability/.*
12. Manuel-Navarrete & Pelling 2015, *Subjectivity and the politics of transformation in response to development and environmental change. Global Environmental Change. doi:10.1016/j.gloenvcha.2015.08.012*

Learning from the experiences of residents: January to July 2022 floods

Associate Professor Mel Taylor[1,2]

Associate Professor Fiona Miller[1,2]

Professor Kim Johnston[2,3]

Dr Barbara Ryan[2,4]

Associate Professor Anne Lane[2,3]

Associate Professor Rachel King[2,4]

Dr Harriet Narwal[1,2]

Madeleine Miller[1,2]

Helga Simon[1,2]

Dipika Dabas[2,4]

1. Macquarie University, Sydney, New South Wales.
2. Natural Hazards Research Australia, Melbourne, Victoria.
3. Queensland University of Technology, Brisbane, Queensland.
4. University of Southern Queensland, Toowoomba, Queensland.

Abstract

Following a series of flooding events in New South Wales and Queensland during the period January to July 2022, Natural Hazards Research Australia funded a large post-event research project to understand and learn from the experiences of those affected. A major aim of the study was to identify insights of relevance to policy and practice across emergency management with a goal of using these findings to inform a broad set of stakeholder organisations and provide an evidence base to support future improvements in community safety in future severe natural hazard events. In-depth interviews were conducted between August and October 2021 with 194 residents affected by these floods. An online survey was completed by 430 flood-affected residents during the period November 2022 to February 2023. The data collected included details of prior flood exposure, damage or losses from the floods, information and warnings received, protective actions taken, decisions and actions taken during the flood and details about the clean-up, community and other sources of support as well as flood resilient adaptations made to homes before the floods and any future (planned) adaptations and actions. Three reports are available: a summary of policy implications, a main report detailing key findings and a technical report that includes summary data.

The 2022 floods in New South Wales and Queensland

Floods in eastern Australia in 2022 followed 2 years of above-average rainfall and, nationally, the wettest month on record was recorded in November 2021. This eventuated in extensive and damaging flooding that began in Queensland at the end of 2021 and in New South Wales in February 2022. Rain and severe flooding occurred again in late March and late June. These floods caused widespread devastation throughout communities, with some areas being flooded twice in only a few months, leaving inadequate time to recover or prepare from compound flooding. Further damage was done to eroded riverbanks, landslips, undercut roads and other essential infrastructure.

In response, Natural Hazards Research Australia conducted a large mixed-method, post-flood study of residents in Queensland and New South Wales focusing on people affected by flooding between January and July 2022. The aim was to hear and learn from the personal stories of people who were directly affected or threatened by floods. This project was conducted by researchers at Macquarie University, the University of Southern Queensland and Queensland University of Technology. Close research partnership throughout the process was provided by Queensland Fire and Emergency Services and the New South Wales State Emergency Service.

Trauma-informed community research

The project design followed an established post-event research approach (Natural Hazards Research Australia 2022) used by Australian researchers working in community-focused research after bushfires and floods (e.g. Haynes *et al.* 2018). Researchers interviewed 192 flood-affected residents (92 in Queensland and 100 in New South Wales) between August and October 2022 using a participant-led, trauma-informed

approach that invited residents to 'share their story'. A total of 430 residents (140 in Queensland and 290 New South Wales) participated in an in-depth online questionnaire between November 2022 and February 2023.

The online questionnaire was informed by the interview responses and included a mix of questions used in prior post-event research, as well as tailored questions. This mixed-method approach is a strength of this project. The qualitative interviews provide detail and richness about lived experiences, while analysis into themes allows for commonly reported experiences to be presented and reported succinctly. The quantitative questionnaire allows for identification of broader trends in the data and for statistical analysis to uncover relationships within the data.

Researchers investigated many themes with residents, including levels of preparedness and the role of prior flooding experiences to identify why some residents were more prepared than others, what actions they took in the lead up to and during the floods and the challenges they faced throughout the process. Participants were also asked how they received information and which sources were trusted. Researchers examined the types of housing that were flood damaged, any pre-flood modifications and the challenges posed in reconstruction under the threat of floods. The research assessed levels of satisfaction of participants with support provided by emergency services organisations and community service providers.

To enable initial summary reporting, qualitative data were coded to identify common themes in residents' experiences. Quantitative data were summarised and subjected to simple statistical analysis. These findings have been included in the project main report (Taylor *et al.* 2023) and a summary report details the policy-relevant implications (Natural Hazards Research Australia 2023). A sample of findings are included here to exemplify the survey findings.

Flood 'shock' and contributing factors

The severity of the floods, especially those in late February and early March, was often referred to in the media and by those in authority as 'unprecedented'. The flooding affected many areas that had been badly flooded previously, such as Maryborough, Gympie, suburbs of Brisbane, the Northern Rivers region, the Hunter and the Hawkesbury regions. Nearly two-thirds of participants in the survey (63%) had experienced floods previously; 18% recently, in 2021 (see Figure 1). These participants were, generally, engaged in and knowledgeable about local flooding. However, the severity of these floods was greater than expected and previously experienced, leaving people under-prepared and having to lift possessions ever higher as floodwaters rose or they expected to be safe when sheltering in place. In addition, a substantial proportion of the survey sample (37%) had not been flooded previously and many were not aware of being at risk of flooding. Some had been living in their properties for decades and experienced no flooding and, consequently, had no flood insurance. Both groups encountered a degree of flood 'shock'.

The challenges respondents encountered at the time of the floods and in the months following were exacerbated by several other interlinked factors, such as the scarcity of resources and access to professional and trades people caused by the extensiveness of the flooding (and subsequent flooding in other areas in 2022), supply shortages linked to the pandemic and the war in Ukraine as well as the rising costs of materials when rebuilding. At the time of the survey, around 10 months post-flood on average, more than half of

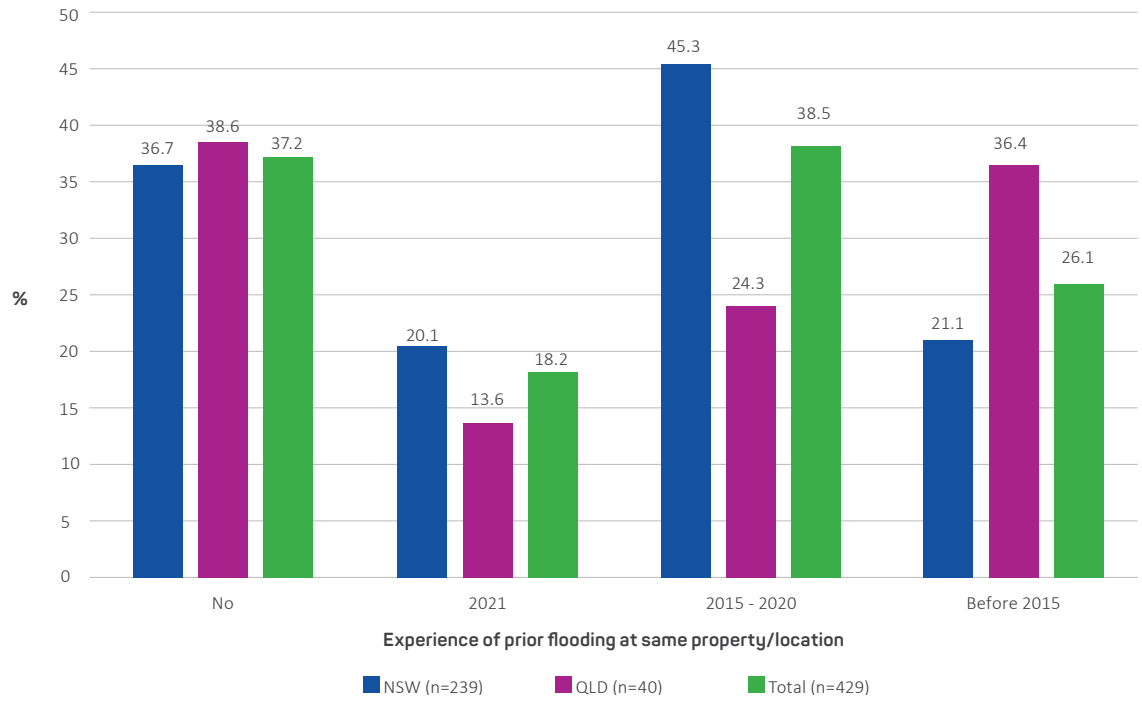


Figure 1. Exposure to prior flooding at the same property/location and the timing of prior flooding (multiple responses permitted).

the participants who had their homes damaged by the 2022 floods (55%) reported that everything was taking longer, 46% couldn't get the trades or expertise they needed to help and 36% reported they weren't coping well with the situation or managing what needed to be done.

The power of connection

An enduring finding across many areas of the study, in both interviews and the survey, was the importance of family, friends and neighbours. The highest levels of satisfaction with 'support received' was from friends and family, neighbours and the local community, with 87%, 84% and 78% of respondents, respectively, rating their satisfaction level with support from these sources as 'extremely' or 'somewhat' satisfied.

Friends, family and neighbours were important for alerting people to the flooding and 10% of respondents reported that they first found out they were likely to experience flooding from their family, friends or neighbours. This ranks second to participants who first found this out through observing the threat for themselves (30%). Friends, family and neighbours were also the groups most likely to provide help with the clean-up (82% of participants said they received help from these sources) and friends, family and neighbours were the most trusted sources of help in understanding the likely extent and location of flooding (see Figure 2). The power of connection and the importance of community for recovery has long been recognised in research and practice and operationalised in concepts such as social capital (Phoenix Australia 2022). This study expands on this evidence and situates it in a broad context of prior exposure, effects and events during and in the months after a disaster event.

Sheltering in place - home as a port in the storm

Interviewees told their stories about decisions made and actions taken during the floods. Experiences differed greatly, with some waking up in floodwater or finding out too late that their home was inundated and that it was not possible to leave. Others had more time to prepare and act and although the flooding was generally worse than previously experienced, they were able to stay home and manage their situations.

In the survey, 61% of respondents sheltered in place or did not leave their home during the flood (30% left or self-evacuated and 9% were away from home and unable to return). Respondents provided many reasons for why they stayed (see Figure 3). In addition to those who had planned to stay or had stayed before (and presumably had been safe), many other reasons were given. Some stayed to reduce damage and get on with the clean-up quickly, to protect animals and to protect their property from looting. Others had more concerning reasons; it was too late or they were unable to leave, or they had nowhere to go, or had no transport or they or other household members had physical difficulties that made it hard to leave.

There was a range of different reasons but many encountered the same challenges. Three-quarters (75%) lost electricity, 52% lost communications, 39% lost sewerage and 32% were anxious about staying. Despite the challenges faced, 79% of respondents who stayed felt that it was the best decision.

What next

This research provided vital and valuable insights into community experiences of floods and will assist emergency management

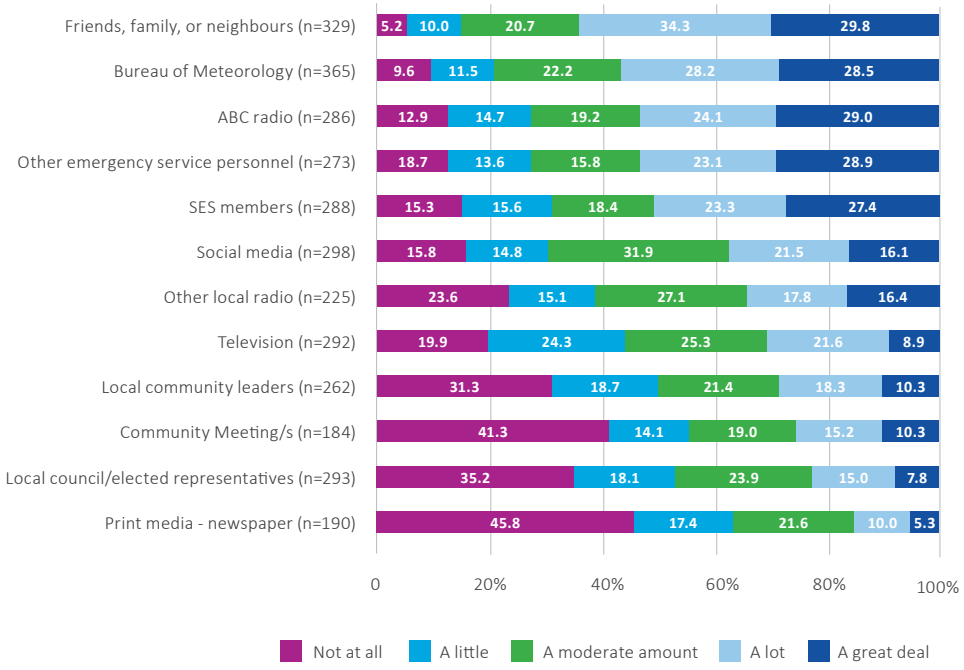


Figure 2. Level of trust in difference sources for help in understanding the likely extent and location of flooding (n/a responses removed).

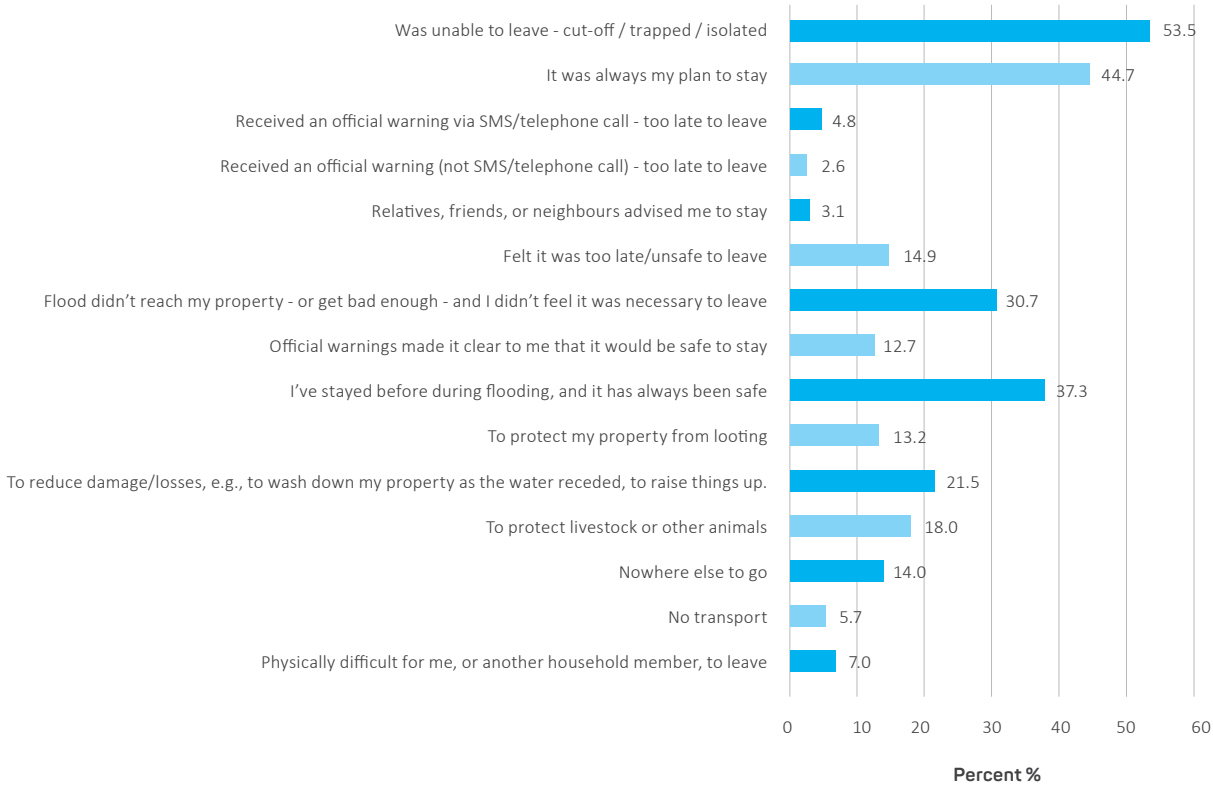


Figure 3. Reasons respondents stayed during the flood (n=228) (multiple responses permitted).

organisations, government departments, local councils and communities with a better understanding of the complexities of people's experiences and perspectives before, during and after severe weather. The research team, along with Natural Hazards Research Australia, have been providing briefings and producing written outputs to ensure that the lived experiences of residents are heard and seen. Many participants in the study were motivated to take part because they wanted others to learn from their experiences and they wanted emergency management organisations to know the challenges they had faced or were still facing. The de-identified data from this study is a rich resource that can be interrogated and analysed for further insights.

Reports are available at www.naturalhazards.com.au/floods2022.

Acknowledgments

The authors acknowledge the support and guidance provided by the Natural Hazards Research Australia Node Research Managers: Dr Kat Haynes and Nicola Moore as well as the Communications Team: Nathan Maddock and Bethany Patch. Also acknowledged is Phillipa Barr and Harriet Townsend for their help with interviews and the participants in this research for their generous contributions.

References

Natural Hazards Research Australia 2022, *Community experiences of the 2022 eastern Australia floods – Research Methodology. At: www.naturalhazards.com.au/sites/default/files/2022-07/Floods%202022_methodology.pdf.*

Haynes K, Tofa M, Avci A, van Leeuwen J & Coates L 2018, *Motivations and experiences of sheltering in place during floods: implications for policy and practice. International Journal of Disaster Risk Reduction, vol. 31, pp.781-788.*

Taylor M, Miller F, Johnston K, Lane A, Ryan B, King R, Narwal H, Miller M, Dabas D & Simon H 2023, *Community experiences of the January-July 2022 floods in New South Wales and Queensland – final report: policy-related research findings, Natural Hazards Research Australia, Melbourne. At: www.naturalhazards.com.au/floods2022.*

Natural Hazards Research Australia 2023, *Community experiences of the January - July 2022 floods in New South Wales and Queensland: Summary Report. At: www.naturalhazards.com.au/floods2022.*

Phoenix Australia 2022, *Recovery Capitals (ReCap) Guide. At: www.phoenixaustralia.org/disaster-hub/resources/recovery-capitals/#capitals.*

Australian Red Cross psychosocial approach to disaster preparedness

Abstract

Emergency and disaster preparedness is often centred on preparing the physical environment. Moving the emphasis from the physical to the personal, people can be physically and mentally better prepared to face and recover from these events. This paper examines the approach by Australian Red Cross to improve psychosocial preparedness. It outlines how theories of psychosocial support, adaptive capacity and behaviour change are operationalised as well as the evaluation methods used to assess effectiveness.

Peer reviewed

John Richardson[1,4]
ORCID: 0009-0005-8396-9638

Leanne Kelly[2,3]
ORCID: 0000-0002-3360-5212

Antonia Mackay[2]

1. Australian Institute for Disaster Resilience, Melbourne, Victoria
2. Australian Red Cross, Melbourne, Victoria.
3. Alfred Deakin Institute, Deakin University, Melbourne, Victoria.
4. Community Wellbeing Unit, University of Melbourne, Melbourne, Victoria.

SUBMITTED
8 November 2022

ACCEPTED
22 May 2023

DOI
www.doi.org/10.47389.38.3.31

Introduction

Emergencies and disasters have long lasting and profound effects on people's lives. Not only can these events injure people and cause death and ruin homes, they also have consequences for people's wellbeing, employment and education; disrupt community networks; destroy landscapes, places and buildings that have meaning; and challenge people's ontological security. They also effect the goals and aspirations of people and whole communities.

Taking pre-emptive action to build resilience and reduce such negative psychosocial effects can have a positive influence on people's experiences during and after disasters (Randrianarisoa *et al.* 2021). In this paper, these actions are described as 'disaster preparedness'.

Preparedness is defined as:

> *The knowledge and capacities developed by governments, response and recovery organisations, communities and individuals to effectively anticipate, respond to and recover from the impacts of likely, imminent or current disasters* (UNDRR 2020, n.p.).

Definitions like this and preparedness programming can be problematic as they focus on practical action to help people survive the first 72 hours post-event, after which formal assistance often becomes available (Kohn *et al.* 2012). However, this perspective fails to consider the longer-term psychosocial, financial and physical impacts of disasters on people and communities (Gowan *et al.* 2015).

This paper presents an overview of how Australian Red Cross conceptualises disaster preparedness. This adds to the literature by providing a case study example of how psychosocial preparedness has been operationalised and developed in practice. The theory and research around psychosocial support and adaptive capacities is explained and, in demonstrating how theory is operationalised, we explain the Red Cross approach, including its messaging used to encourage people to take action. The monitoring and evaluation methodology links to and upholds the practice principles and provides evidence to support this approach to preparedness.

The evolution of the unique approach to preparedness

Australian Red Cross provides psychosocial support before, during and after emergencies and disasters, based on the Hobfoll *et al.* (2007) 5 pillars of psychosocial support of safety, calm, self-efficacy, social connection and hope. Since 2007, this work has focused on preparedness actions that strengthen people's psychosocial wellbeing so that they feel safe, calm, connected to others, able to help themselves, can see a positive pathway to recovery and have access to the services and support they need.

When Australian Red Cross established the preparedness program in 2007 the content of existing household preparedness advice was analysed to identify gaps. The advice at the time concentrated on people being informed about hazard risk, making a household plan to guide actions in response to this risk and creating an emergency kit. These actions aligned with surviving the hazard and with an approach to disaster preparedness that had emerged in the 1990s (Kirschenbaum 2006). Where there was advice related to reducing post-disaster affects, it was limited to ensuring adequate insurance coverage and guiding people to make copies of their identity documents (Richardson 2009).

Since that time, Australian Red Cross identified patterns in people's experiences in the recovery stage of severe events and developed actions that could help reduce the longer-term consequences. The lived experiences of people that were prominent included bereavement (associated with the loss of family, friends, colleagues, neighbours and pets), separation during disasters, loss of housing and income and grief associated with loss of family heirlooms. Australian Red Cross developed advice related to planning for potential separation and reunification of family members, alternative short- and long-term accommodation, disruption to income, identification and protection of items of sentimental value as well as planning for pets.

American Red Cross preparedness messaging ('be informed, make a plan, and get a kit') was adopted in Australia with the additional ground-breaking step of 'know your neighbours' (Richardson 2009) to account for the emerging knowledge about the importance of social connection for better preparedness (Nagakawa & Shaw 2004, Paton, Smith & Johnston 2005). The advice was also deliberatively hazard-agnostic and recommended that people seek specialist hazard advice from emergency management agencies (Richardson 2009).

To encourage individual and household preparedness actions beyond resource distribution, Australian Red Cross also developed a community education program that included free face-to-face information sessions delivered by volunteers and the provision of RediPlan booklets in local councils across Australia. To understand the effect of these sessions, a self-report survey from program participants in South Australia and Western Australia was administered before, immediately after and 3 months after each program. This feedback showed that 98.5% of respondents felt more prepared to deal with an emergency and 89% planned to take preparedness action. Three months after the sessions, 81% of respondents had taken action to increase their community connections and 56% had written down important phone numbers and swapped numbers with neighbours (Australian Red Cross 2015).

In 2010, Australian Red Cross introduced the psychological preparedness AIM technique to its preparedness program (Morrissey & Reser 2003). This technique helps people anticipate what challenges they may face, identify how they may react to these challenges or threats and put plans in place to manage those challenges.

In 2014, Australian Red Cross commenced its annual disaster preparedness awareness campaigns. These were broad-based media campaigns with localised activations for volunteers to conduct within their community. In addition to this, Australian Red Cross offered capacity-building workshops to community service providers and carers who worked with people with disability, the elderly or people who were socially isolated.

A review of Australian Red Cross preparedness resources and its program in 2014 showed opportunity to explore other delivery channels, use a range of formats for resources, address a potential gap in the sector working with children and leverage the popularity of face-to-face engagement models in prompting people to take action. Face-to-face engagement allowed for the tailoring of information to suit the audience, adapting content to local contexts and prompted people to assess their own risks and capacities. The group dynamic allowed people to hear how others may have addressed the risk in their lives before, during and after an emergency.

The RediPlan resource document was updated and reorganised with greater use of iconography to deliver messages. 'Prepare your mind' became the starting point. The content for 'Know your neighbour' was also moved to precede 'Getting an emergency kit' to highlight its importance. The resources and program were updated to reflect 4 key messages:

- Get in the know
- Get connected
- Get organised
- Get packing.

The updated resources presented a person-centred approach to self-assessments of people's capacity and capability to deal with emergency events and directed people to advice in the booklet on how to build capacity. The language used was positively framed to encourage self-efficacy and reduce fear to motivate people to prepare (see Paton 2019).

The review also identified a need to adopt a behaviour-change approach to community engagement. As a result, Paton's (2018) Critical Awareness Theory and Prochaska and DiClemente's (1983) well-known Stages of Change Model were adapted to guide this work and be incorporated into the program. Linking to the work of Prochaska and DiClemente (1983), Paton's (2019) theory proposes there are 3 stages a person goes through psychologically to prepare for disaster: motivation, forming intention and taking action. Within those stages, enabling conditions that help people move through to the next stage

include high frequency of local discussion about the threat, high anxiety about the threat and realistic perception of risk.

To address the potential gap in the sector in working with children, an international pilot of the Pillowcase Project was undertaken in 2015. This project was a US school-based preparedness education program emphasising psychosocial preparedness. The project was adapted for the Australian context. The interactive activities were designed to help students aged 8–10 understand and discuss the importance of being prepared; how to prepare their mind for the thoughts and feelings that may arise before, during and after an emergency; how to know what to pack in an emergency kit and how they could be positive change agents in their community (McNeill & Ronan 2017). This program is a key offering in the Australian Red Cross preparedness program.

Australian Red Cross has examined and expanded its work at a community level to encourage communities to take preparedness actions to improve the collective resilience to disruptive events. Factors like participation (Paton 2013), a sense of belonging (Thornley *et al.* 2015), collective efficacy (Paton & Johnston 2011) and social infrastructure have significant influence on people's psychosocial wellbeing and recovery and warrant further investigation.

A psychosocial approach to preparedness

The term 'psychosocial' refers to the dynamic relationship between the psychological and social dimension of a person. The psychological dimension includes internal, emotional, thought processes, feelings and reactions. The social dimension includes relationships, family and community networks, social values and cultural practices (IFRC 2014). Hence, the term 'psychosocial preparedness' is applied to the Australian Red Cross approach to preparedness. Psychosocial preparedness refers to the practical, psychological and social actions a person takes to prepare for an emergency. These actions include acquiring knowledge about their threat environment; building their skills and capacity to take care of themselves and others, both psychologically and practically; and increasing their social capital (Australian Red Cross 2016). It should be noted that the psychosocial approach developed by Australian Red Cross is broader than implied by the individual concept of psychological preparedness discussed by researchers such as Boylan and Lawrence (2020) and Every *et al.* (2019), in that it incorporates the important role of social and community relationships and connections.

The broad suite of Australian Red Cross preparedness messaging and actions, linked to the Hobfoll *et al.* (2007) 5 pillars of psychosocial support are shown in Table 1. Viewing preparedness in this way links preparedness and recovery.

Targeting action with a capacity approach

Many preparedness programs use a deficit-based approach when targeting work in community. Groups of 'vulnerable' people are identified around demographic categories, for example, age, ability, ethnicity and gender. Australian Red Cross takes a capacities approach, in that all people have capacity and are the experts on their circumstances. Factors within and outside of their control can result in reduced capacity to manage the effects of a severe event. Other people can have greater capacity and are able to adapt to a changed situation (Richardson 2014).

To help with targeting, Australian Red Cross draws on the adaptive capacities described by Norris *et al.* (2008), which are grouped into 4 areas of wellbeing, knowledge, security and connection (Richardson 2014). Wellbeing refers to a person's health and quality of life, including their psychological coping ability. Knowledge relates to having access to appropriate information, communal knowledge and local and traditional wisdom in respect to hazard risk profiles and risk mitigation strategies. Security relates to having adequate shelter, personal safety and the capacity to maintain financial protection of people or a household's assets and livelihoods (Richardson 2014). Connection relates to the amount of support people can draw on to achieve goals or shared objectives. This can be through formal or informal links such as family, friends, local groups and colleagues. It also relates to a connection to place (Baker 2011, Bishop *et al.* 2000, Bihari & Ryan 2012, Proudley 2013) and, in Australia, to Country (Williamson, Weir & Cavanagh 2020).

The idea of connection as links between people is commonly referred to as social capital, or the network of relationships that exist between people and communities that allow them to function collectively, share norms and exchange information (Putnam 2000). Social capital has a strong positive correlation with resilience, disaster outcomes and disaster recovery (Aldrich & Kyota 2017, Nagakawa & Shaw 2004). People with strong social capital are likely to cope and recover faster from upheavals than those with weaker social capital. People and communities with deeper reserves of social capital have greater trust, believe in their ability to alter their circumstances, have a stronger sense of belonging and are likely to take collective action (Aldrich & Kyota 2017). As such, developing and strengthening the social capital of individuals, communities and organisations is a significant part of the Australian Red Cross disaster preparedness approach, with the recognition that social capital can be created and sustained through deliberate action (Australian Red Cross 2012).

Measuring effectiveness

The effectiveness of the Australian Red Cross psychosocial approach to preparedness was assessed via evaluations of groupwork programs, which were measured using before and after surveys, monitoring of organisational data as well as interviews and focus groups (Kelly, Goodall & Lombardi 2022). The bushfires in the Perth Hills area of February 2021 was an opportunity to assess the effectiveness of the approach. Australian Red Cross had worked in the affected area delivering preparedness activities for several years prior to the bushfires. Some months after the bushfires struck, researchers from Curtin University conducted an evaluation with affected community members to assess whether preparedness activities had made a difference. The evaluation looked at how being prepared

Table 1 - Red Cross' psychosocial approach.

Preparedness actions	Key pillar/s of psychosocial support	Reducing disaster impact
Psychological preparedness (preparing the mind)	Calming	Remaining calm and confident during disasters, reduces stress, and has a positive impact on recovery times (e.g. Randrianarisoa *et al.* 2021, Morrisey & Reser 2003).
Understanding the hazard risk	Safety	Reducing death and injury.
Understanding how the disaster event might affect them	Safety	Reducing disruption from the effects of disasters (Gibbs *et al.* 2021).
Understanding an individual's strengths and weaknesses	Self-efficacy	Targeted action (e.g. Villeneuve *et al.* 2021, Chandonnet 2021).
Understanding the importance of community connections and building activities	Connection	Information, support and resources during and after disaster (Aldrich & Meyer 2015, Nagakawa & Shaw 2006).
Planning for separation and reunification	Calming, Safety	Reducing short- and long-term stress and mental health effects (Richardson *et al.* 2016).
Developing a personal support network	Connection	Assisting with evacuation, relocation, and others (Teague, McLeod & Pascoe 2010).
Planning for business and income disruption	Self-efficacy	Minimising financial disruption and having financial resources for recovery (Ulubasoglu & Beaini 2019).
Ensuring that Powers of Attorney and Wills are in place in case of injury or death	Calming, Self-efficacy	Reducing stress and distress emerging from managing an estate in the context of a disaster (Australian Centre for Grief and Bereavement 2011).
Planning for pets	Calming	Ensuring people make good evacuation decisions, and reducing grief and loss from pet bereavement (Harms *et al.* 2015, Taylor *et al.* 2015).
Identifying irreplaceable items	Hope, Calming	Reducing grief from loss of items that shape a person's identity or loss of family cultural heritage (Miller *et al.* 2012).
Copying and securing identity documents	Self-efficacy	Expedited application for disaster assistance.
Having adequate household insurance	Self-efficacy	Reduction of financial impacts and potential homelessness and or poverty (Every, Richardson & Osborn 2019).

influenced people's immediate response to the threat as well as their capacity to recover after the event. Of particular interest was how the preparedness activities of the in-school Pillowcase Program had prepared children in the region.

Through analysing survey responses (n=51) and in-depth interview results (15), the evaluation showed that respondents who used the Australian Red Cross preparedness resources, particularly the emergency plan, indicated that they felt being prepared had reduced harm because they were confident in their knowledge of what to do and acted purposively to activate their plan (Newnham & Dzidic 2022). Regarding child-centred preparedness, the evaluation noted that 'Participants frequently reported that students had applied the skills and lessons learnt from the Pillowcase Program during the…bushfires and had remained calm during evacuation' (Newnham & Dzidic 2022, p.5). Overall, participants in the evaluation identified that the program helped them respond and recover better from the event and that the emergency plans, survival kits, important document lists and psychosocial skills development training were particularly beneficial.

A study conducted by Australian Red Cross in 2019 examined the experiences of 165 people who lived through an emergency or disaster between 2008 and 2019. The analysis of the survey responses relied on descriptive statistics as well as factor and cluster analyses. Findings were that feeling prepared reduced stress levels, which improved self-reported recovery outcomes. Survey responses showed that the more people did to prepare, the more they felt prepared. Respondents reported that the Australian Red Cross psychosocial-specific information helped them feel in control of actions during an emergency while information from fire and emergency services or local government (hazard-specific) helped them feel confident with decisions made during the emergency (Randrianarisoa *et al.* 2021).

Similarly, the psychosocial approach to recovery was assessed through rigorous external evaluations of recovery programs. While these evaluations demonstrate good outcomes, apart from the Curtin University example, they do not specifically and explicitly address any causal links between preparedness programs and recovery outcomes. This indicates that further research in this area would be beneficial.

Conclusion

This paper presented an overview of Australian Red Cross psychosocial approach to preparedness. This approach presents as unique in its holistic focus on individual and community resilience and contributes to the other elements of preparedness that are hazard-specific, infrastructure and physical landscape related that are the prevue of the emergency management sector. Although psychosocial preparedness is only one part of disaster preparedness, it is a vital part that is often overlooked. Psychosocial preparedness can improve people's ability to cope with and recover from disasters.

To add to this evidence of the efficacy and impact of psychosocial preparedness programs on individuals and communities, further evidence is required to test this approach in a range of settings. Future research should include larger-scale studies on the efficacy of psychosocial preparedness as well as examining what actions have the most effect to improve people's longer-term recovery outcomes. The Australian Red Cross experience of operationalising this approach is limited to the Australian context and largely to fairly homogenous regional areas so this limits its ability to generalise in broader applicability. Testing the approach internationally and with a larger number of participants would help to demonstrate its efficacy (or not) outside of community area where Australian Red Cross has been active with its programs. It would be particularly beneficial to replicate and extend studies such as the one conducted by Curtin University to examine whether and how people recover differently depending on their exposure to psychosocial preparedness programs prior to the event.

References

Aldrich D & Meyer M 2015, *Social capital and community resilience. American Behavioral Scientist, vol. 59, no. 2, pp.254–269.*

Aldrich D & Kyota E 2017, *Creating community resilience through elder-led physical and social infrastructure. Disaster Medicine and Public Health Preparedness, vol. 11, no. 1, pp.120–126.*

Australian Centre for Grief and Bereavement 2011, *Surviving Traumatic Grief: When Loved Ones Die in a Disaster, volume 1. At: http://apmha.com.au/wp-content/uploads/Surviving-Traumatic-Grief-vol1.pdf.*

Australian Red Cross 2012, *Relationships matter: The application of social capital to disaster resilience.*

Australian Red Cross 2015, *Monitoring report for household preparedness in South Australia and Western Australia.*

Baker E 2011, *Household preparedness for the aftermath of hurricanes in Florida. Applied Geography, vol. 31, 46e 52.*

Bihari M & Ryan R 2012, *Influence of Social Capital on Community Preparedness for Wildfire. Landscape and Urban Planning, vol. 106, no. 3, pp.253–261.*

Bishop B, Paton D, Syme G & Hancarrow B 2000, *Coping with Environmental Degradation: Salination as a Community Stressor. Network, vol. 12, pp.1–15.*

Boylan J & Lawrence C 2020, *The development and validation of the bushfire psychological preparedness scale. International Journal of Disaster Risk Reduction, vol. 47, p.101530.*

Chandonnet A 2021, *Emergency Resilience in Culturally and Linguistically Diverse Communities: Challenges and Opportunities, Australian Red Cross.*

Cretney R 2016, *Local responses to disaster. Disaster Prevention and Management, vol. 25, no. 1, pp.27–40.*

Donahue A 2014, *Risky business: Willingness to pay for disaster preparedness. Public Budgeting and Finance, vol. 34, no. 4, pp.100–119.*

Every D, McLennan J, Reynolds A & Trigg J 2019, *Australian householders' psychological preparedness for potential natural hazard threats: An exploration of contributing factors. International Journal of Disaster Risk Reduction, vol. 38, p. 101203.*

Every D, Richardson J & Osborn E 2019, *There's nowhere to go: Counting the costs of extreme weather to the homeless community. Disasters, vol. 43, pp.799–817.*

Gibbs L, Molyneaux R, Harms L, Gallagher H, Block K, Richardson J, Brandenburg V, O'Donnell M, Kellett C, Quinn P, Kosta L, Brady K, Ireton G, MacDougall C & Bryant R 2020, *10 Years Beyond Bushfires Report. University of Melbourne, Melbourne.*

Gowan ME, Sloan JA & Kirk RC 2015, *Prepared for what? Addressing the disaster readiness gap beyond preparedness for survival. BMC Public Health, vol. 15, no. 1, p.1139.*

Harms L, Gibbs L, Bryant R, Lusher D, Richardson J, MacDougall C, Block K, Snowdon E, Gallagher C, Sinnott V, Ireton G, Forbes D & Waters E 2015, *Conceptualising post-disaster recovery: Incorporating experiences of grief and loss. British Journal of Social Work, vol. 45, sup. 1, pp.i170-i187.*

Hobfoll S, Watson P, Bell C, Bryant R, Brymer M, Friedman M, Gersons BPR, de Jong JTVM, Layne CM, Maguen S, Neria Y, Norwood AE, Pynoos RS, Reissman D, Josef I Ruzek, Shalev AY, Solomon Z, Steinberg AM & Ursano RJ 2007, *Five essential elements of immediate and mid-term mass trauma intervention: Empirical evidence. Psychiatry, vol. 70, pp.283–315.*

International Federation of Red Cross and Red Crescent Societies (IFRC) 2014, *Moving together: Promoting psychosocial well-being through sport and physical activity.*

Kelly L, Goodall J & Lombardi L 2022, *Developing a monitoring and evaluation framework in a humanitarian non-profit organisation using agile methodology. Disaster Prevention and Management. doi:10.1108/DPM-11-2021-0312*

Kohn S, Lipkowitz Eaton J, Feroz S, Bainbridge A, Hoolachan J & Barnett D 2012, *Personal disaster preparedness: An integrative review of the literature. Disaster Medicine and Public Health Preparedness, vol. 6, pp.217–231.*

McNeill I & Ronan K 2017, *Children in disasters: the role of household preparedness. Natural Hazards, vol. 89, pp.1239–1254.*

Morrisey S & Reser J 2003, *Evaluating the effectiveness of psychological preparedness advice in community cyclone preparedness materials. Australian Journal of Emergency*

Management, vol. 18, no. 2, pp.46–61. At: https://knowledge.aidr.org.au/resources/ajem-may-2003-evaluating-the-effectiveness-of-psychological-preparedness-advice-in-community-cyclone-preparedness-materials/.

Miller J 2012, *Psychosocial capacity building in response to disasters, Columbia University Press.*

Nagakawa Y & Shaw R 2004, *Social capital: A missing link to disaster recovery. International Journal of Mass Emergencies and Disasters, vol. 22, no. 1, pp.5–34.*

Newnham E & Dzidic P 2022, *Australian Red Cross Perth Hills preparedness emergency programs: Impact evaluation, Curtin University, Perth.*

Paton D 2019 *Disaster risk reduction: Psychological perspectives on preparedness. Australian Journal of Psychology, vol. 71, no. 4, pp.327–341.*

Paton D 2013, *Disaster resilient communities: Developing and testing an all-hazards theory. Journal of Integrated Disaster Risk Management, vol. 3, no. 1, pp.1–17.*

Paton D, Smith L & Johnston D 2005, *When good intentions turn bad: Promoting natural hazard preparedness. Australian Journal of Emergency Management, vol. 20, no. 1, pp.25–30. At: https://knowledge.aidr.org.au/resources/ajem-feb-2005-when-good-intentions-turn-bad-promoting-natural-hazard-preparedness/.*

Paton D & Johnston D 2001, *Disasters and communities: Vulnerability, resilience and preparedness. Disaster Prevention and Management, vol. 10, no. 4, pp. 270–277.*

Prochaska J & DiClemente C 1983, *Stages and processes of self-change of smoking: Toward an integrative model of change. Journal of Consulting and Clinical Psychology, vol. 51, no. 3, pp.390–395.*

Proudley M 2013, *Place Matters. Australian Journal of Emergency Management, vol 28, no. 2, pp.11–16. At: https://knowledge.aidr.org.au/resources/ajem-apr-2013-place-matters/.*

Putnam R 2000, *Bowling alone: The collapse and revival of American community, Simon & Schuster.*

Randrianarisoa A, Richardson JF, Brady K & Leguy L 2021, *Understanding preparedness and recovery: A survey of people's preparedness and recovery experience for emergencies, Australian Red Cross.*

Richardson JF 2009, *Beyond survival: A new look at household preparedness, Western Australian Fire and Emergency Services Conference.*

Richardson JF 2014, *Beyond vulnerability: Developing disaster resilience capacities to target household preparedness activities, Australian and New Zealand Emergency Management Conference, Gold Coast.*

Richardson JF, Snowdon E, Gallagher HC, Gibbs L, Block K, Lusher D, Kellett C, MacDougall C & Smith M 2016, *Separation and reunification in disasters: the importance of understanding the psycho-social consequences (pp.357–372). In Adenrele Awotona (Ed.), Planning for community-based disaster resilience worldwide: Learning from case studies in six continents, Ashgate Publishing Limited.*

Richardson JF 2019, *Barriers and enablers of household preparedness: A literature review, Australian Red Cross.*

Taylor M 2015, *The preparedness and evacuation behaviour of pet owners in emergencies and natural disasters. Australian Journal of Emergency Management, vol. 30, no. 2, pp.18–23. At: https://knowledge.aidr.org.au/resources/ajem-apr-2015-the-preparedness-and-evacuation-behaviour-of-pet-owners-in-emergencies-and-natural-disasters/.*

Teague B, McLeod R & Pascoe S 2010, *Final Report of the Victorian Bushfire Royal Commission. At: http://royalcommission.vic.gov.au/Commission-Reports/Final-Report.html.*

Thornley L, Ball J, Signal L, Lawson-Te Aho K & Rawson E 2015, *Building community resilience: learning from the Canterbury earthquakes, Kōtuitui: New Zealand Journal of Social Sciences Online, vol. 10, no. 1, pp.23–35.*

Ulubasoglu M & Beaini F 2019, *Black Saturday bushfires: counting the cost. Australian Journal of Emergency Management, vol. 34, no. 2, pp.5–6. At: https://knowledge.aidr.org.au/resources/ajem-april-2019-black-saturday-bushfires-counting-the-cost/#:~:text=In%20one%20of%20the%20world's,loss%20is%20still%20being%20counted.*

UNDRR 2020, *Preparedness, United Nations Disaster Risk Reduction. At: www.undrr.org/terminology/preparedness#:~:text=The%20knowledge%20and%20capacities%20developed,likely%2C%20imminent%20or%20current%20disasters.*

Villeneuve M, Abson L, Pertiwi P & Moss M 2021, *Applying a person-centred capability framework to inform targeted action on disability inclusive disaster risk reduction. International Journal of Disaster Risk Reduction, vol. 52, pp.1–11.*

Williamson B, Weir J & Cavanagh V 2020, *Strength from perpetual grief: How Aboriginal people -experience the bushfire crisis, The Conversation, January 10.*

About the authors

John F Richardson is the Manager of Knowledge Development for the Australian Institute for Disaster Resilience and an Honorary Fellow with the University of Melbourne's Community Wellbeing Unit. He was formerly the National Resilience Adviser for Australian Red Cross. He has extensive experience in recovery and resilience programming for over 25 years.

Leanne M Kelly, PhD is a pracademic in the fields of humanitarianism, development and evaluation studies within non-government organisations. Her work focuses on crises including conflict, violence, extremism and disasters. She is a Postdoctoral Research Fellow at Deakin University and the National Evaluation Advisor for emergency services at Australian Red Cross.

Antonia Mackay is the National Lead – Disaster Resilience for Australian Red Cross with over 7 years' experience working in resilience programming.

Pets and smoke inhalation: improving immediate and prehospital management

Peer reviewed

Dr Ian Porter[1]
ORCID: 0009-0002-9206-8792

Associate Professor Valerie Ingham[2]
ORCID: 0000-0001-7908-5155

1. Veterinary Surgeon, Tylden, Victoria
2. Charles Sturt University, Bathurst, New South Wales

SUBMITTED
3 March 2023

ACCEPTED
10 May 2023

DOI
www.doi.org/10.47389.38.3.37

Abstract

Around the world, pets and companion animals coexist with people to help them live their lives through work, social support and companionship. Commentary by Kahler (2018) and the Invisible Fence Brand (2022) report that significant numbers of these animals are estimated globally each year to die from smoke inhalation during residential fires. International efforts have improved the prehospital management of pets suffering from smoke inhalation, however, this trend has not been experienced in Australia. To support improvements in the prehospital management of pets suffering smoke inhalation, a narrative review of existing research and publicly available reports was undertaken. This review considered aspects of the unknown number of pets suffering smoke inhalation due to residential fire, the potential for under-reporting and the potential value of improved veterinary integration at the small-scale incident level. Several conclusions are drawn that can inform further research and contribute to existing practice by Australian fire service agencies in the prehospital treatment of pets suffering smoke inhalation.

Introduction

Household pets, such as dogs and cats, are part of many people's lives. According to Animal Medicines Australia (2021), pet ownership in Australia has increased to 69% of homes in 2021, up from 61% in 2019 (Animal Medicines Australia 2019). In comparison, in the United States, pet ownership rates are 49% to 68% (Bruilliard & Clement 2019). Given the high rates of pet ownership in the United States, it is not surprising that between 40,000 to 150,000 animals there are estimated to die each year in residential fires, mostly due to smoke inhalation (Kahler 2018, Invisible Fence Brand 2022). To reduce the risk of animals suffering injury due to residential fires, pet oxygen masks have been distributed for use by firefighting and emergency medical service authorities in North America (Wag'N O2 Fur Life LLC 2021, Invisible Fence Brand 2022) and in the United Kingdom (British Animal and Rescue Trauma Care Association 2021, Smokey Paws Ltd 2022). The Scottish Fire and Rescue Service has also indicated its intention to equip fire stations in Scotland with pet oxygen masks (Milligan 2019). This capability development in prehospital care of pets suffering smoke inhalation does not exist in Australia.

Through the review and synthesis of existing literature, this paper supports improvements in evidenced-based practice for the prehospital management of pets suffering from smoke inhalation due to residential fires in the Australian context. This paper identifies patient-focused improvements in research and practice pertaining to the prehospital management of smoke inhalation in pets.

Methodology

This study was initially intended as a scoping review and an interrogation of existing research and publicly available reports pertaining to smoke inhalation in pets was undertaken. A search of international veterinary journals[1] was conducted for literature related to smoke inhalation in cats and dogs. This yielded limited results. Literature was excluded from the review where it involved animal experimentation, was not available in the English language, or where the full-

1. See: www.ebsco.com/products/research-databases/veterinary-source

text article was not available. Due to the limited nature of the results, grey sources of literature such as websites, veterinary educational materials and media reports were included within the original literature review.

As a result of the limited search results, a narrative review was undertaken in place of a scoping review. Opportunities for further research and improvements in current practice within Australia have been identified as part of this review. As the intention was to focus on the patient-based approach to smoke inhalation by pets, specific and detailed recommendations for firefighter safety and training were not included. Furthermore, additional injuries that pets may be exposed to in a residential fire event, such as thermal injuries or other trauma, are not included in this review.

Frequency of pet smoke inhalation

While the significance of pets in people's lives is well documented (Animal Medicines Australia 2021, Human Animal Bond Research Institute 2022), the frequency of pets suffering smoke inhalation during residential fires is not. No mechanism appears to exist within Australia to readily and effectively report the death or injury of pets due to smoke inhalation, either by fire services or other agencies.

In the United States, it is acknowledged that no official statistics on the number of animals dying due to fire exists (Invisible Fence Brand 2022). Veterinary literature supports the view that the limited number of pets being presented for veterinary care reflects a high pre-hospital admission mortality rate (Jasani 2015). However, the outcome for animals suffering smoke inhalation alone (i.e. when not complicated by severe burns) has a reported high survivability (Vaughn *et al.* 2012). That said, despite the absence of readily available and publicly reported data relating to pets suffering smoke inhalation in Australia, these occurrences are not uncommon in news reports (Marshall 2015, Naughtin 2017, Paynter 2020) and fire services media releases (Fire and Rescue New South Wales 2007, 2017, 2021; Pakenham 2014).

Reporting mechanism challenges

While animal deaths and injuries due to residential fires remain as estimations, human fatalities and injury associated with residential fire are commonly reported. In Sweden, an investigation of fire-related human fatalities indicated under-reporting in the vicinity of 20–25% (Jonsson *et al.* 2015). In Australia, a study based in New South Wales revealed only 15% of fire-related injuries to humans were recorded by or attended to by fire services agencies (Ghassempour *et al.* 2021). Jonsson *et al.* (2015) and Ghassempour *et al.* (2021) interrogated records such as coronial reports, hospital admission data and fire services reporting to identify reporting accuracy and both point to the likelihood that multiple sources of data are required.

Despite the reported under representation that may occur in the identification of human fire-related fatalities and injuries, the situation is even more complex when identifying the frequency of pets dying or sustaining injury due to residential fires. In the United States, fire services agencies are not required to report fire-related animal deaths and injuries (Animal Welfare Institute 2022) and implications for the purpose and intent of reporting mechanisms appear to further influence the absence of data. This is recognised in the differing nature of fire services reporting when compared with health services reporting (Ghassempour *et al.* 2021).

Complicating the insufficiency of current fire services reporting mechanisms further, Fitzgerald and Flood (2006) state that dogs and cats that did not have worsening signs by the second day had an improved prognosis. However, it is unlikely that these outcomes could be effectively captured by fire-specific reporting mechanisms. The absence of suitable reporting and follow-up in Australia does not address the knowledge gap in short- and long-term outcomes for smoke inhalation. This is particularly concerning when delayed complications of smoke inhalation are well reported and understood within the veterinary literature (Vaughn *et al.* 2012, Cope 2021). Put succinctly, unless fire services reporting mechanisms are designed to intentionally capture data relating to animals, it is unlikely that meaningful data will be collected for animals suffering smoke inhalation.

Animal outcomes in the broader incident context

For many people, the loss of their pet can be emotionally devastating. Hunt *et al.* (2008) reported on pet loss following Hurricane Katrina, identifying the significance of the psychological harm associated with the loss of a pet during the disaster. Zottarelli (2010) identified that people who lost pets during Hurricane Katrina were also more likely to have experienced other traumatic events, such as family separation or an increased likelihood of being injured. These findings may appear unsurprising, given the role of animals in people's lives, however, the effects of smoke inhalation by pets may extend beyond the psychological harm of pet loss and grief alone.

In a reported case from the United States, a dog suffering smoke inhalation-related medical complications required hospitalisation for 16 days and cost over US$15,000 (Guillaumin & Hopper 2013). This is a significant financial cost and potentially outside the financial capabilities of many pet owners. It is difficult to envisage suffering a residential fire let alone making decisions for a loved pet based on financial circumstances. The death of a pet from smoke inhalation does not stop at the fire scene. The absence of follow-up mechanisms can mask the full outcomes for animals and humans alike. This paucity of evidence pertaining to psychosocial harm also extends to first responders. Reported anecdotal evidence of psychological harm exists for firefighters during bushfires in association with animal welfare needs (Klinberg, cited in Westcott *et al.* 2017; Walsh, cited in Westcott *et al.* 2017). Further research is required and a focus on improving animal-patient outcomes may offer improvements to outcomes that extend beyond the animal alone.

Forensic and fire investigations

Research by Stern *et al.* (2014) reports on the post-mortem investigation of 4 dogs; 2 were identified as having died as a direct result of fire. That research showed that the 2 dogs died from carbon monoxide poisoning due to smoke inhalation. The research also identified that although one of the deceased dogs had sustained burns, the burns occurred after the dog had died.

These findings, although adding to literature relating to smoke inhalation in animals, relates specifically to forensic investigation and concluded with the importance of veterinary forensics in arson investigation. Such views are supported by Sobhakumari *et al.* (2018) who reported on the investigation of 2 cats that were found deceased with their owners following exposure to carbon monoxide (due to a non-fire-related event). In exploring their investigative methodology, Sobhakmari *et al.* (2018) commented on the shared environment of pets and people, positing the value of a collaborative approach between veterinary and human forensic investigations in simultaneous pet and human fatalities. It appears that an approach involving veterinary forensics may prove beneficial in the investigation of fires that do not involve human fatalities or injury, particularly with respect to better understanding of fire development and behaviour (as potentially indicated by carbon monoxide and hydrogen cyanide exposure in pets). Further investigation is required to confirm the potential value of veterinary forensics in fire investigation for fires not involving human fatalities or injury.

Smoke toxicology in animals and communication of smoke exposure history

Although literature and research about animal smoke inhalation due to residential fires may be limited, the understanding of smoke toxicology within veterinary medicine is not. The significance of carbon monoxide and/or hydrogen cyanide is clearly identified as are the mechanisms in which these compounds (and other compounds, particulates and thermal injury) cause harm to animals (Vaughn *et al.* 2012, Jasani 2015, Hanel *et al.* 2016). The circumstances of smoke exposure, such as exposure time, fire environment and combustible materials present, are all identified as important factors in diagnosis and treatment (Fitzgerald & Flood 2006, Jasani 2015, de Laforcade 2017). However, it is recognised that these details may typically not be provided to treating veterinary staff (Cope 2021). This is a circumstance likely to remain unchanged in the absence of timely and effective information sharing between fire services agencies and veterinary staff within Australia.

Contributing to the lack of reporting of pets suffering smoke inhalation at residential fires is the anecdotal evidence of pets being returned to owners to seek veterinary attention (Pakenham 2014, Marshall 2015). While these actions align with the responsibilities of owners to their pets during emergencies (Gurtner & Parison 2021), any communication breakdown between first responders and veterinary staff may deprive veterinarians of important clinical history from the fire scene that can guide treatment. There is a need to address the lack of reporting and communication, both within fire services agencies and outward to pet owners and veterinarians.

Smoke inhalation management

Smoke is a mixture of heterogenous gases and particles with specific toxicity attributed to carbon monoxide and hydrogen cyanide (Jasani 2015, Cope 2021). The American College of Veterinary Emergency and Critical Care Committee on Trauma has developed guidelines for the prehospital care of dogs and cats (Hanel *et al.* 2016) that includes smoke inhalation. These guidelines, specifically those for smoke inhalation, highlight the significance of oxygen administration to animals exposed to smoke (where possible), the transportation of injured animals to veterinary care and the need to inform veterinary staff about the fire environment, including the burnt materials. Where possible, according to the British Animal Rescue and Trauma Care Association (2021), the administration of oxygen should continue for at least 20 minutes, with the likelihood of veterinary staff needing to continue this beyond that time.

The decontamination of animals following exposure to smoke and/or fire should also be addressed as part of prehospital care, however, current guidance remains limited. Fitzgerald and Flood (2006) note that decontamination, such as irrigation of the eyes and skin, can be instigated at the fire scene. In contrast to animal decontamination, the health-protective benefits of decontaminating firefighters and their personal protective clothing is well described. For example, Baker (2019) indicated the need to routinely decontaminate firefighters exposed to smoke. In a limited study, Davidson *et al.* (2020) identified weaknesses in the decontamination of human burns patients outside of mass casualty events, pointing to the need for further investigation of burns patient decontamination practices and also highlighting that inadequate decontamination may hinder the provision of care within the clinical setting. The need for adequate decontamination following exposure of pets to residential fires is explained by Jim Green (personal communication, 13 December 2022) who said that conscious pets may, and do, ingest contaminants from their skin and coat following exposure to a residential fire. The decontamination of animals suffering smoke inhalation warrants further investigation. However, it appears reasonable that evidence-based decontamination protocols may minimise risks to pets suffering smoke inhalation while enhancing the safety of first responders and veterinary staff.

The British Animal Rescue and Trauma Care Association provides guidance for the management of smoke inhalation by first responders (Oxygen Therapy for Companion Animals[3]) in addition to the National Fire Chiefs Council National Operational Guidance.[4]

Conclusion

Pets exert a considerable influence on human behaviour and, according to Green (2018), emergency response resourcing and actions, regardless of the incident type, should consider animals as part of routine emergency planning and response. Australian emergency management organisations have made considerable advancements in the management of animal-specific incidents, such as large animal rescue, with the introduction of techniques and equipment to safely manage these events (e.g. State Emergency Service of South Australia 2021). Smoke inhalation by pets due to residential fire differs from these events as the management of smoke-affected animals exists as one of the many time-critical considerations, such as human prehospital care, fire suppression and other activities. The identification of smoke as a complex mixture of toxins and particulates in

3. Oxygen Therapy for Companion Animals, at www.bartacic.org/wp-content/uploads/2021/03/Smokey-Paws-Guidance-1-1.pdf.

4. Incidents involving animals, at www.ukfrs.com/guidance/incidents-involving-animals?bundle=control_measure&id=20973&parent=20974.

veterinary literature (Fitzgerald & Flood 2006, Jasani 2015) holds parallels to the complex and diverse needs of pets and their owners during fires. Mechanisms that support animal welfare in larger-scale events may not prove sufficient nor appropriate for managing the immediate welfare needs of animals harmed during emergency incidents such as residential fires.

The need for prompt treatment and transportation poses challenges for fire services agencies, first responders and pet owners. Improving the immediate prehospital care of pets, including improvements in inter-disciplinary cooperation, has potential to improve outcomes for animals and people alike. The absence of representative research and data relating to pets and residential fires internationally has not hindered the development of capabilities within some emergency services organisations with improvements developed to support guidelines and animal outcomes. Further research into the frequency, current prehospital management and outcomes for pets suffering smoke inhalation due to residential fire is warranted.

The anecdotal evidence suggests prehospital treatment of pets for smoke inhalation does not mirror that given to human smoke inhalation patients, nor mirror best practice international veterinary guidelines. Investments in training and equipment appear to offer considerable improvements in animal welfare. Such efforts may help drive improvements in reporting mechanisms, and these in turn may likely demonstrate if the hypothesised benefits are realised.

Existing literature related to smoke inhalation in pets involved in residential fire, although limited, reveals a complex and broad number of considerations. These considerations often involve under-reporting, an unknown frequency of pets suffering smoke inhalation, the identification of broader psychosocial effects of smoke inhalation in pets and the value of enhanced veterinary integration at the small-scale incident involving animals. Further research is imperative to fully understand these matters in an Australian context, and to drive evidence-based practice in the future.

To address the matters raised in existing literature, Australian fire services should consider if investment in pet oxygen masks and animal first aid training may prove beneficial. Fire services may also consider improving reporting methodology to enhance data collection related to animals affected by residential fire, such as animal species, state of consciousness, treatment provided and the provider of definitive care. Such data may be captured within current fire reporting systems or through novel reporting mechanisms explicitly for this purpose. Actions to develop relationships and improve mechanisms to share time-critical and pertinent information with veterinary staff about animals affected by residential fire should be implemented.

Acknowledgments

The views expressed here do not reflect the views of any Australian emergency management organisation. The authors thank colleagues and the anonymous peer reviewers for their insights and helpful comments and feedback.

References

Animal Medicines Australia 2019, *Pets in Australia: A national survey of pets and people, Animal Medicines Australia. At: https://animalmedicinesaustralia.org.au/report/pets-in-australia-a-national-survey-of-pets-and-people/ [27 February 2022].*

Animal Medicines Australia 2021, *Pets and the Pandemic. A social research snapshot of pets and people in the COVID-19 era, Animal Medicines Australia. At: https://animalmedicinesaustralia.org.au/report/pets-and-the-pandemic-a-social-research-snapshot-of-pets-and-people-in-the-covid-19-era-2/ [27 February 2022].*

Animal Welfare Institute 2022, *Barn Fires: A Deadly Threat to Farm Animals, Animal Welfare Institute. At: https://awionline.org/store/catalog/animal-welfare-publications/farm-animals/barn-fires-deadly-threat-farm-animals [27 February 2022].*

Baker M 2019, *DEBRiS: A tool for fire scene management, Asia Pacific Fire Magazine 2019, vol. 69, pp.50 –52.*

British Animal Rescue and Trauma Care Association 2021, *Oxygen Therapy for Companion Animals, British Animal Rescue and Trauma Care Association. At: www.bartacic.org/wp-content/uploads/2021/03/Smokey-Paws-Guidance-1-1.pdf [27 February 2022].*

Brulliard K and Clement S (31 January 2019), *How many Americans have pets?, The Washington Post. At: www.washingtonpost.com/science/2019/01/31/how-many-americans-have-pets-an-investigation-into-fuzzy-statistics/ [7 July 2022].*

Cope R 2021, *Smoke Inhalation Injury in Animals. At: www.msdvetmanual.com/toxicology/smoke-inhalation-injury/smoke-inhalation-injury-in-animals [27 February 2022].*

Davidson S, Brunken N, Naughton S, and VandenBerg S 2020, *Burn patient decontamination outside of mass casualties. Journal of the American College of Emergency Physicians Open, vol. 1, no. 6, pp.1250–1254. doi:10.1002/emp2.12280*

De Laforcade A 2017, *Smoke inhalation injury [PDF 2.07MB], VETGirl. At: https://vetgirlontherun.com/wp-content/uploads/2017/04/siad417.pdf [27 February 2022].*

Fire and Rescue New South Wales (20 May 2007), *Dog rescued from house fire at Riverwood [Media Release], Fire and Rescue New South Wales. At: www.fire.nsw.gov.au/news.php?news=499 [27 February 2022].*

Fire and Rescue New South Wales (13 June 2017), *Firefighters reunite rescued dog and owner after blaze [Media Release], Fire and Rescue New South Wales. At: https://www.fire.nsw.gov.au/news.php?news=2349 [27 February 2022].*

Fire and Rescue New South Wales (19 May 2021), *House fire – St Marys [Media Release], Fire and Rescue New South Wales. At: www.fire.nsw.gov.au/news.php?news=1264 [6 March 2022].*

Fitzgerald K & Flood A 2006, *Smoke Inhalation. Clinical Techniques in Small Animal Practice, vol. 21, no. 4, pp.205 –214. doi:10.1053/j.ctsap.2006.10.009*

Ghassempour N, Tannous W, Avsar G, Agho K & Harvey L 2021, *Estimating the Total Number of Residential Fire-Related Incidents*

and Underreported Residential Fire Incidents in New South Wales, Australia by Using Linked Administrative Data. International Journal of Environmental Research and Public Health, vol. 18, no. 13, p.6921. doi:10.3390/ijerph18136921

Green J 2018, *Incidents involving animals – the crosscutter, UK Fire website. At: https://ukfiremag.mdmpublishing.com/incidents-involving-animals-the-crosscutter/ [6 March 2022].*

Guillaumin K & Hopper K 2013, *Successful outcome in a dog with neurological and respiratory signs following smoke inhalation. Journal of Veterinary Emergency and Critical Care, vol. 23, no. 3, pp.328–334. doi:10.1053/j.ctsap.2006.10.009*

Gurtner Y & Parison S 2021, *Promoting owner responsibility for pets in disasters. Australian Journal of Emergency Management, vol. 36, no. 3, pp.37–43. At: https://knowledge.aidr.org.au/resources/ajem-july-2021-promoting-owner-responsibility-for-pets-in-disasters/.*

Hanel R, Palmer L, Baker J, Brenner J, Crowe D, Dorman D, Gicking J, Gilger B, Otto C, Robertson S, Rozanski E & Trumpatori B 2016, *Best practice recommendations for prehospital veterinary care of dogs and cats. Journal of Veterinary Emergency and Critical Care, vol. 26, no. 2, pp.166–233. doi:10.1111/vec.12455*

Human Animal Bond Research Institute 2022, *2016 Pet Owners Survey, Human Animal Bond Research Institute website. At: https://habri.org/2016-pet-owners-survey [27 February 2022].*

Hunt M, Al-Awadi H & Johnson M 2008, *Psychological Sequelae of Pet Loss Following Hurricane Katrina, Anthrozoös, vol. 21, no. 2, pp.109 –121. doi:10.2752/175303708x305765*

Invisible Fence Brand 2022, *Project Breathe: Pet Oxygen Mask Donation Program - The Invisible Fence Brand, Invisible Fence Brand website. At: www.invisiblefence.com/why-invisible-fence/project-breathe [27 February 2022].*

Jasani S 2015, *Chapter 147 - Smoke Inhalation, in Silverstein D and Hopper K (eds) Small Animal Critical Care Medicine, 2nd ed., W.B. Saunders, St Louis.*

Jonsson A, Bergqvist A & Andersson R 2015, *Assessing the number of fire fatalities in a defined population. Journal of Safety Research, vol. 55, pp.99–103. doi:10.1016/j.jsr.2015.10.001*

Kahler S (15 February 2018) *When fire strikes home, American Veterinary Medical Association. At: www.avma.org/javma-news/2018-02-15/when-fire-strikes-home [27 February 2022].*

Marshall L (8 December 2015) *Puppy rescued from Melbourne house fire 'lucky to be alive', 9 News. At: www.9news.com.au/national/puppy-rescued-from-melbourne-house-fire-lucky-to-be-alive/a6cfe842-085a-46e8-8f2a-0a0594a184b8 [27 February 2022].*

Milligan J (9 September 2019) *SFRS aiming to equip every Scottish fire station with oxygen masks for pets, Scottish Fire and Rescue Service. At: www.firescotland.gov.uk/news/2019/september/sfrs-aiming-to-equip-every-scottish-fire-station-with-oxygen-masks-for-pets/ [27 February 2022].*

Naughtin P (13 July 2017) *Pet cat couldn't be revived by MFB firefighters following Mont Albert house fire, Whitehorse Leader. At: https://www.heraldsun.com.au/leader/east/pet-cat-couldnt-be-revived-by-mfb-firefighters-following-mont-albert-house-fire/news-story/d99489bf56151a608f2b41dc8e8c9949 [27 February 2022].*

Pakenham K (16 June 2014) *Dog rescued from Doveton house fire, Country Fire Authority. At: https://news.cfa.vic.gov.au/news/dog-rescued-from-doveton-house-fire [27 February 2022].*

Paynter J (30 June 2020) *Firefighters rescue pet dog from burning house in St Albans, Nationwide News Pty Ltd [27 February 2022].*

Smokey Paws Ltd 2022, *FAQs | Providing Oxygen Masks for Pets Across the UK | Smokey Paws, Smoke Paws Ltd website. At: www.news.com.au/national/victoria/news/firefighters-rescue-pet-dog-from-burning-house-in-st-albans/news-story/8eec57d6e8ce5c400dfc3af8a95bd06d [27 February 2022].*

Sobhakumari A, Poppenga R, Pesavento J & Uzal F 2018, *Pathology of carbon monoxide poisoning in two cats. BMC Veterinary Research, vol. 14, no. 1. doi:10.1186/s12917-018-1385-4*

State Emergency Service of South Australia 2021, *Large Animal Rescue, State Emergency Service of South Australia website. At: www.ses.sa.gov.au/about-us/what-we-do/large-animal-rescue/ [6 March 2022].*

Stern A, Lewis R & Thompson K 2014, *Toxic Smoke Inhalation in Fire Victim Dogs. Veterinary Pathology, vol. 51, no. 6, pp.1165 –1167. doi:10.1177/0300985813519134*

Vaughn L, Beckel N & Walters P 2012, *Severe burn injury, burn shock, and smoke inhalation injury in small animals. Part 2: diagnosis, therapy, complications, and prognosis. Journal of Veterinary Emergency and Critical Care, vol. 22, no. 2, pp.187–200.*

Wag'N O2 Fur Life LLC 2021, *About, Wag'N O2 Fur Life LLC website. At: www.petoxygenmasks.org/about_us.html [27 February 2022].*

Westcott R, Ronan K, Bambrick H & Taylor M 2017, *Expanding protection motivation theory: investigating an application to animal owners and emergency responders in bushfire emergencies. BMC Psychology, vol. 5, no. 1. doi:10.1186/s40359-017-0182-3*

Zottarelli L 2010, *Broken Bond: An Exploration of Human Factors Associated with Companion Animal Loss During Hurricane Katrina. Sociological Forum, vol. 25, no. 1, pp.110–122. doi:10.1111/j.1573-7861.2009.01159.x*

About the authors

Dr Ian Porter is a veterinarian and emergency services worker interested in the prehospital care of animals injured at emergency incidents. He has a Master of Emergency Management, Charles Sturt University. This paper was developed as a part of those studies.

Associate Professor Valerie Ingham lectures in emergency management at Charles Sturt University. Her research highlights the importance of local community organisations in building community connections for risk reduction and disaster resilience.

Abstract

In Aotearoa-New Zealand and perhaps in other countries, firefighters are increasingly required to attend highly demanding and stressful non-fire incidents. This study used a qualitative descriptive research design to examine the gaps in preparation experienced by firefighters in Aotearoa-New Zealand when responding to non-fire incidents, particularly medical calls. Forty-four firefighters and 12 selected informants were interviewed. Ten Māori firefighters took part in a face-to-face focus group. Results indicate that firefighters equated preparation with training for their role. Training was considered by some to be limited to a specific range of first aid skills and it was felt a higher level of medical training would be beneficial. A need for more training in relation to working cross-culturally was also identified, particularly in relation to Māori and the application of cultural processes and protocols when death occurs. Training to improve firefighters' abilities to console and communicate with families at incidents was also noted. Besides training, participants identified the need to prepare for unfavourable outcomes, this included reframing what 'success' looks like, enhancing psychological wellbeing and encouraging help-seeking behaviours.

Ready to respond: preparing firefighters for non-fire incidents

Peer reviewed

En-Yi Lin[1]
ORCID: 0000-0002-5720-2813

Verne-Maree McManus[1]

Jeffery Adams[1]
ORCID: 0000-0003-3052-5249

1. Massey University, Auckland, New Zealand.

SUBMITTED
22 February 2023

ACCEPTED
26 May 2023

DOI
www.doi.org/10.47389.38.3.42

Introduction

Firefighting is dangerous and stressful work, presenting both physical and psychological challenges for firefighters (Carey *et al.* 2011, Piazza-Gardner *et al.* 2014, Wagner & O'Neill 2012). In addition to their core role of attending and extinguishing fires, firefighters are often involved with non-fire responsibilities including attending car accidents, providing urban search and rescue, stabilising incidents involving hazardous substances, performing animal rescues and rescues from swift water, controlling traffic around incidents and promoting fire safety in communities (Fire and Emergency New Zealand 2022). Alongside this has been a recent trend in many countries to call on firefighters to attend medical emergencies in community settings (Svensson *et al.* 2018, Williams *et al.* 2017).

There is evidence of acceptance among firefighters in countries such as England, Sweden and Australia of the need to attend medical call outs as this role expansion is viewed as being part of a contemporary emergency service (Abelsson 2019, Byrne-Davis *et al.* 2019, Smith *et al.* 2001). These incidents can vary considerably and include life-threatening events (cardiac and respiratory), suicide, drowning, road traffic crashes and direct rescue. Such events are highly demanding and stressful (Benedek, Fullerton & Ursano 2007; McLennan *et al.* 2009; Regehr *et al.* 2003) and can overwhelm a firefighter's normal ability to cope (Deanne, Jane & Ian 2014; Harris, Baloğlu & Stacks 2002; Straud *et al.* 2018). There is limited research relating to firefighters attending non-fire related incidents. A Swedish study examining firefighters' experiences of first response emergency care (Abelsson 2019) found that having time to mentally prepare and being allowed to show feelings were factors that assisted firefighters to cope.

The New Zealand context

Fire and Emergency New Zealand identified that the number of medical emergencies, including suicides, heart attacks and respiratory arrests that firefighters respond to is significantly increasing. In 2021, there were over 13,000 medical co-response and first response callouts (Fire and Emergency New Zealand 2022). Firefighters, including those with a medical role, are exposed to dangerous and stressful

situations and potentially traumatising events in the course of their work (Deanne, Jane & Ian 2014; Straud *et al.* 2018).

In late 2014, New Zealand Fire Service (now known as Fire and Emergency New Zealand) participated in a collaborative approach for medical emergencies with 2 ambulance services (St John New Zealand and Wellington Free Ambulance). This required firefighters to attend life-threatening cardiac or respiratory arrest emergencies (known as 'purple' calls) as co-responders. While, in some situations, ambulances also attend co-response calls, firefighters are often first to arrive, especially in smaller communities where ambulance and police officers are based further away.

The aim of this study was to understand how firefighters can better prepare for non-fire incidents, particularly medical calls, and to identify potential actions to help them manage the adverse effects of non-fire incidents.

Method

Recruitment

This study was carried out in New Zealand during 2017 and 2018. At the time of study, there were 469 fire stations and depots staffed by 1,739 career firefighters, 11,260 volunteer firefighters and 866 management and support personnel (Fire and Emergency New Zealand 2018). Attracting study participants (any active career or volunteer firefighter) was undertaken by Fire and Emergency New Zealand. Interested participants contacted the research team and telephone interviews were scheduled at times convenient for the participants. A face-to-face focus group of Māori firefighters was also held. Māori participants were invited by Fire and Emergency New Zealand's National Māori Advisor. Ethical approval was obtained from the Massey University Northern Human Ethics Committee (NOR17/47).

Participants

A total of 44 firefighters were interviewed individually by telephone and 10 firefighters took part in the face-to-face focus group. Thirty-seven of the firefighters interviewed individually were Pākehā (New Zealanders of European descent) or Australian. Two of the firefighters who were interviewed and all 10 focus group participants identified as Māori. Five participants did not provide their ethnicity.

Similar numbers of male and female volunteers (first and co-responders) participated, while there were more male than female participants in the career firefighter sample. The age range of firefighters interviewed was 18 years to 69 years. The length of service of firefighter participants (individual interviews and focus groups) ranged from 1 year to 44 years; 26 (59%) had 10 or more years of service (see Table 1).

Data collection and analysis

A guide was developed for the individual interviews and the focus group to ensure a similar range of topics was covered. The interviews were digitally recorded with interviewee consent and transcribed. A general inductive analytic approach was employed (Thomas 2006). In this approach, both the research aims and the raw data guided the data analysis. All transcriptions were printed, read independently and discussed by 2 researchers who then developed the themes. The quotes presented in this paper are slightly edited to facilitate ease of reading.

Table 1: Research summary (N=54)

Characteristics	Details
Interview method	44 by telephone, 10 by face-to-face focus group
Ethnicity	37 Pākehā /Australian, 12 Māori, 5 unspecified
Gender	14 male volunteer firefighters, 12 female volunteer firefighters 21 male career firefighters, 7 female career firefighters
Age	Between 18 and 69 years
Length of service	Between 1 and 44 years 26 participants (59%) had 10 or more years of service

Results

The research results are presented under 2 main themes: preparation for necessary skills and preparation for unfavourable outcomes.

Preparation for necessary skills

Firefighters generally equated preparation for their role with the training they had received for their respective functions. Firefighters reported a direct link between being well trained and having confidence to perform the medical aspects of their role. Although firefighters mentioned the importance of having sufficient medical and technical skills, much of the training identified was related to 'soft skills' (such as cross-cultural skills and relational skills).

Medical and technical skills

Firefighters reported that the medical skills they learnt and the experiences of attending medical calls had positive results on their personal lives. These positive effects typically centred on firefighters valuing and appreciating their lives and their families more as well as their increased ability to cope with stressful situations and emergencies in their personal lives.

> *… you kind of just appreciate life so much more, and your family and you just, you hold things dearer to your heart, you can see how life is snuffed out in an instant, and it has no rhyme or reason, it just happens so you kind of, I don't know, I appreciate things more, I make sure I utilise every day as much as I can, and do things I enjoy doing.*

Training for medical calls was seen by some participants as being an additional responsibility on top of firefighting requirements. It was viewed as important to ensure training for

fire responsibilities was maintained, but there should be scope to enhance medical training, particularly as some medical calls could be challenging and difficult to cope with and, with extra training, firefighters could be confident and effective.

> *… we are going to more and more of those medical calls, I would like to feel a little bit more confident going into those situations … we all know how to do CPR and those sorts of things, but sometimes when you're dealing with children, it's a little bit different and I'd like to see … more training in those areas …*

Training in medical and technical skills was generally viewed as positive, however, firefighters identified a gap in cross-cultural training.

Cross-cultural skills

A gap identified by participants in training and preparation was around appropriate and respectful care and practice related to ethnicity and culture. There was a particular concern about the lack of processes or protocols for when a person has died that demonstrated respect for the deceased person and their family in a culturally appropriate way while also supporting the wellbeing of the firefighters attending the incident. This gap was especially significant when working with Māori. For Māori, applying spiritual practices at the scene of an incident and at debriefing times was acknowledged as important. This would typically involve a karakia (blessing) of the crew, the truck, the family and the site. Firefighters felt these protocols were not always addressed well.

> *… from a Māori perspective … we needed more of cultural approach around deaths … I think that's spiritual wellbeing … we don't do that very well … sometimes ritual and those sorts of things in and around things like death actually are part of helping cope …*

Alongside cross-cultural skills training, another 'soft skill' identified by firefighters was around relational skills.

Relational skills

The role of firefighters attending a medical event was viewed as different to their role at a fire because it involved dealing with people and usually took place within someone's home. Firefighter participants noted that dealing with families and relatives, many of whom were highly distressed and upset, while attending incidents was a challenge they felt under-prepared for. Relationship skills training that improved a firefighter's ability to console and communicate with families and relatives while attending incidents was regarded as important. Also noted was the need for a balance between showing empathy towards the family while simultaneously protecting the firefighter crew from becoming so emotionally involved they then struggle to separate themselves from the scene.

> *… they're either in the lounge, in the hallway and very often in the bedroom, so these most sort of intimate places of a home … so, it's not like squirting water at an inanimate building, or working with paramedics extricating somebody from a motor vehicle accident, it's tactile and more than that … we have to undress people, to do CPR … so it's very intimate in that sense as well … it's a huge contrast as I said with tackling a fire, there's just no comparison.*

> *I think one of the challenges we face especially when we're going to suicides, purple calls, dealing with the deceased's whānau (family) and stuff like that is finding that balance of having that empathy and opening yourself up to it, and then closing off as well at the same time so that you don't go too deep and you don't get hurt too bad. But where's that balance? I never got told where that balance would be or how involved to get or how not involved to get or anything like that …*

The second main theme identified by firefighters when responding to non-fire incidents was preparation for unfavourable outcomes.

Preparation for unfavourable outcomes

The medical calls attended by co-responder brigades usually involve cardiac arrests and respiratory arrests (purple calls). These are reported to have a high death rate. Being perceived as 'the good guys' who help and support the community can affect firefighters attending purple calls where both the community and firefighters may have unrealistic expectations of a good outcome. Preparing firefighters to deal with unfavourable outcomes is important to support mental health and resilience.

Reframing success

The view that firefighters need support to develop a realistic understanding of 'what success for a medical co-response looks like' was expressed. The experiences of firefighters attending purple calls and the low success rate associated with such callouts negatively affected their psyche compared with the positive feeling of success experienced after putting a fire out.

> *… we're geared up to go to an incident, like a house fire for example, to render assistance, so we walk away from that kind of incident with a feeling of, like, we did something, we put the fire out … so it's, like, a positive, whereas you walk away from a CPR job and most of the time you're not getting a positive result, so it affects your psyche … because you haven't been successful and we're so used to that; walking away and thinking, yeah, we did a great job, whereas we walk away from the CPR, it's not necessarily anything to do with what we did at the job, it's just the result that was always going to happen, and that's hard to deal with …*

A key aspect of reframing success for firefighters identified by the participants was to recognise and accept purple calls as unlikely to have a positive (or successful) outcome in terms of lives saved. Reframing success then meant 'measuring' it in other ways such

as performing duties well and bringing comfort to people at incidents. The need to remove the negative connotations for firefighters associated with medical calls and replace them with positive affirmations and statements was also identified.

> *… I think the challenges are … being regularly exposed to traumatic events that generally have a poor outcome … but I'm trying to turn that into a positive by saying, 'well, you're well trained, you're effectively bringing a level of comfort, you're making a difference in a positive way' …*

Reframing success was an important step in preparing firefighters to deal with unfavourable outcomes of non-fire incidents. Another aspect identified by the participants was to help them deal with unfavourable outcomes to enhance their psychological wellbeing.

Enhancing psychological wellbeing

While participants often reported attending fires as exciting and challenging, medical calls were seldom reported this way. Many firefighters reported that calls to attend medical events induced anxiety. A concern was the uncertainty about what they would find at the incident. Another difficulty reported was the outcomes of medical calls often remain unknown, leading to a lack of closure. Integrating regular mental health checks for firefighters to address these concerns was suggested. Also noted was the potential for greater psychological preparation at the recruitment level to facilitate realistic expectations of the role.

> *Personally, I don't see why the mind is any different from your physical being … we have physical checks … heart rate, blood pressure, sight, lung capacity … and that's a yearly thing that's available for us to take up, but definitely nothing on a psychological side, and personally I think that that is needed.*

> *… I think there's a potential to sort of start the psychological health journey, at recruit level so giving them the awareness, giving them the conversations, talk to individuals in… how they cope with those type of incidents…*

Besides enhancing psychological wellbeing, participants also expressed the need for leadership to encourage help-seeking behaviours.

Encouraging help-seeking behaviours

Participants reported experiencing a gradual change in their brigade from a culture where help-seeking was historically viewed as a weakness to one with more open and supportive attitudes. Leadership modelling was essential to encouraging help-seeking. When brigade leaders (or senior crew members) started to be open about seeking help, this created space for others to discuss the effects of difficult medical callouts and allowed them to access help and support to cope with these challenging situations.

> *I think historically this organisation can be quite elitist and as such you know, any kind of weakness is really frowned upon … and really like, you must be a loser if you need help… It's improving … we're all tough, we don't really want to talk about it, but it takes one person really or a group of people to start the movement and the barriers come down and I can see that happening…*

> *… with the increase in medical responses… it's alright to feel this way when you come back from a call or even when you're at a call, it's not a sign of weakness… it's painting a more accurate image of who we are cos we are people at the end of the day, like everyone else, but we are also courageous, fit and strong as well…*

Discussion

Firefighting is a mentally and physically challenging occupation and firefighters are exposed to a range of stressors in their medical and non-medical roles. Career and volunteer firefighters are increasingly required to attend medical and other non-fire calls, including suicides, heart attacks and respiratory arrests. This research investigated firefighter views about attending non-fire calls and how they could be better prepared for these events. Firefighters in this study reported that attending non-fire incidents such as medical calls had negative impacts on them. A number of contributing causes were identified including the limited success of purple calls (due to those calls having a high death rate outcome), anxiety when attending medical calls, pressure to achieve positive outcomes, dealing with people and families (especially from different cultures) and a lack of closure. Consistent with the literature, these non-fire events can be highly demanding and stressful, and can be beyond a firefighter's ability to cope.

Some firefighters in this study reported experiencing personal growth and resilience as a result of attending non-fire, medical calls. While attending critical events was reported as causing stress reactions, many participants indicated that they were able to maintain their usual level of functioning and some perceived their role in non-fire calls as having a positive effect on their personal and family life. Participants reported valuing and appreciating these aspects more and considered they were better able to cope with emergencies in their personal lives.

Participants indicated that more medical and technical training would be beneficial to their preparedness and confidence when attending non-fire incidents and medical calls. Similar findings have been reported for firefighters elsewhere including the desirability of more training in severe and complex medical scenarios (Abelsson & Lundberg 2019).

A need for more training in relation to working cross-culturally was identified, particularly in relation to Māori, and cultural processes and protocols when a death occurs (Parkes, Laungani & Young 2015). With increasing ethnic diversity in modern societies, it is important to improve firefighter awareness of cross-cultural differences and their ability to provide respectful

care and practice to people across a range of ethnicities and cultures, as has been done in the healthcare sector (Luo 2019).

Another area where a need for extra training was indicated related to dealing with families at medical incidents. Participants suggested more training in relationship skills would improve their ability to console and communicate with families and relatives while attending incidents. Similar findings have been reported for firefighters elsewhere, including the desirability for more training in communication skills and how to provide the best care not only for the patient but also for the next of kin (Abelsson 2019, Jacobsson *et al.* 2015).

In Aotearoa-New Zealand, the medical calls attended by co-responder firefighters are for life-threatening emergencies, which are reported to have a high death rate. Being better prepared for unfavourable outcomes is to reframe the understanding of what success looks like when attending purple calls. A reframed outcome could be that the job was carried out well, including following the correct procedure and providing appropriate care.

A shift in brigade culture and mindset would enhance psychological wellbeing and encourage help-seeking behaviours. Participants expressed the need to change 'old school' attitudes that created barriers to seeking support. Good leadership was seen as key to building a culture of help-seeking. Seeking help and caring for one's psychological wellbeing should not be viewed as being weak or not coping, but rather as an extension of professional behaviour (Duran, Woodhams & Bishopp 2018; Van Hasselt, Bourke & Schuhmann 2022). Participants also expressed a desire to be informed of the outcomes of their medical calls. This would enable a sense of closure and enhance their psychological wellbeing.

Limitations

As is typically the case when conducting qualitative research, participant involvement was dependent on participants contacting the research team. To support this, the study was advertised and promoted extensively to ensure the self-selected sample was drawn from a wide pool of potential participants. This article reflects the views of the firefighters and key informants who were interviewed and does not account for the views of all firefighters.

Conclusion

Firefighters are increasingly required to attend medical and other non-fire callouts. The negative stress firefighters experience in non-fire incidents is a significant concern for firefighters and emergency services organisations. This study identified several areas for potential action to ensure firefighters are better prepared and supported for this vital role. Emergency services organisations could continually review their training and support programs to evaluate if they meet the needs of firefighters. Appropriate medical training, cross-cultural and relationship skills training relevant to firefighter needs should be available and its effectiveness evaluated. In addition, leaders and organisations should strive to normalise help-seeking practices and behaviour and recruitment practices and support must accurately portray and keep abreast of the demands of the role.

References

Abelsson A 2019, *First response emergency care – experiences described by firefighters, International Journal of Emergency Services, vol. 8, no. 3, pp.247–258. doi:10.1108/IJES-05-2018-0026*

Abelsson A & Lundberg L 2019, *Simulation as a means to develop firefighters as emergency care professionals. International Journal of Occupational Safety and Ergonomics, vol. 25, no. 4, pp.650–657. doi10.1080/10803548.2018.1541122*

Benedek DM, Fullerton C & Ursano RJ 2007, *First responders: Mental health consequences of natural and human-made disasters for public health and public safety workers. Annual Review of Public Health, vol. 28, pp.55–68. doi:10.1146/annurev.publhealth.28.021406.144037*

Byrne-Davis LMT, Marchant D, Bull ER, Gyles D, Dean E & Hart JK 2019, *How do members of a fire and rescue service perceive expanding their roles to deliver more health care services? Journal of Public Health, vol. 40, no. 3, pp.593–599. doi:10.1093/pubmed/fdy148*

Carey MG, Al-Zaiti SS, Dean GE, Sessanna L & Finnell DS 2011, *Sleep problems, depression, substance use, social bonding, and quality of life in professional firefighters. Journal of Occupational and Environmental Medicine, vol 53, no. 8, pp.928–933. doi:10.1097/JOM.0b013e318225898f*

Deanne A, Jane S-F & Ian S 2014, *Predicting post-traumatic growth and post-traumatic stress in firefighters. Australian Journal of Psychology, vol. 66, no. 1, pp.38–46. doi:doi:10.1111/ajpy.12032*

Duran F, Woodhams J & Bishopp D 2018, *An interview study of the experiences of firefighters in regard to psychological contract and stressors. Employee Responsibilities and Rights Journal, vol. 30, no. 3, pp.203–226. doi:10.1007/s10672-018-9314-z*

Fire and Emergency New Zealand 2022, *Annual report for the year ended 30 June 2022. Wellington: Fire and Emergency New Zealand.*

Gist R, Lohr JM, Kenardy JA, Bergmann L, Meldrum L, Redburn BG, Paton D, Bisson JI, Woodall SJ & Rosen GM 1997, *Researchers speak on CISM. Journal of Emergency Medical Services, vol. 22, no. 5, pp.27–28.*

Harris MB, Baloğlu M & Stacks JR 2002, *Mental health or trauma-exposed firefighters and critical incident stress debriefing. Journal of Loss and Trauma, vol. 7, no. 3, pp.223–238. doi:10.1080/10811440290057639*

Jacobsson A, Backteman-Erlanson S, Brulin C & Hörnsten Å 2015, *Experiences of critical incidents among female and male firefighters. International Emergency Nursing, vol. 23, no. 2, pp.100–104. doi:10.1016/j.ienj.2014.06.002*

Luo X 2019, *Cultural competence in ethnically diverse healthcare: A case of a district health board in New Zealand (Doctoral dissertation). At: https://researchspace.auckland.ac.nz/handle/2292/47533.*

McLennan J, Birch A, Cowlishaw S & Hayes P 2009, *Maintaining volunteer firefighter numbers: Adding to value to the retention coin. Australian Journal of Emergency Management, vol. 24, no. 2, pp.40–47. At: https://knowledge.aidr.org.au/resources/ajem-may-2009-maintaining-volunteer-firefighter-numbers-adding-value-to-the-retention-coin/.*

Parkes CM, Laungani P & Young B 2015, *Death and bereavement across cultures (2nd ed.). Routledge, Taylor & Francis Group. doi:10.4324/9781315721088*

Piazza-Gardner AK, Barry AE, Chaney E, Dodd V, Weiler R & Delisle A 2014, *Covariates of alcohol consumption among career firefighters. Occupational Medicine, vol. 64, no. 8, pp.580–582. doi:10.1093/occmed/kqu124*

Regehr C, Hill J, Goldberg G & Hughes J 2003, *Postmortem inquiries and trauma responses in paramedics and firefighters. Journal of Interpersonal Violence, vol. 18, no. 6, pp.607–622. doi:10.1177/0886260503251131*

Smith KL, Rich D, Pinol JP, Hankin J & McNeil J 2001, *Acceptance of a medical first-responder role by fire fighters. Resuscitation, vol. 51, no. 1, pp.33–38.*

Straud C, Henderson SN, Vega L, Black R & Van Hasselt V 2018, *Resiliency and posttraumatic stress symptoms in firefighter paramedics: The mediating role of depression, anxiety, and sleep. Traumatology, vol. 24, no. 2, pp.140–147. doi:10.1037/trm0000142*

Svensson A, Österberg SA, Fridlund B, Stening K & Elmqvist C 2018, *Firefighters as first incident persons: Breaking the chain of events and becoming a new link in the chain of survival. International Journal of Emergency Services, vol. 7, no. 2, pp.120–133. doi:10.1108/IJES-10-2017-0051*

Thomas DR 2006, *A general inductive approach for analyzing qualitative evaluation data. American Journal of Evaluation, vol. 27, no. 2, pp 237–246. doi:10.1177/1098214005283748*

Van Hasselt V B, Bourke ML & Schuhmann BB 2022, *Firefighter stress and mental health: Introduction to the special issue. Behavior Modification, vol. 46, no. 2, pp.259–266. doi:10.1177/01454455211064*

Wagner SL & O'Neill M 2012, *Mental health implications of volunteer fire service membership. Disaster Prevention and Management: An International Journal, vol. 21, no. 3, pp.310–319. doi:10.1108/09653561211234499*

Williams J, Newton A, Talbot J, Skedgel C, Herbland A, Skinner A, Mikrut T, Willmore I & Jones K 2017, *Broadening responsibilities: Consideration of the potential to broaden the role of uniformed fire service employees. National Joint Council for Local Authority Fire and Rescue Services, London, UK.*

About the authors

En-Yi Lin is a research fellow at the SHORE & Whāriki Research Centre, Massey University. She has a interest in the health and wellbeing of ethnic groups and has experience in analysing and interpreting quantitative and qualitative data of social and public health projects.

Verne-Maree McManus (Ngā Puhi nui ki Whangaroa) is a research coordinator at the SHORE & Whāriki Research Centre, Massey University. She has worked with Māori organisations providing project planning and evaluation across health programs and initiatives.

Jeffery Adams is Associate Professor at the SHORE & Whāriki Research Centre, Massey University. He has led research and evaluation projects and contributed to public and community health and social service initiatives.

Abstract

This article proposes a working definition for the term 'lost wilderness tourist' and uses this definition to examine lost wilderness tourist events through the lenses of tourism literature, lost person behaviour literature, search and rescue literature and wilderness tourists in Australia. A tool was developed using existing literature to recruit self-identifying lost wilderness tourists. First-person stories were collected through open ended, one-on-one qualitative interviews. Interview data were analysed using 3-step coding. The findings propose a definition for the term 'lost wilderness tourist', establish that lost wilderness tourist events can be categorised as 'disorientated' or 'stuck' and that these 2 meta categories can be further divided into subcategories. The findings offer insights into the lived experiences of lost wilderness tourists. These insights are useful for anyone with an interest in lost wilderness events and the safety of people in Australia's wilderness areas.

Who is a lost wilderness tourist?

Peer reviewed

Steve Schwartz[1]

1. University James Cook University, Cairns, Queensland.

SUBMITTED
28 January 2023

ACCEPTED
19 April 2023

DOI
www.doi.org/10.47389.38.3.48

Introduction

The Australian landmass covers approximately 7.6 million square kilometres and includes deserts, savannahs, rainforests, mountains and alpine regions (Australian Maritime Safety Authority 2021). Each year, approximately one and a half million people enter Australian wilderness spaces in pursuit of leisure or pleasure (Cohen 1979, Leiper 1979, McCabe 2005, Yu *et al.* 2012). Several thousand of these people become lost (Dacey, Whitsed & Gonzalez 2022).

The benefits of wilderness tourism are well documented and include spiritual, physical and mental health benefits (Boller *et al.* 2010, Boore & Bock 2013). Tourists[1] are however, vulnerable because of their tourist status (Faulkner 2001, Gurtner 2014, Jeuring & Becken 2013). Despite their unique wants, needs and vulnerabilities, wilderness tourists are not identified in contemporary lost person taxonomies. Lost person taxonomies have been developed by Koester (2008b), Twardy, Koester and Gatt (2006), the Australian Maritime Safety Authority (2021), Schwartz (2022) and Whitehead (2015). These taxonomies are based on statistical data that connects found locations, demographics, psychographics and behavioural patterns (Australian Maritime Safety Authority 2021, Koester 2008b *et al.* 2016). However, the current body of work lacks consistency and the depth that is required to address the unique needs of lost wilderness tourists. This paper uses qualitative analysis to ask who a lost Australian wilderness tourist is and what constitutes a lost wilderness tourist event.

These questions are answered by positioning tourists within lost person literature, developing a working definition for the term 'lost wilderness tourist' and using that definition to categorise lost wilderness tourists. This provides a baseline understanding of lost tourists and provides a tool for further lost wilderness tourist research.

Theoretical overview

Literature review

Tourists are voluntary, temporary travellers making discretionary trips outside of their usual environments to engage in touristic behaviour in pursuit of leisure or pleasure

1. In this paper, the term 'tourist' is used for anyone exploring wilderness areas away from where they live, be that domestically or from overseas.

(Cohen 1979, Leiper 1979, McCabe 2005, Yu *et al.* 2012). They either self-identify as tourists or are easily identified by others as tourists (Yu *et al.* 2012).

Lost people theorists such as Schwartz (2022), Montello (2020), Fernández Velasco and Casati (2020), Dudchenko (2010), Hill (1998, 2010) and Syrotuck and Syrotuck (2000) show that lost people may be unable to find their way, may be injured or incapacitated, may be unable to be found, may be unable to understand or to cope with the situation, may be deceased, may be thought of by others as lost or may be experiencing a combination of these predicaments. Fernández Velasco and Casati (2020) also suggest that being lost has both subjective and objective elements as lost people negotiate the objective reality of being lost and the subjective feeling of disorientation.

By merging tourism, social science, lost person behaviour and search and rescue literature Schwartz (2022) defined lost wilderness tourists as:

> *…people who engage in touristic behaviours in wilderness environments and are identified by themselves or others as tourists who are geographically disorientated and / or unable to return to places of safe refuge. (p.64)*

This definition is used to develop the research method for this paper as it seeks to answer the question 'who is a lost Australian wilderness tourist?'.

Method

Tourists regularly become lost in wilderness environments (Boore & Bock 2013, Goodrich *et al.* 2008, Scott & Scott 2008, Twardy *et al.* 2006). This study examined who lost wilderness tourists are and explored what constitutes a lost wilderness tourist experience. It steps away from the searcher-centric quantitative methodologies of existing taxonomies such as those developed by Koester (2008b), Twardy *et al.* (2006) and the Australian Maritime Safety Authority (2021) and takes a qualitative, lost-person centred approach. Sampling, data collection and data analysis is consistent with generally accepted qualitative research design, methods and methodologies as prescribed by Maxwell (2005) and Neuman (2014).

Participant recruitment

Recruitment of participants was via online and other channels such as word of mouth, print media, radio advertising, and snowballing to target people who had been lost in the wilderness while engaging in recreational or touristic activities. Self-identifying candidates were asked to contact the researcher through email, telephone or, a third-party contact. Potential candidates were screened for eligibility and suitability. Candidates who were deemed suitable were offered places in the study. Targeted advertising and self-selection ensured a high conversion rate between the people who connected with the study and those who participated. One candidate was excluded because they became lost while working. One candidate self-excluded because they felt that participating could become traumatic. The recruitment process resulted in 14 suitable candidates to be interviewed for this study.

Data analysis

Data was collected via one-on-one interviews. Interviews were electronically recorded and transcribed and coded using a 3-step process. Initial coding identified emergent themes. Axial coding clustered the open codes into meta-level themes and selective coding was used to identify key narratives. Ethical considerations were addressed through the James Cook University Human Research Ethics Committee (ethics approval number H8401).

Screening questions

Each participant was screened for age and to ensure they had been a lost wilderness tourist in Australia.

Question 1. Is the person over 18 years of age?

Question 2. Did the experience occur whilst engaging in touristic or recreational activity?

Question 3. Did the lost experience happen in an Australian wilderness area?

If the answer to all these questions was yes they were asked four further qualifying questions.

Question 4. Did they know their geographic location?

Question 5. Did they know where their intended destination was?

Question 6. Could they get to their intended destination unaided?

Question 7. Did someone else believe they were lost?

If a participant answered 'no' to any of questions 4, 5 or 6 or 'yes' to question 7, they were invited to continue in the study. Candidates were given study information and asked to provide informed consent. All participants were assigned pseudonyms that are used throughout this paper.

Findings

Overview

Participants included males and females ranging in age from early 20s to mid-70s. All identified as Australians and all had some prior wilderness experience. All had entered wilderness areas on foot and all were motivated by recreational goals such as hiking, photography and exploring. Some had travelled considerable distances to reach their wilderness destination.

Lost events occurred in various environments including rainforests, mountains, alpine regions, savannahs and outback regions. Most events occurred on the Australian mainland; one took place in Tasmania and one occurred on a subtropical island approximately 700km off the Australian east coast. Participants were considered lost because they self-identified as lost, were considered lost by other people or both self-identified as lost and were also thought of as lost by others. Lost events could be broadly categorised into those involving disorientation and those involving entrapment.

Geographically disorientated

Participants who identified as geographically disorientated were those unsure about their location, their destination or their route. Some were completely lost, some were partially lost and some became lost, unlost and then re-lost. Some participants became disorientated after failing to navigate tracks, some became disorientated while attempting to navigate off-track and some were unable to navigate between known locations. The most common scenario for participants who were geographically disorientated was that they were partially or temporarily disorientated.

Partially disorientated while on-track

Some participants became disorientated while they were following a formed and marked track. Bruce, for example, became disorientated while on the Overland Track[2] because of unexpected foul weather.

> *We were about halfway up the mountain when it started sleeting. We thought, oh the weather will be fine- like it'd be okay; we're like we're all geared up for it. And the further we got up, the harder the wind got, the icier things got, the snow started or the sleet turned into little cubes of ice. We had trail markers; we weren't necessarily lost. But we also didn't know just how far because I hadn't been on that trail. We knew that we had to get to Kitchen Hut at one point on the trail, but we had no idea how far along the trail we were…pure sheer anxiety and we're in a really bad space.*
>
> [Bruce]

Partially disorientated while off-track

Some participants became disorientated while off a trail. These participants had planned to explore off-track and were comfortable doing so. Thomas became disorientated exploring a rainforest valley. Max became disorientated attempting to return from a mountain summit and Liz became disorientated trying to navigate off a mountain top. Liz described her experience:

> *Dad decided we would not approach Mt Ossa by the usual track. We would go up a different track and then walk out the easy track. The problem with that was that meant you would follow markers on trees and rocks and so on because there wasn't a defined trail. It wasn't as well marked as many other trails.*
>
> *We managed to get up to the top. And, of course, there was a cairn there and there were footprints everywhere. And it was like 'okay, which was the way down?'. And we couldn't find the trail marking down because most people approach from the trail knowing where to go back to. So there were too many footprints and if you followed some, it would lead to nothing.*
>
> *So we were looking for a ridge and then the track should have been slightly to the side of it. And so unfortunately, there was another very prominent ridge running directly south which was not the ridge that we were meant to be on. So we searched everywhere along that ridge line and to the banks on each side of it. And it had been too many years since my dad had climbed Mt Ossa so he couldn't remember. So of course, we're looking down and everywhere we looked it was this huge boulder field. So these massive boulders took a lot of effort to climb up and over them. And so we looked, I don't know how many hours we were looking.*
>
> [Liz]

Unable to navigate between known locations

Some participants knew where they were and knew where they wanted to go but couldn't navigate between known locations without becoming disorientated. This was especially common at the tops of mountains and peaks. These participants were unable to navigate to target destinations but could easily return to their known locations at the tops of hills or mountains. This was described by Dale talking about how he dealt with a panicked member in his walking party.

> *Two of the guys got into a panic state, so I tried to keep them from getting too panicky about the fact that, you know, we don't know where we are and everything. I'd say, 'well we know where we are on top of this mountain we know exactly where we are we just can't see where we're going'.*
>
> [Dale]

For Dale, factors that made it impossible to navigate included too many trails, poor weather and reduced visibility.

> *Once we got on top of the mountain that was a big problem; it was just tracks everywhere. And then a big weather front came through. And it just closed in over us and the visibility was about 2 metres in front of us. We had no idea exactly where we were.*
>
> [Dale]

Max also became stuck at the top of a hill. He described his disbelief at being unable to find the way down.

> *It was probably about 6 hours that we were lost. In fact, I don't even like to use the word lost because I knew exactly where I was. I just couldn't get out…I was feeling a bit scared at this stage. We continued going up and down for probably 2 hours, 3 hours. And I could not believe that we couldn't find our way back down because there was no trail, but it was simply just walked up. And well, how come we can't walk back down? Yeah, I mean, it's just [you] follow a ridge line. And to know you're just going to a peak. Yeah. It was amazing that you can be so close and still not get out. You're still lost. You still can't get down.*
>
> [Max]

2. The Overland Track is a popular bushwalking track traversing Cradle Mountain-Lake St Clair National Park within the Tasmanian Wilderness World Heritage Area.

Reorientation attempts

When participants realised they were disorientated they typically sought to reorientate themselves back to their original target destinations or to other known locations such as tracks, high points and roads. For some, these reorientation attempts were successful. One example was William.

> *I didn't realise the weather was a problem. And 3 or 4 hours later, after I'd been trying to get down and I got the break in the clouds, [I] climbed a tree and looked out and saw the islands off to the right. Not straight ahead. And that's when I realised that the clouds had confused me. Until then I didn't realise and perhaps I might have been able to get myself out of it.*
>
> [William]

An example of failing to reorientate was Mary. On the second day of her lost experience Mary found a marker and thought she had become reorientated. She then lost the track again.

> *And the next morning I got up and I found a marker. So I set off thinking, 'oh, this is great'. You know, I'll be back. I knew I didn't walk very far...good I'm on my way back. I can't be very far I'm right. I still had a tin of sardines. And I wasn't worried about food. I think I still had a muesli bar. I was positive and somehow then I got lost again.*
>
> [Mary]

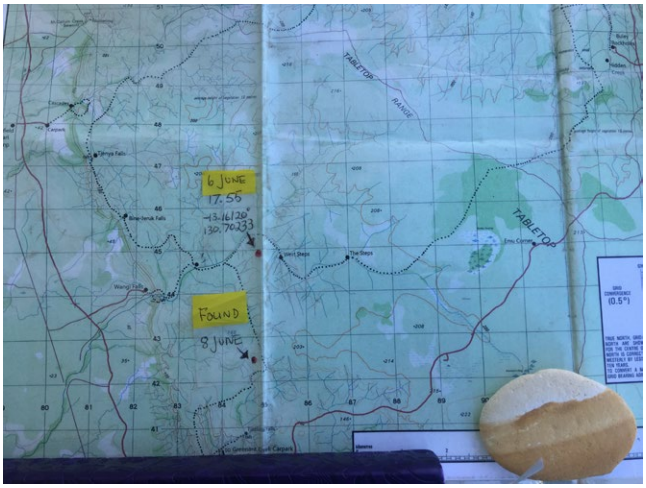
Completely disorientated

Participants who reported being completely disorientated included Mary (early 70s) and Carly (early 20s). Mary became disorientated because the trail she was following was poorly marked. Carly became disorientated because she followed the wrong creek bed. Mary was lost for 3 days and 2 nights before being spotted and rescued via helicopter. Carly was rescued via helicopter after she activated her personal locator beacon on the first day she was lost. Mary described becoming disorientated.

> *And after a bit you couldn't see any path on the ground. It wasn't discernible at all. It was rocky, it was open. But it was still, you know, a bit hilly and you were relying on metal posts with a triangle. And sometimes you couldn't see, you couldn't always see them in your line of sight. So you're heading thinking, 'I think I'm going the right way'. And then I'd have to backtrack to the previous post. And that's how I got lost. I lost the posts.*
>
> [Mary]

Carly also described realising that she was disorientated.

> *I realised that afternoon that I was meant to be at a campsite at a certain time and that time had passed. And I was just happily travelling along a creek bed. And I looked at my map and realised that I'd actually meant to be going, I think, southeast and I was going northeast. And I had no idea how long I'd been going in the wrong direction for I had no idea kind of where I was. And I immediately panicked.*
>
> *And like now looking back, I'm like 'how did I select the wrong creek bed?'. But I was obviously just having a great time trotting along. There were markers. Yeah, I just missed the marker. I just missed the marker like... there's so many dry creek beds that are kind of going every which direction along that trail and I'd obviously been looking at something and missed it and just kept walking. And as I said, it was when I looked at the map that day, and I was like, ' I'm supposed to be going southeast, but I'm going northeast'. That's what I really realised. Like I've missed, I'm not in the place where I'm supposed to be today. And I'm not going the way that I meant to be going.*
>
> [Carly]



Map showing Mary's location when lost.

Image: supplied (Mary)

Physically stuck

Physically stuck participants had become stuck because of external factors such as extreme weather or impenetrable terrain or because of internal factors such as injury, fatigue and skill deficiency. Some knew exactly where they were, some had some idea where they were and others were completely disorientated.

Entrapped

One participant who became entrapped was Bryan. Bryan had abseiled midway down a waterfall and became stuck on the rock face. After several self-rescue attempts, Bryan became fatigued and remained where he was until he was rescued via helicopter the following morning.

> *We decided to start climbing and I was having a lot of trouble. I was only getting a few metres and it was taking a long time to do it. He was sort of trying to show me, but we were just having trouble. Then we stopped for a while and then the next section I just free climbed up because*

that was easier for me; it's exhausting but it's easier. Then we got to the point where I stopped and that's where I stayed. I waited for someone to go back up…right at the beginning I thought I would, it didn't look hard. You don't realise it could be so much trouble.

[Bryan]

Stuck due to injury

Oscar became stuck after falling and injuring his foot.

So basically, it [the log] fell and it collapsed on my foot. And what I did is, yeah, I just looked around at everyone. And I said, 'look', I just laughed and I said, 'we'll go to the summit, I'll put my boot on'. And straightaway I remember standing up and this enormous pain; I just went 'this is so intense'. This is like, this absolutely sucks. And what I did is I literally stood up and then fell back down and then my foot just stayed in the water. And that's where I stayed for 2 and a half hours. I couldn't move.

[Oscar]

After the onset of a genuine fear for his survival, Oscar accepted he was stuck and called for help.

I just wanted to get back to the car because I knew the trip was over straightaway. And I just said, 'maybe we'll come back in 3 weeks to do it again'. And I looked at everyone and I said, 'look, we've got to call…we've got to call an ambulance, because what happens if a blood clots here? You know, like, what happens if there's a blood clot and I don't want to die'.

[Oscar]

Disorientated and stuck

Some participants were both disorientated and stuck. Thomas became disorientated in tropical rainforest, then became stuck in impassable terrain and then injured himself trying to self-rescue. Max and his companion became stuck after trying to navigate through harsh tropical vegetation.

And when we started to come back down, we got caught in this big wait a while thicket, that was the thickest infestation of wait a while I've ever seen in my life. And we're getting lacerated and so we went OK, this is stupid. We didn't come through this on the way up. So we just climbed back up, and it's quite steep at the top. Got to the very top, you can tell you're at the top because it's only about the size of a small house. Then, so we thought okay, so we were just down there so let's just bear off a couple of degrees and we beared off a couple of degrees and we thought we'll go down here.

But anyway, so we beared off a few degrees and we went down again. Still wait a while forest. What the hell.

Oscar became stuck in this creek after injuring his foot.

Image: supplied (Oscar)

The log that injured Oscar's foot.

Image: supplied (Oscar)

So we went back up again. Beared off a bit more went down again, wait a while. So we thought okay, we must have been a bit this way. So we try the third time. And we came to the real cliff face… my head starting to go holy crap…And Bruce was cramping. We've run out of water. And he started to get a little panicky. So I was trying on the outside to be really calm, but inside I'm thinking how can we not find this trail?…. He got so exhausted and the cramps are so bad, he just had to sit, I made him just stop and just sit under a tree.

[Max]

Discussion

The objective of lost person research is to develop better understandings about how people become lost and what can happen in lost person events in order to plan for, prevent, respond to and recover from these events. Contemporary lost person behaviour research has tended to be searcher focused and quantitative in design. This approach has produced excellent predictive models such as those developed by Koester (2008a) and has undoubtedly saved many lives, but it may lack some of the richness and depth provided by qualitative studies.

This study has moved away from that approach by adopting a lost person focus, by using a qualitative research methodology and by looking beyond rescue literature as it has sought to define and categorise lost wilderness tourist events. This study used multi-disciplinary literature, first-person narratives and qualitative enquiry to ask who a lost Australian wilderness tourist is and what constitutes a lost wilderness tourist event. A literature-based definition provided a baseline for recruiting participants. Self-identified participants were screened against this literature-based definition and working definitions were developed.

All study participants had entered wilderness areas in pursuit of leisure or pleasure. They expected to engage in activities of their choosing, they expected to traverse their chosen paths and they expected to leave the wilderness areas at times and places of their choosing. This did not happen. Some participants became disorientated, some became stuck and some became both disorientated and stuck. Some participants self-rescued and some required external assistance. The study findings suggest that a lost wilderness tourist might be defined as:

> *…a person who has entered a wilderness area in the pursuit of leisure or pleasure and who has become permanently or temporarily unable to reach a place of safety because they are geographically disorientated, geographically stuck or both disorientated and stuck.*

The study findings also resulted in 2 meta-level lost categories and 5 subcategories of lost wilderness tourists. The meta-level categories are 'geographically disorientated' and 'physically stuck'. Participants who were disorientated could be further categorised into 'partially disorientated', 'completely disorientated' and 'unable to navigate between known locations'. Participants who were physically stuck could be further categorised into those who were 'impeded by internal restrictions' and those who were 'impeded by external restrictions'. This is summarised in Table 1.

Table 1: Geographic awareness of lost people.

Fully aware	Somewhat aware	Not at all aware
Knows: • current location • destination • route.	Unsure of: • current location • destination • route.	No awareness of: • current location • destination • route.
This person is not geographically lost.	This person is partially disorientated.	This person is completely lost.
This person may still be a lost person if they are immobile or entrapped.	This person may also be a lost person because they are immobile or entrapped.	This person may also be a lost person because they are immobile or entrapped.

Limitations

A limitation of this study was the lack of international tourists. This was due to government-imposed travel restrictions associated with the pandemic response. A second limitation is that the study was informed by only 14 participants. This low sample rate is typical of qualitative research. All the participates provided valuable qualitative data that was used to develop the findings. Furthermore the participants experiences reflected most Australian landscapes including Tasmanian alps, northern rainforests and central Australian deserts.

Future research

The methodology, the findings and the conclusions of this study offer research opportunities. The proposed definition and taxonomies might be tested and refined. The qualitative, user-centric methodology might be used to further understand lost wilderness tourist experiences. The proposed methodology might also be used to better understand other groups of lost people such as people with disability and people with dementia. Future research might seek to compare, contrast and combine the richness of qualitative research with the high sample rates of quantitative research methods to develop understandings of lost person behaviour and guide lifesaving best practice. Future research should also seek to recruit international tourists who become lost to examine the similarities and differences between lost local tourists, lost domestic tourists and lost international tourists.

Conclusions

This paper achieved 3 outcomes. It positioned lost wilderness tourists inside lost person literature. It developed a working definition for the term 'lost wilderness tourist' and it used the proposed definition to categorise lost wilderness tourists.

Combining tourism literature, lost person behaviour literature and search and rescue literature with empirical research positions tourists inside lost tourist research. This produces

findings that can be used by anyone including wilderness tourists, tourism agencies, response agencies, policy planners and academic theorists. Tourist-centric stakeholders could use the findings to better understand lost tourist journeys. Stakeholders with an interest in prevention could use the findings to develop risk reduction strategies to reduce the trauma of lost tourist events. Search and rescue stakeholders might seek to integrate the proposed lost wilderness tourist definition and categories into existing taxonomies to improve search outcomes.

References

Australian Maritime Safety Authority 2021, *National Search and Rescue Manual. At: www.amsa.gov.au/national-search-and-rescue-council/manuals-and-publications/national-search-and-rescue-manual.*

Boller F, Hunziker M, Conedera M, Elsasser H & Krebs P 2010, *Fascinating remoteness: the dilemma of hiking tourism development in peripheral mountain areas. Mountain Research and Development, vol. 30, no. 4, pp.320–331.*

Boore S & Bock D 2013, *Ten Years of Search and Rescue in Yosemite National Park: Examining the Past for Future Prevention. Wilderness & Environmental Medicine, vol. 24, no. 1, pp.2–7. doi:10.1016/j.wem.2012.09.001*

Cohen E 1979, *A phenomenology of tourist experiences. Sociology, vol. 13, no. 2, pp.179–201.*

Dacey K, Whitsed R & Gonzalez P 2022, *Using an agent-based model to identify high probability search areas for search and rescue. Australian Journal of Emergency Management, vol. 37, no. 4, pp.88–94. doi:10.47389.37.4.88*

Dudchenko PA 2010, *Why people get lost: the psychology and neuroscience of spatial cognition. Oxford: Oxford University Press.*

Faulkner B 2001, *Towards a framework for tourism disaster management. Tourism Management, vol. 22, no. 2, pp.135–147.*

Fernández Velasco P & Casati R 2020, *Subjective disorientation as a metacognitive feeling. Spatial Cognition and Computation, vol. 20, no. 4, pp.281–305. doi:10.1080/13875868.2020.1768395*

Goodrich MA, Morse BS, Gerhardt D, Cooper JL, Quigley M, Adams JA & Humphrey C 2008, *Supporting wilderness search and rescue using a camera-equipped mini UAV. Journal of Field Robotics, vol. 25, nos. 1–2, pp.89–110.*

Gurtner YK 2014, *It's more than tourism: investigating integrated crisis management and recovery in tourist reliant destinations: case studies of Bali and Phuket. PhD thesis, James Cook University. doi:10.25903/96va-1562*

Hill KA 1998, T*he psychology of lost. In: Lost Person Behavior, pp.1–15.*

Jeuring J & Becken S 2013, *Tourists and severe weather–An exploration of the role of 'Locus of Responsibility'in protective behaviour decisions. Tourism Management, vol. 37, pp.193–202.*

Koester RJ 2008a, *Lost Person Behavior: A Search and Rescue. dbs Productions LLC.*

Koester RJ 2008b, *Lost Person Behavior: A search and rescue guide on where to look-for land, air and water. dbS Productions LLC. Charlottesville, VA, August.*

Leiper N 1979, *The framework of tourism: Towards a definition of tourism, tourist, and the tourist industry. Annals of Tourism Research, vol. 6, no. 4, pp.390–407.*

Maxwell JA 2005, *Qualitative research design: an interactive approach (2nd ed.). Thousand Oaks, CA: Sage Publications.*

McCabe S 2005, *Who is a tourist?: A critical review. Tourist Studies, vol. 5, no. 1, pp.85–106. doi:10.1177/1468797605062716*

Montello DR 2020, *Geographic orientation, disorientation, and misorientation: a commentary on Fernandez Velasco and Casati. Spatial Cognition and Computation, vol. 20, no. 4, pp.306–313. doi:10.1080/13875868.2020.1767105*

Neuman WL 2014, *Social Research Methods: Qualitative And Quantitative Approaches. Harlow: Pearson Education.*

Sava E, Twardy C, Koester R & Sonwalkar M 2016, *Evaluating Lost Person Behavior Models. Transactions in GIS, vol. 20, no. 1, pp.38–53. doi:10.1111/tgis.12143*

Schwartz S 2022, *Get lost! Safeguarding lost tourists in wilderness environments. Australian Journal of Emergency Management, vol. 37, no. 2, pp.63–67. doi:10.47389/37.2.63*

Scott G & Scott H 2008, *An economic assessment of the voluntary land search and rescue sector in New Zealand. Australian Journal of Emergency Management, vol. 23, no. 3, pp.49–57. At: https://ajem.infoservices.com.au/items/AJEM-23-03-09.*

Syrotuck W & Syrotuck J 2000, *Analysis of Lost Person Behavior: An Aid to Search Planning, Barkleigh Productions. Philadelphia, USA.*

Twardy C, Koester R & Gatt R 2006, *Missing Person Behaviour An Australian Study. Final Report to the Australian National SAR Council, vol. 72.*

Whitehead J 2015, *Search and rescue in Australia. Australian Journal of Emergency Management, vol. 30, no. 1, pp.43–45.*

Yu X, Kim N, Chen C-C & Schwartz Z 2012, *Are you a tourist? Tourism definition from the tourist perspective. Tourism Analysis, vol. 17, no 4, pp.445–457.*

About the author

Steven Schwartz is a researcher with the Centre of Disaster Studies at James Cook University. He is in the final year of a PhD in lost person behaviour. He is exploring the lost wilderness tourist experience through the eyes of lost people and other stakeholders. Outside of academia Steve has also been involved in numerous search and rescue operations in Far North Queensland, Australia as a volunteer. Through his unique blend of academic and practical insights Steve hopes to help reduce the trauma associated with lost person events in wilderness areas.

Fear and Wonder: a climate podcast

Fear and Wonder is a climate podcast by *The Conversation* that looks inside the climate report by the United Nations through the hearts and minds of the scientists who wrote it. The sixth report from the UN's Intergovernmental Panel on Climate Change (IPCC) is an analysis of humanity's impact on the conditions for life on Earth. The report took hundreds of climate experts from all over the world 4 years to write, drawing on decades of prior knowledge.

Fear and Wonder is hosted by Joelle Gergis, a climate scientist and lead author for the IPCC and her friend, Michael Green, an award-winning journalist. Together they interview a broad range of expects to unpack the density and complexity of the IPCC Synthesis Report, which draws together the findings of the previous IPCC Working Groups and Special Reports.

Across 9 episodes, the podcast explores climate drivers and risks, impacts on life on earth, new technologies and solutions and the ethical implications for addressing the global challenge of climate change.

The full series of Fear and Wonder is available through podcast apps or via *The Conversation* website: https://theconversation.com/introducing-fear-and-wonder-the-conversations-new-climate-podcast-200066.

The National Indigenous Disaster Resilience Summit will bring together Indigenous and non-Indigenous researchers, emergency management practitioners, and agency heads, to build awareness, share new thinking, and network, beginning the long-overdue conversation between and about Indigenous peoples disaster resilience. The Summit is hosted by Monash University's Fire to Flourish.

National Indigenous Disaster Resilience Summit

Monday, 21 August 2023 Customs House, 399 Queen St, Brisbane

The Summit is a unique opportunity for Indigenous community leaders, organisations, agency staff, researchers, and more, to share experiences from recent events and shine a light on best practice responses. The Summit presents a unique opportunity to connect Indigenous people with key non-Indigenous stakeholders including resilience organisations, agency staff, researchers, and government, to connect, learn, and identify ways to strengthen their common work.

FIRE to FLOURISH