Australian Government
Attorney-General's Department
Emergency Management Australia

AUSTRALIAN JOURNAL OF EMERGENCY MANAGEMENT

ISSN: 1324 1540 | Australian Emergency Management Institute | Volume 29 I No. 4 I October 2014

DISASTER RESILIENT AUSTRALIA
GET READY

Contents

Volume 29 | No. 4 | October 2014

Some contributions to the *Australian Journal of Emergency Management* are reviewed. Academic papers (denoted by Ⓡ) are peer reviewed to appropriate academic standards by independent, qualified experts.

AUSTRALIAN JOURNAL OF EMERGENCY MANAGEMENT

Vol. 29 No. 4, October 2014, ISSN: 1324 1540

PUBLISHER

The *Australian Journal of Emergency Management* is published by the Australian Government Attorney-General's Department. The Journal is published on the Australian Emergency Management website at www.em.gov.au.

COVER

Wellington City Mayor Celia Wade-Brown and Councillor Paul Eagle help launch the Tsunami Blue Lines in Owhiro Bay, NZ. The Blue Lines are a community-driven initiative developed by local residents and facilitated by the Wellington Region Emergency Management Office, to mark a Tsunami Safe Zone. This simple and powerful approach replaces traditional signage for locals and visitors. The blue line painted across the road marks the maximum run-up height of a local tsunami. The International Associations for Emergency Managers recognised the value of the model with the Global Award for Public Awareness in 2012. To learn more about how resilience is being enhanced in Wellington, see page 55.

ABOUT THE JOURNAL

The *Australian Journal of Emergency Management* is Australia's premier Journal in emergency management. Its format and content is 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 and 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 roles of Emergency Management Australia (EMA) and the Australian Emergency Management Institute (AEMI) 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 emphasises empirical reports but may include specialised theoretical, methodological, case study and review papers and opinion pieces. The views in this journal are not necessarily the views of the Attorney-General's Department.

CIRCULATION

Approximate circulation (print and electronic): 5 500.

PUBLICATION DEADLINE

The Journal is published on the last day of January, April, July and October each year. Copies of the Journal are distributed quarterly without charge to subscribers throughout Australia and overseas.

SUBMISSIONS

The ***Australian Journal of Emergency Management*** welcomes submissions. The Contributors' Guidelines are available at www.em.gov.au/ajem. In brief, contributions should be no longer than 3 000 words, be submitted as a Word file and contain photographs, graphs and tables in their original software applications as separate files. All articles must contain an abstract and a small 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@ag.gov.au. All academic papers are peer reviewed. Please note that the *Australian Journal of Emergency Management* is indexed by several indexing organisations throughout the world, please visit our website for details.

SUBSCRIPTIONS

For new subscriptions please visit us online at https://ema.infoservices.com.au/member/new.

Changes to current subscription details can also be made by visiting us online at https://ema.infoservices.com.au/member.

CONTACT US

Mail: *Australian Journal of Emergency Management*
Australian Emergency Management Institute
Main Road, MT. MACEDON VIC 3441
Email: ajem@ag.gov.au
Phone: 0409 823 344 (editorial enquiries only)

DISASTER RESILIENT AUSTRALIA
GET READY

Foreword

By Margareta Wahlström, Head, United Nations Office for Disaster Risk Reduction and Secretary-General's Special Representative for Disaster Risk Reduction

Forty years after the town of Darwin was practically destroyed in a cyclone which took 71 lives and left thousands homeless in 1974, Australia today is in the vanguard of disaster risk management when it comes to making it a national and local priority. This is illustrated, for instance, by the fact that Emergency Management Australia is already anticipating the possibility of an El Niño event later this year and the attendant prospect of drought and another challenging season of bushfires.

Australia is a role model for many other countries in terms of the laser-like focus brought to bear on major disaster events and extracting the lessons learned and putting them into action in very practical ways, which help to reduce future risk.

An outstanding example of Australia's willingness to tackle the underlying drivers of risk was the introduction of stronger building codes in the mid-'80s following the devastation caused by *Cyclone Tracy* in Darwin. Another tragic anniversary which will be marked this year in Australia, the region and further afield, is the 2004 Indian Ocean tsunami which caused 230 000 deaths, disrupted millions of lives, and caused huge economic losses.

Again, Australia responded. That response has included the establishment of the Joint Australian Tsunami Warning Centre operated by Geoscience Australia and the Bureau of Meteorology. It's based in Melbourne and Canberra; Canberra being a role model city[1] for the 2 000-plus members of UNISDR's Making Cities Resilient campaign when it comes to preparing for, and responding to disasters. The two agencies have the necessary scientific expertise and the technology for seismic and sea-level monitoring and tsunami modelling to provide a 24/7 service, which gives emergency managers at least 90 minutes notice of potential impact on Australia's coastline. It also helps serve the early warning needs of the wider region.

Knowledge, education and innovation are a hallmark of many developments in Australia's multi-hazard approach to disaster risk. The dispatch of researchers into the field within five days of the 2009 Black Saturday bushfires in Victoria has produced outstanding insights into bushfire management that benefits firefighters and emergency management services around the world.

All of this is to say that Australia is a leading example of a country that has made significant progress across the board in implementing the five priorities of the *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters* (HFA).

The HFA was approved by 168 countries represented at the last UN World Conference on Disaster Risk Reduction in 2005, propelled by the tragedy of the Indian Ocean tsunami. Later in the year it was endorsed unanimously at the UN General Assembly making it the world's first comprehensive agreement outlining what needs to be done to reduce the loss of life from disasters and the economic losses inflicted.

Alongside Australia's progress in HFA implementation as reported by the Attorney-General's Department through the UNISDR online monitor (available on UNISDR's PreventionWeb website), the country stands out for its adoption of 'a whole-of-nation' approach to disaster management through the *National Strategy for Disaster Resilience* adopted in February 2011.

The provision of high-level guidance on disaster management to federal, state, territory and local governments, business and community representatives, contributes greatly to Australia's efforts to save lives and reduce economic losses from disasters, which is now a major global challenge as we witness more extreme disaster events around the world, driven by urbanisation, population growth

1 Making Cities Resilient. At www.unisdr.org/campaign/resilientcities/cities/view/2982.

in hazard-prone locations, poverty, environmental degradation, poor land use, and inadequate building codes.

Thanks to its strong institutions and multi-hazard approach to managing risk, Australia is well-positioned to influence the HFA's successor, which will be adopted at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan, from March 12–15 in 2015. Australia's experience of implementing the *National Strategy for Disaster Resilience* will be key to that.

Australia is already contributing significantly to the formal and informal consultations which continue to take place under the aegis of the recently convened Inter-Governmental Preparatory Committee whose co-chairs have noted in the pre-zero draft of the Post-2015 Framework for Disaster Risk Reduction.

The urgency of grappling with the rapid exponential growth of exposure to disaster risk is brought home to us on a daily basis. Even if the world is experiencing some success at reducing the loss of lives in weather-related disaster events thanks to improved early warning systems and better preparedness, there is widespread concern about the steady escalation in economic losses from disasters.

Direct disaster losses are at least 50 per cent higher than internationally reported figures. The latest risk modelling estimates that losses so far this century are in the region of US$2.5 trillion. This is money that could be better invested in disaster resilient infrastructure and it is crucial that the public and private sectors work together to stop this wasteful haemorrhaging of investment funds. Thankfully business attitudes are starting to change in Australia and elsewhere. Embedding disaster risk management in business processes is increasingly seen as a key to resilience, competiveness and sustainability.

In the post-2015 development agenda, we are likely to see a new paradigm for disaster risk governance which will include the private sector in a more meaningful way than ever before. This makes sense when one considers that private investment largely determines disaster risk. In most economies 70-85 per cent of overall investment is made by the private sector including annual institutional investments worth more than US$80 trillion globally.

2015 is a year of opportunity to get major components of international development policy aligned in a way that integrates the complementary goals of tackling poverty, reducing disaster risk and mitigating climate change. New sustainable development goals will be adopted, and there will be a new agreement on climate change to complement the new framework for disaster risk reduction.

There is little doubt that Australia will play an important role in shaping this international architecture at the highest level.

Margareta Wahlström

Head, United Nations Office for Disaster Risk Reduction, Secretary-General's Special Representative for Disaster Risk Reduction

Post-2015 Framework for Disaster Risk Reduction

In December 2013, the United Nations General Assembly requested the Third World Conference on Disaster Risk Reduction be held in Sendai, Japan, from 14-18 March 2015 at the highest political level. Its objectives:

1. To complement the assessment and review the implementation of the HFA.
2. To consider the experience gained through the regional and national strategies/institutions and plans for disaster risk reduction.
3. To adopt a concise, focused, forward-looking and action-oriented post-2015 framework for disaster risk reduction.
4. To identify modalities of co-operation based on commitments to implement a post-2015 framework.
5. To determine modalities for periodic review of the implementation.

Based on previous frameworks, consultations, the mid-term review of the HFA, General Assembly resolutions, UNISDR documentation and statements received at the first session of the Preparatory Committee held in Geneva in July 2014, the co-chairs of the Preparatory Committee released the pre-zero draft of the Post-2015 Framework for Disaster Risk Reduction www.wcdrr.org/preparatory/post2015. Further consultations with all partners are taking place and the next meeting of the Preparatory Committee takes place in November.

Three strategic and mutually-reinforcing goals are being considered for the post-2015 framework; the prevention of disaster risk creation, the reduction of existing disaster risk, and the strengthening the disaster resilience of persons, communities and countries.

The year 2015 offers a generational opportunity. The post-2015 framework on disaster risk reduction, together with the sustainable development goals and a renewed agreement on climate change can provide the world, for the first time, with a comprehensive and risk-sensitive development agenda, one that lays the foundations for a more resilient planet in the 21st century.

UNISDR 13 October

INTERNATIONAL DAY FOR DISASTER RISK REDUCTION

www.unisdr.org/we/campaign/iddr

Online forums showcase three years of Bushfire CRC research

By Brenda Leahy, Bushfire CRC Communications Officer

Hundreds of participants from across the emergency management sector, both in Australia and internationally, have participated in the Bushfire CRC's Research To Drive Change series of online research forums held from May to October this year.

The series presented the findings of the Bushfire CRC's research program (2010-2014), delivering scientific insights into ways of making both communities and firefighters safe, as well as vastly improving forecasting and modelling. Other topics in the series included community safety, ecology, incident management and economics to aid decision-making.

Each of the forums involved a documentary-style video summarising the research findings, together with a *Fire Note* and in-depth research reports. These resources, together with a complete video of each forum, are available on the Bushfire CRC website for replay and downloading.

Next Generation Fire Prediction

One of the first forums covered Next Generation Fire Prediction, which proved to be one of the most popular. The forum was held in May 2014 with more than 120 people logging in on the day to join the researchers for the interactive webinar.

The collaborative research project produced the Fire Impact and Risk Evaluation Decision Support Tool (FireDST), a proof-of-concept simulation system that aimed to provide critical fire planning information to emergency services, government, and the public. FireDST is an advanced software program that could be used to understand the potential impacts a bushfire may have on community assets, infrastructure and people. FireDST demonstrates the prediction of probabilities of both neighbourhood and house loss, as well as the potential health impacts of bushfire smoke and the areas likely to be affected by a bushfire.

Paying the Price

The Paying the Price forum featured research that investigated the role of economics in the management of bushfire strategy and its execution.

Case studies of integrated assessment of fire risk management strategies in the Central Otago region of New Zealand and the Mount Lofty Ranges in South Australia were used to demonstrate how fire-prevention strategies could provide value for money.

A decision framework was developed to provide an integrated assessment of the benefits and costs of fire risk management strategies. The study highlighted the fire risk management strategies (including prescribed burning) that were likely to produce the highest benefit per dollar spent. The methodology offers valuable decision-making inputs into fire management programs.

Also discussed was the use of economic decision-making processes within fire and land management agencies. The research showed that economic evaluation was a useful tool for bushfire management, but remains under-utilised by agencies. A number of key actions were identified to increase the use of economic evaluation methods. These included:

- increasing economic expertise among bushfire management and policy professionals, and
- designing economic evaluations that connect to the broader social and political context of bushfire management decision-making.

Image: Bushfire CRC

Research investigated the economics of prescribed burning with case studies in South Australia and New Zealand.

Power to the People

The concept of shared responsibility and the broader implications for legislative, policy and planning processes were examined in the Power to the People forum. More than 90 participants logged on for the event. The aim of the research featured in the forum was to develop a deeper understanding of shared responsibility and the role of planning, policy and legislative processes as key drivers of change in risk management. The research also investigated emergency management policy and law, as well as urban planning and its role as communities expand into the rural/urban fringe.

What are you telling us?

The role and scope of communication in bushfire preparedness and response was the focus of the What are you Telling Us? forum. It explored ways to engage communities and individuals living in fire-prone areas in community safety initiatives.

The researchers, led by RMIT Professor Peter Fairbrother, examined the complexities of how people in these different localities organised and operated. The study investigated their formal and informal networks, and how individuals and groups within these 'social networks' relate and communicate with each other, as well as with emergency services agencies.

The researchers suggested that communication should be interactive and tailored to the complexity and diversity of each locality to have lasting and measurable impact. That diversity included a broad range of factors, such as differences by locality, class, economics, ethnicity, gender and age.

Image: Bushfire CRC

Communicating about bushfire was studied, exploring ways to engage communities and individuals living in fire-prone areas in community safety initiatives.

Living on the Edge

The Living on the Edge forum attracted more than 90 participants who joined the conversation about perceptions and reality of risk in bushfire prone communities.

Professor Ross Bradstock from the University of Wollongong and Associate Professor Ruth Beilin from the University of Melbourne, together with industry representative Mike Wouters of South Australia's Department of Environment, Water and Natural Resources, detailed extensive research findings on householder perceptions of fire risk and how these shaped bushfire preparedness.

Professor Bradstock's research indicated that people living in fire-prone areas recognised fire risk, but may have treated it as a lower priority than other lifestyle values and factors, such as lack of time, cost barriers, and aesthetic quality.

Dr Beilin's study provided a 'mud map' mechanism for householders to visualise and reflect on the fire risk in and around their properties so they could take action. The technique could be a useful tool for community safety educators to talk to people about fire risks and to identify ways to safeguard their properties and increase their chances of surviving a bushfire.

Fire in the Landscape

Fire and its impact on water, air and land featured in the Fire in the Landscape forum. This forum turned the spotlight on the findings of four key projects by University of Melbourne and University of Sydney. Researchers looked at the impact of fire on water quantity and quality and the changing nature of carbon stores (above and below the ground).

The first two studies focused on the role of planned and unplanned fire and the impact on water quality and quantity from catchment forests in south eastern Australia. The other two studies concentrated on the quantification of carbon losses during fire; a key issue emerging from climate change and increasing greenhouse gases within the atmosphere.

Other forums

The Thinking Under Fire forum investigated how people behave and make decisions in response to stressful conditions such as the threat of bushfire.

The Awake, Smoky and Hot! forum examined health and safety issues for frontline emergency management workers, including the impact of toxicity from fire emissions.

The Beyond the Incident forum investigated information flow, communication, capacity to adjust to emerging scenarios, breakdown in co-ordination, training and education, and how changes to these elements support more effective incident management.

The Bushfire CRC has now concluded, but embedding its research findings into agency practice continues. To replay all forums and documentary videos for free, visit www.bushfirecrc.com/drivechange.

Emergency Management in Federated Countries Workshop: international experts from federated countries meet in the spirit of 'learning from each other'

This article, supplied by the International Engagement Section, Emergency Management Australia, outlines the objective, agenda and outcome of the Emergency Management in Federated Countries Workshop held from 20 to 21 February 2014 at the Australian Emergency Management Institute, Victoria. It explains the background to the workshop and the development of the future Forum Paper, currently being authored by the Forum of Federations. This article demonstrates and celebrates the enhanced outcomes achieved when governments work effectively together to achieve common goals – especially when those goals are within a complex policy area such as emergency management in federated systems of government.

'Learning From Each Other'

This is the core principle of the Forum of Federations and the theme that underpinned the Emergency Management in Federated Countries Workshop held at the Australian Emergency Management Institute on 20-21 February 2014. Convened by the Forum of Federations in partnership with the Australian Government Attorney-General's Department, the workshop brought together a number of experts and senior officials from Australia, Canada, India, Pakistan and the United States to exchange perspectives on emergency management in a federated system of government. Through presentations and a series of facilitated group discussions, preceded by shared country-specific information on institutional arrangements on emergency management, the workshop explored issues around the delineation of responsibility among levels of government in managing disasters, the impact federalism has on emergency and disaster response, best practice, intergovernmental co-ordination and co-operation, challenges and successes.

Outcomes of the workshop were captured in a Forum of Federations Paper, which will serve as a position paper on emergency management in federated countries to inform future Forum work.

Hosted at the Australian Emergency Management Institute, the workshop was co-chaired by Mr Chris Collett, Assistant Secretary of the Crisis Coordination Branch, Emergency Management Australia (Attorney-General's Department) and Dr Rupak Chattopadhyay, President and CEO of the Forum of Federations.

The Forum of Federations

The Forum of Federations is an international governance organisation that promotes intergovernmental learning and best practice through its partnerships with ten federated countries. The Forum organises a number of knowledge sharing events each year to explore innovative solutions to challenges posed by multi-level governance in federal, devolved, and decentralised countries.
See www.forumfed.org.

Federalism and emergency management

Emergency management has become increasingly complex; as the frequency and impact of disasters increases, so too has the need, and ways in which, countries mitigate and recover from them. In federated countries, the constitutional division of powers and responsibilities between the federal government and the state governments presents additional complexities. As in Australia, emergency management in any large federated country is the responsibility of the states/territories/provinces with the federal/national government playing a major role in building and promoting disaster resilience, co-ordinating national strategic emergency management policy, co-ordinating operational support to the states/territories/provinces and providing emergency relief and recovery resources.

With the complexities of federated systems of government come challenges and opportunities to co-ordinate between the different governance levels and improve strategies for disaster prevention, mitigation, preparedness, response and recovery. In terms of response, the capability of state-level governments is critical. The federal government can provide support when local and state resources are overwhelmed.

Increasingly, modern emergency management policy also focuses on identifying and understanding risks and mitigating these risks through levels of government, community and individual action.

In addition, comparisons were made between the participating countries of the paradigm shift from a response and recovery focussed approach to an holistic framework in the PPRR spectrum. In Australia, the Federal Government is leading a national shift towards a whole-of-government, resilience-based approach to disaster management, which focuses on building community resilience through reducing community risks to disasters. Although Australia was the only country represented at the workshop that did not have a disaster management Act, the *National Strategy for Disaster Resilience*, endorsed by the Council of Australian Governments, provides the underpinning national level governance of emergency management.

Another common theme identified was that of all participating countries re-balancing funding towards preparedness and mitigation rather than response and recovery, acknowledging that risk reduction is not visible and resilience cannot readily be measured at the whole-of-nation level.

Workshop outline

The Emergency Management in Federated Countries Workshop provided a platform to build an international knowledge network encompassing the common challenges and innovative solutions for co-ordinating and managing natural disasters in federations. Key themes identified and discussed throughout the workshop included:

- the mismatch between responsibility/ownership for risk with the capacity to make decisions/changes
- funding responsibilities across levels of government
- engagement with the private and third sectors
- consistency across jurisdictions
- the role of the military and civil-military co-operation in disaster response
- policy paradigm shifts towards more sophisticated and whole-of-government approaches
- land use planning and its role in risk management, and
- growing community expectations.

Institutional emergency management arrangements

In preparation for the workshop, countries circulated an overarching information paper outlining their institutional emergency management arrangements, the assignment of operational and policy responsibilities in their country, existing emergency management structures, and the capacity and mandate of agencies dealing with disasters. An understanding of these enabled participants to attend the workshop with a broad awareness of each country's arrangements and the differences and commonalities between them.

Of the countries represented, all share a similar three-tiered structure of national/federal, state/territory/provincial and local/municipal/district government, with primary responsibility for disaster management assigned to the state/territory/provincial governments. In the case of the US, a four-tiered system, which includes a tribal level, recognising a trust relationship between Indian tribes and the US state and federal governments, and their right to self-govern.

Traditionally, emergency management in Canada has focused on preparedness and response. It is now recognised that addressing the modern hazard-scape requires all levels of government to deal with risks, hazards and vulnerabilities through prevention and mitigation as well as prudent recovery measures. Greater attention or investment in prevention and mitigation can prevent disasters or significantly reduce the social, economic and environmental costs and damages when events occur. Forward looking recovery measures allow communities not only to recover from recent disaster events, but also to build back better in order to help overcome risks and vulnerabilities in the future.

Under the 2007 framework, *An Emergency Management Framework for Canada*, federal, provincial and territory governments work together to develop national strategies to help each level of government advance their emergency management activities. The Canadian Council of Emergency Management Organisations (CCEMO) works to develop consensus and provide a voice for provinces and territories in order to develop a proactive national agenda. All levels of government have longstanding relationships with numerous domestic stakeholder organisations, such as the Canadian Red Cross, St John Ambulance and the Canadian Association of Fire Chiefs.

The *Disaster Management Act of Pakistan 2010* establishes the framework for emergency management in Pakistan. The National Disaster Management Commission (NDMC) is the apex policy making body in Pakistan, headed by the Prime Minister and including the Chief Executives of all provinces, key ministries and departments. Its functions include approving the *National Plan* and *Plans of Ministries*, finalising guidelines for federal and provincial governments, taking measures for prevention of disasters, mitigation, preparedness and capacity building. The National Disaster Management Authority (NDMA) is responsible for the preparation of the *National Plan* to be approved by the NDMC, laying down guidelines for policy formulation, co-ordination, implementation and monitoring of the entire spectrum of disaster management.

The NDMA's primary role is to facilitate and co-ordinate, however it intervenes whenever a disaster is beyond the capacity of local/provincial authorities. Otherwise, disaster management is devolved in Pakistan, and each province has its disaster

management authority and is responsible for disasters within their capacity. Local emergencies remain the responsibility of local or district governments.

In Australia, the Federal Government plays a significant part in building and promoting disaster resilience. It co-ordinates and provides operational support in emergency response to the states and territories and provides a national emergency relief and recovery framework on a cost-sharing basis with the other levels of government. Australia's emergency management arrangements bring together the efforts of all levels of government, private industry and volunteer agencies to deliver co-ordinated emergency management across all hazards. These arrangements are based on a high level of trust and co-operation between the community and emergency managers, building on common experiences dealing with disasters.

The United States Federal Government has legal authorities, fiscal resources, research capabilities, technical information and services, and specialised personnel to assist local, tribal and state agencies in responding to and recovering from emergencies and disasters. When an incident occurs that exceeds or is anticipated to exceed local or state resources – or when an incident is managed by federal departments or agencies acting under their own authorities – the federal government uses the National Response Framework (NRF) to involve all necessary departments and capabilities, organise the federal response, and ensure co-ordination with response partners.

The Federal Emergency Management Authority (FEMA) leads and supports the United States approach in a risk-based comprehensive emergency management system of preparedness that includes prevention, protection, response, recovery, and mitigation. Each state government has legal authority for emergency response and recovery and serves as the point of contact between local and federal governments. For certain types of federal assistance, tribal governments can opt to work with the state. Local government has responsibility for the safety of its people, knowledge of the situation and accompanying resource requirements, and proximity to both events and resources (within local government are emergency services departments that are capable of responding to emergencies 24 hours a day).

Following three mega disasters in 1999, 2001 and 2004, a paradigm shift in India's disaster management arrangements occurred. The *National Disaster Management Act 2005 of India* provides the framework for government agencies responsible for emergency management. The National Disaster Management Authority (NDMA) is responsible for laying down guidelines and approving plans prepared by ministers or departments. The National Executive Committee (NEC) is responsible for preparing the *National Plan*, co-ordinating and implementing national policy and NDMA guidelines and giving direction regarding the mitigation and preparedness measures to be taken by different ministries, departments and agencies. The National Institute of Disaster Management (NIDM) leads training and capacity building, research, documentation and development of the national information database on disasters. It also provides assistance to state governments in the formulation of state level policies for disaster management and the development of education materials. The State Disaster Management Authority (SDMA) and District Disaster Management Authority (DDMA) are responsible for implementing disaster management policies and ensuring measures for the prevention of disasters and mitigation of their effects.

Innovative policy case studies

Adding additional insight into recent policy initiatives, each country presented an innovative policy case study which closely examined a policy initiative that has moved emergency management forward across their federated system of government. Presentations identified the gap which was addressed by implementing the initiative, key considerations in its design and implementation, the role of the different levels of government in its implementation nation-wide, challenges, funding considerations and how it changed the way emergency management is governed in that country. A summary of each country's initiative follows.

India's National Disaster Response Force (NDRF) is a specialised response agency tasked with evacuations, search and rescue during natural disasters. The NDRF was created in 2009 by India's National Disaster Management Authority, in recognition that police, paramilitary, civil defence and fire services were ill-prepared to conduct specialised disaster response to disasters. At present, the NDRF consists of ten battalions consisting of Boarder Security Force, Central Reserve Police Force, Central Industrial Security Force and Indo-Tibetan Border Police. With a volunteer base of over 850 000 community volunteers, the NDRF restores roads, rail and other communication networks. More information can be found at http://ndrfandcd.gov.in/.

Canada's all-hazards National Public Alerting System (NPAS) provides emergency management organisations throughout the country with the capability to warn the public of imminent or unfolding hazards to life using radio, cable television and satellite television. A multi-jurisdictional approach using public/private partnerships for public alert collection and broadcasting processes, the NPAS initiative is an innovative and cost-effective means of ensuring authoritative warning messages reach as many Canadians as possible, as quickly as possible, in the event of a threat to their life or safety. While the approach lists many advantages, challenges include a lack of broadcaster participation under a voluntary system. Visit www.publicsafety.gc.ca/index-eng.aspx for further information.

The **USA National Preparedness System** is an organised process for the whole community – from families, to faith based groups, business and all levels of government – to move forward with preparedness

Forum of Federations Emergency Management in Federations Workshop participants.

activities with the aim of achieving the national preparedness goal 'A secure and resilient nation with the capabilities required across the whole community to prevent, protect against, mitigate, respond to, and recover from the threats and hazards that pose the greatest risk'. The system, detailed at www.fema.gov/national-preparedness-system, identifies and assesses risk, estimates the level of capabilities needed to address those risks, builds or sustains the required levels of capability, develops and implements plans to deliver those capabilities, monitors progress, and reviews and updates efforts to promote continuous improvement.

Pakistan has recently implemented the Cash Transfer Programme, under which the provincial and federal governments of Pakistan have provided cash assistance for human, property and income loss and injury as a result of the impact of disasters. As part of the program, cash compensation is paid in monthly instalments to help vulnerable families, particularly families headed by women, to rebuild their houses and livelihoods. The provincial and federal governments of Pakistan are currently jointly improving upon the program to ensure the speedy delivery and transparency of cash transfers as a means of disaster relief.

Australia presented the Council of Australian Government-endorsed national disaster resilience initiative. The *National Strategy for Disaster Resilience* emphasises understanding and communicating risk within government and the community. A broad and sophisticated work program is well underway, involving a wide range of projects to better identify and address risks, improve community engagement, build national capacity and improve recovery arrangements. One example is the development and publication of State Natural Disaster Risk Assessments. These assessments are underpinned by a nationally-agreed methodology for risk assessments, and are now informing ongoing mitigation work across jurisdictions. Further information on the *National Strategy for Disaster Resilience* can be found at: www.ag.gov.au/EmergencyManagement/Pages/NationalStrategyForDisasterResilience.aspx.

Implications for emergency management

The discussions and presentations that took place at the workshop informed the development of an academic Forum of Federations Paper outlining key discussions and learnings at the workshop. The Paper, authored by Dr P.G. Dhar Chakrabarti, Distinguished Fellow, Energy and Resources Institute, New Delhi, will form the basis of future international discussions on emergency management. The Forum's Secretariat and the Indian Government are consulting with the intention of holding the Forum's next international conference in India in 2014/15. The paper, *Workshop on Emergency Management in Federal Countries* will be presented at the Conference and will be available on the Forum of Federations website www.forumfed.org.

The workshop presented an opportunity to collaborate with a network of federated countries on emergency management, both at the workshop and externally, through the Forum of Federations network of partner governments. With a view to widen the network further, the workshop participants also considered new opportunities for engagement, including the possibility of holding an event in the margins of the Third United Nations World Conference on Disaster Risk Reduction in 2015.

As Mr Roger Wilkins AO (Secretary, Australian Government Attorney-General's Department) observed (Federalism and the Emergency Services, September 2009), *'real policy outcomes are enhanced when governments work together to achieve common objectives. Effective emergency management in a federated system requires sophisticated co-ordination and co-operation between the state and federal governments'*. The Emergency Management in Federated Countries Workshop also demonstrated inter-governmental co-ordination and co-operation on an international level: governments 'learning from each other' to reduce the threat that natural disasters pose to lives and property.

A podcast on the workshop can be found at https://itunes.apple.com/au/podcast/emergency-management-australia/id786783889.

Developing a model and tool to measure community disaster resilience

Professor Paul Arbon explains how his team developed a community-friendly toolkit that can be used by a community to understand their likely level of resilience in the face of disaster.

ABOUT THE AUTHORS

Professor Paul Arbon is the Director of Torrens Resilience Institute in Adelaide. His team members on this project were Professor Kristine Gebbie, Project Lead, Dr Lynette Cusack, Senior Lecturer, Dr Sugi Perera, Chief Project Officer, and Sarah Verdonk, Research Officer.

Introduction

The concept of 'community resilience' is widely used by community leaders, policy makers, emergency management practitioners and academics in Australia, but there is little agreement on its meaning and application. Despite its popularity, there are widely differing views on the meaning and utility of the resilient community concept. This lack of consensus undermines its usefulness when developing emergency and disaster management policies and plans at national, state, territory and local levels.

This paper discusses the development of a practical toolkit that can be used by communities to understand the likely level of resilience in the face of disaster. The toolkit takes an all-hazards approach and helps local policy makers to set priorities, allocate funds, and develop emergency and disaster management programs that build local community resilience.

The toolkit is the result of a project funded by the National Emergency Management Program (NEMP) that supports the 2009 Council of Australian Governments *National Disaster Resilience Statement* and the *National Strategy for Disaster Resilience.* The project was completed in several stages with the assistance of a National Advisory Committee and a project working group. A review of literature was used to develop a definition and model of community disaster resilience and a scorecard was designed to assess levels of existing community disaster resilience. Guidelines were constructed for its use. The definition, model and scorecard were reviewed and refined with the help of two communities before a final version was trialled in four communities across Australia (Northern Territory, Queensland, South Australia and Western Australia).

The feedback from those communities was used to finalise the scorecard and guidelines. The final version of the toolkit is available for use by communities interested in measuring their disaster resilience and supports them in plans to strengthen resilience in the future.

Background

In 2009 the Council of Australian Governments (COAG) agreed to adopt a whole-of-nation resilience-based approach to disaster management, which recognises that a national, co-ordinated and co-operative effort is required to enhance Australia's capacity to withstand and recover from emergencies and disasters. The *National Strategy for Disaster Resilience* (2011) sets out how the nation should achieve the COAG vision, emphasising that disaster resilience is not solely the domain of emergency services but requires society as a whole to be involved. In response, the Torrens Resilience Institute, a collaborative effort of the University of Adelaide, Cranfield University (UK), Flinders University, and the University of South Australia, developed a community disaster resilience model and assessment tool.

Defining disaster resilience

Generally, Australians have become more aware of the potential for a range of disastrous events to occur. There is a growing awareness that disaster readiness involves more than an efficient emergency service and rapid response capability during the acute phase of a catastrophic event. The process of recovery following an emergency takes time, and for some communities and families, much more time than others. In the world of individual psychology, the term 'resilience' is used to describe the trait that allows a person to move through a challenge, adapt if necessary and return to a (relatively) healthy state. The term is now being applied to whole communities. Community resilience is a process of continuous engagement that builds preparedness prior to a disaster and allows for a healthy recovery afterwards. Academic research is beginning to understand the complexities of this process, often using long-term studies and complex

measurements (Flanagan 2011, Longstaff 2010, Maguire *et al.* 2008, Zobel 2011). This project used the available research-based knowledge about resilience to create a model of community disaster resilience then translated that into a user-friendly tool that allows people to assess the current level of likely disaster resilience and create action plans to strengthen resilience in their community.

The scientific and grey literature reveals a wealth of information, definitions, frameworks and models of community resilience. Many articles provide tools that can be used by communities to build their overall resilience to issues that may affect their health and wellbeing (Cox *et al.* 2011, Emergency Volunteering 2011, Longstaff 2010, Mayunga 2007). Those articles that specifically consider community disaster resilience have a focus on individuals, community vulnerability and risk assessments (Fekete 2011, Fekete *et al.* 2009, Flanagan *et al.* 2012, Frommer *et al.* 2011, Insurance Council of Australia 2008, James Cook University 2010). Despite the range and depth of material, no standard definition of community disaster resilience was found, nor was there a published, validated tool that communities could easily use to assess their ability to prepare for an emergency event at the community level rather than the individual level.

Defining community

For the purpose of this project a community was defined as a group of people living together within a defined geographical and geopolitical area such as a town, district or council. The community disaster resilience toolkit is designed so that community members can collectively accept their roles to:

- foresee and/or acknowledge threats and risks
- work with emergency services organisations and other agencies
- invest in a 'sense of community' and social capital, and
- take responsibility to reduce the socio-economic impact of disruptive events, emergencies, and disasters.

Method

The project team worked on the tool in conjunction with a Project Advisory Committee and a project working group. The National Advisory Committee met quarterly, to oversee the general direction of the project, while the Working Group met in person or reviewed draft documents at varying intervals depending on the work being done.

Project Advisory Group - a national group with a broad perspective drawn from federal and state government. Members were:

- Chief Officer, State Emergency Services South Australia
- Project Officer, Community Engagement Sub-Committee National Emergency Management Committee Brisbane
- Assistant Secretary, Emergency Management Policy Branch, Attorney-General's Department
- Manager Policy and Strategy, SA Fire and Emergency Services (SAFECOM)
- Community Engagement Sub-Committee, National Emergency Management Committee
- Infrastructure and Emergency Management Adelaide
- Manager Policy and Strategy, SA Fire and Emergency Services (SAFECOM)
- Policy Manager, Department of the Premier and Cabinet Adelaide

Working Group – members drawn from the universities that comprise the Torrens Resilience Institute as well as other government and emergency sector representatives. They were chosen from different specialties to contribute their varied expertise, to assist with the development of the definition of community disaster resilience and the key elements of a model and criteria for the Scorecard. Members were:

- Manager of Community Development, Adelaide Hills Council
- Lecturer School of Education, Flinders University
- Manager of Health and Regulatory Services, Adelaide Hills Council
- Senior Lecturer, James Cook University, Human Geography Cairns
- Finance, Business School, Flinders University
- Director IT Services, University of Adelaide
- Structural Engineering, School of Civil, Environmental and Mining Engineering, University of Adelaide
- Board Member, Queensland Council of Social Services
- School of Social and Policy Studies, Flinders University
- Centre for International Security and Resilience Cranfield University, United Kingdom
- School of Medicine, Flinders University
- Director of Studies, University of Adelaide
- Senior Lecturer, School of Education, University of South Australia
- Griffith University

Based on the literature review the project working group identified reoccurring themes and concepts that informed the model of community disaster resilience (see Figure 1). The model is consistent with available research and identifies the overlapping relationships of community connectedness, risk/vulnerability, planning/ procedures and available resources as comprising a community's disaster resilience.

Source: www.torrensresilience.org

Figure 1: Community Disaster Resilience Model.

Using this model, questions that could illuminate each of the four components were drafted from the perspective of an informed community member rather than a research scholar. The response to each question would be a ranking on a five-point Likert scale, with the responses ranging from extremely low to very high. As with the questions themselves, this approach was deemed by the working group as the one most likely to work for informed community members using the toolkit. The initial draft of nearly 100 questions was reduced to 22 by the working group.

The scoring levels for each question were based on research where available or the best judgment of the working group based on research or knowledge and experience of communities and disasters. Where possible information such as the Census or locally-developed planning documents were used. Examples of the scoring options are presented in Table 1. If there was disagreement among committee members on a score, a lower rather than higher score was allocated as the disagreement itself is indicative that there is work to be done, and community engagement in follow-up activities is one goal of the process. Summary scoring consists of summing up the total points for questions in each section and then the total scorecard. This sum identifies whether the community has achieved only 25 per cent of the possible points (red or 'danger zone'), is in the middle 50 per cent of points (caution zone), or has ranked itself in the highest 25 per cent of points (green or 'going well').

The final 22 scorecard questions.

What proportion of your population is engaged with organisations (e.g. clubs, service groups, sports teams, churches, library)?

Do members of the community have access to a range of communication systems that allow information to flow during an emergency?

What is the level of communication between local governing body and population?

What is the relationship of your community with the larger region?

What is the degree of connectedness across community groups? (e.g. ethnicities/sub-cultures/age groups/ new residents not in your community when last disaster happened)

What are the known risks of all identified hazards in your community?

What are the trends in relative size of the permanent resident population and the daily population?

What is the rate of the resident population change in the last five years?

What proportion of the population has the capacity to independently move to safety? (e.g. non-institutionalised, mobile with own vehicle, adult)

What proportion of the resident population prefers communication in a language other than English?

Has the transient population (e.g. tourists, transient workers) been included in planning for response and recovery?

What is the risk that your community could be isolated during an emergency event?

To what extent and level are households within the community engaged in planning for disaster response and recovery?

Are there planned activities to reach the entire community about all-hazards resilience?

Does the community actually meet requirements for disaster readiness?

Do post-disaster event assessments change expectations or plans?

How comprehensive is the local infrastructure emergency protection plan? (e.g. water supply, sewerage, power system)

What proportion of population with skills useful in emergency response/ recovery (e.g. first aid, safe food handling) can be mobilised if needed?

To what extent are all educational institutions (public/ private schools, all levels including early child care) engaged in emergency preparedness education?

How are available medical and public health services included in emergency planning?

Are readily accessible locations available as evacuation or recovery centres (e.g. school halls, community or shopping centres, post office) and included in resilience strategy?

What is the level of food/water/fuel readily availability in the community?

Table 1: Example of the Scorecard.

Question	Score					Information resource
1.1 What proportion of your population is engaged with organisations (e.g., clubs, service groups, sports teams, churches, library)?	**1** <20%	**2** 21–40%	**3** 41–60%	**4** 61–80%	**5** 81–100%	Census
1.2 Do members of the community have access to a range of communication systems that allow information to flow during an emergency?	**1** Don't know	**2** Has limited access to a range of communication	**3** Has good access to a range of communication but damage resistance not known	**4** Has very good access to a range of communication and damage resistance is moderate	**5** Has wide range of access to damage-resistant communication	Self-assessment
1.3 What is the level of communication between local governing body and population?	**1** Passive (government participation only)	**2** Consultation	**3** Engagement	**4** Collaboration	**5** Active participation (community informs government on what is needed)	International Association for Public Participation (IAP2) Spectrum http://c.ymcdn.com/sites/www.iap2.org/resource/resmgr/imported/IAP2%20Spectrum_vertical.pdf
1.4 What is the relationship of your community with the larger region?	**1** No networks with other towns/region	**2** Informal networks with other towns/region	**3** Some representation at regional meetings	**4** Multiple representation at regional meetings	**5** Regular planning and activities with other towns/region	Self-assessment
1.5 What is the degree of connectedness across community groups? (e.g. ethnicities/ sub-cultures/age groups/new residents not in your community when last disaster happened)	**1** Little/no attention to subgroups in community	**2** Advertising of cultural/cross-cultural events	**3** Comprehensive inventory of cultural identity groups	**4** Community cross-cultural council with wide membership	**5** Support for and active involvement in cultural/cross-cultural events (in addition to previous)	Self-assessment tied to demographic profile; local survey to assess
Connectedness score	25% (5–10)	26–75% (11–29)	76–100% (20–25)			

Source: www.torrensresilience.org

The draft instrument was reviewed with members of two communities for clarity of language and the likelihood that a community committee could reach consensus on a score. The final test version of the scorecard, with instructions, was reviewed and approved by the Project Advisory Committee.

The Project Advisory Committee approved a set of pilot communities in different risk zones and of various sizes. No large urban areas were included due to concerns about meeting project deadlines. Possible test communities were contacted through the appropriate head of local government. Of these communities, six expressed interest and four were able to complete the Scorecard and provide feedback on the instructions, the process and the tool itself within the project's timeframe. Each community identified a community committee of 10–15 members that would meet three times to complete the Scorecard and give feedback to the project team. Two members of the project team went to each test community for the first meeting of the community committee to provide an orientation and answer questions about the Scorecard. It was explained to the committee that they might meet within a two-week timeframe to complete a draft score and then two weeks later for a final scoring meeting and evaluation. Two members of the project team subsequently attended this final meeting in each community to gather observations and comments from the participants.

Assessment of feedback from the test sites on the model and the tool was based on responses to a series of questions asked of all focus group participants. Because the Scorecard was not a research instrument but a means of informing and engaging community members, participants were asked whether or not they thought the components in the Scorecard adequately assessed community disaster resilience as they understood it. An additional individual evaluation form and a self-addressed envelope were left for members to complete and return, however very few individual responses were received. As such, evaluation is based primarily on the community group discussions.

The support of local government personnel was consistently excellent in all communities participating as trial sites. The experience of the test communities highlighted the importance of the local government's role in supporting this initiative by bringing the Community Scorecard Working Group together, providing the venue and, in particular, the personnel to co-ordinate the meetings and access information from the databases, which many of the community members were not familiar with.

Outcomes

The trial of the Scorecard was extremely valuable and the feedback allowed refinements to the instructions and the Scorecard. The conclusion voiced by communities and reached by the project team was that the user-friendly Scorecard is a workable tool for people to both assess their community disaster resilience and come together to plan what might further strengthen resilience.

The definition of community disaster resilience was thought to be understandable and the four components of disaster resilience, the questions and criteria, were

considered appropriate measures of resilience. The suggested process of the three community meetings was regarded as sufficient and the Community Scorecard Working Group members reported enjoying the discussions that the scoring generated. They found them as valuable as the final score itself, affirming the positive process nature of community resilience building.

The actions taken in this process can feed into a cycle of quality improvement for local government and local emergency services. A critical point identified is that outcomes must be shared with the wider community in a way that engages their interest. Because this was an initial application of the toolkit, follow-up with communities over a period of a year or more would allow a more definitive assessment of whether or not the engagement was sustained and identified improvements made.

The final Scorecard with toolkit is available under the 'Tools' tab on the Torrens Resilience Institute website: www.torrensresilience.org and includes:

- an introduction to the kit and the process
- instructions for a local government unit on getting the process started, including suggestion on potential members of a scorecard working group
- a working copy of the scorecard for duplication and distribution to the working group
- a master copy of the scorecard, to be completed by group consensus, and
- information on scorecard review and evaluation.

The remaining challenge is to encourage community participation in the scorecard process and to maintain the motivation of communities to accept collective responsibility to reduce the destructive impact of disruptive events, emergencies and disasters.

References

Cox RS & Perry K-ME 2011, *Like a fish out of water: reconsidering disaster recovery and the role of place and social capital in community disaster resilience, American Journal Community Psychology vol. 48, pp. 395-411.*

Emergency Volunteering 2011, *Disaster Readiness Index. Volunteering Qld. & Emergency Management Queensland. Interactive Website. At: http://www.emergencyvolunteering.com.au/home/disaster-ready/menu/readiness-index, [April 2012].*

Fekete A 2011, *Common Criteria for the Assessment of Critical Infrastructures International Journal Disaster Risk Science vol 2, no.1, pp. 15-24.*

Fekete A, Damm M & Birkmann J 2009, *Scales as a Challenge for Vulnerability Assessment Natural Hazards, 55 (2010), Springer Science + Business Media, pp. 729-747.*

Flanagan BE, Gregory EW, Hallisey EJ, Heitgerd JL & Lewis B 2011, *A Social Vulnerability Index for Disaster Management. Journal of Homeland Security and Emergency Management: vol. 8, p 1, Article 3 Berkeley Electronic Press.*

Frommer B 2011, *Climate Change and the Resilient Society: Utopia or Realistic Option for German Regions? Natural Hazards, 58, Springer Science + Business Media, pp. 85-101.*

Insurance Council of Australia 2008, *Improving Community Resilience to Extreme Weather Events, Insurance Council of Australia, Sydney.*

James Cook University 2010, *Know your Patch to Grow your Patch. Understanding Communities Project Bushfire. CRC and Centre for Disaster Studies, James Cook University.*

Maguire B & Cartwright S 2008, *Assessing a Community's Capacity to Manage Change: A Resilience Approach to Social Assessment Bureau of Rural Sciences, Commonwealth of Australia.*

Longstaff PH, Armstrong NJ & Perrin K 2010, *Building Resilient Communities: Tools for Assessment (White Paper). Syracuse, NY: Institute for National Security and Counterterrorism (INSCT).*

Maguire B & Cartwright S 2008, *Assessing a Community's Capacity to Manage Change: A Resilience Approach to Social Assessment Bureau of Rural Sciences, Commonwealth of Australia.*

Mayunga JS 2007, *Understanding and Applying the Concept of Community Disaster Resilience: A Capital Based Approach Summer Academy for Social Vulnerability and Resilience Building, Munich.*

Zobel CW 2011, *Representing Perceived Tradeoffs in Defining Disaster Resilience Decision Support Systems, 50 Elsevier, pp. 394-403.*

The Community Disaster Resilience Scorecard was completed with funding provided under the Australian Government National Emergency Management Program Grant scheme. The full project report, the toolkit and associated guidance are available under 'Tools' on the Institute website at

www.torrensresilience.org

Investigation rural community communication for flood and bushfire preparedness

Dr Helen Boon, James Cook University, presents findings on the communication preferences that link to preparedness activities for residents in two Australian towns.

ABSTRACT

Communicating risk is vital so that communities can prepare to meet approaching natural hazards. This study examined access to emergency communications and subsequent levels of preparedness in two rural Australian communities, Ingham in Queensland and Beechworth in Victoria. In 2009 these towns experienced a flood and fire disaster respectively. Focus interview data were used to design a survey which was completed by 546 respondents across the two communities. Results showed that preparedness was most strongly predicted when emergency communications were received from neighbourhood and community member sources rather than the media or other organisations. Findings also highlighted that communities are inherently different and need targeted emergency communications, tailored to the disaster type and community composition. In particular, the elderly and the unemployed reported social isolation and less access to mobile phone and internet communications. The findings show that emergency communications need to be two-way so that those at risk in an emergency can access specific advice about their household and what action to take to protect themselves and their property. Neighbourhood influences appear to be important in mobilising preparedness actions in the two communities studied.

Introduction

The most recent Intergovernmental Panel on Climate Change (IPCC) (2013) report predicted that Australia will sustain more frequent and/or severe wildfires, droughts, cyclones and floods. Such predictions tip many rural communities into vulnerability even before social community characteristics are considered. It therefore becomes imperative for emergency managers to know how to deliver risk communications so communities can prepare for approaching natural hazards. Research has shown that disaster preparedness is positively associated with risk perceptions (Miceli, Sotgiu & Settanni 2008) which in turn are dependent on trusted risk communications (Reininger *et al.* 2013). The importance of risk communications and their mediating factors on preparedness has been highlighted since Mileti and Fitzpatrick (1992) conducted a large scale study to examine the effectiveness of risk information for earthquake preparedness in the US. They found that risk information was most effective when it was reinforced with additional communication and/or social cues which then led to an active personal search for more information, and a constructed personal meaning of risk and what to do. These social constructions then directed personal preparedness actions.

Communication is woven into the disaster management cycle. This occurs at various stages in the cycle but the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) & International Strategy for Disaster Reduction (UNISDR) (2012) emphasis on disaster reduction and preparedness means that effective engagement at the pre-disaster stage is most critical in reducing negative disaster impacts. In his White Paper on Risk Governance, Renn (2005) emphasised the importance of adjusting risk communications to the specific needs of the people. In this way, people are better able to evaluate risks and make informed decisions about preparedness and personal safety measures. Martens *et al.* (2009) also argued for more attention to the heterogeneity of the public. Simply providing the same message to all individuals at risk is not enough because they may perceive this information differently and respond in different ways (Handmer 2002).

Handmer (2002) emphasised that risk communication must be meaningful, and perceived to be relevant to the recipients. Community diversity based on, for example, experiences, ethnicity, length of residence in the community, socio-economic status, or disability leads to different priorities, languages and levels of understanding, making shared meaning difficult to achieve (Handmer 2002). People are subject to complex socio-psychological processes which partly explain why and how they respond to warnings; they rarely respond in a straightforward 'stimulus–response' manner (Parker, Priest & Tapsell 2009). As Paton (2008) argued, preparedness occurs as a result of social cognitive processes (Paton 2000, 2003). People actively evaluate information about hazards, the actions required of them to mitigate the hazard's effects, and the sources that provide the information before taking appropriate steps to prepare.

Warnings are interpreted and evaluated in both a social context and the context of experience and they may not generate the expected response. Prior experience with, for example, flooding might lead to hypersensitivity to rain and immediate responses (Handmer 2002) or a need to confirm a warning with neighbours because of past 'false warnings' and a loss of trust in the organisations issuing the warnings (Parker *et al.* 2009).

López-Marrero (2010) analysed preparedness measures in two flood-prone communities in Puerto Rico concluding that beliefs that floods were getting less common along with a reliance on structural state interventions for flood protection, reduced householder perceived risks associated with future floods and diminished the willingness to take precautionary measures. Gissing, Keys and Opper (2010, p. 41-42) examined flood preparedness in Australia and cited previous research that found

> *'weaknesses in Australian flood warning practices are cultural rather than technical, with flood warning products under-used by a combination of poor attention given to flood warning practice and a response-biased (as distinct from preparedness-focused) culture in which proactive flood emergency management is not valued.'*

Nicolopoulos and Hansen (2009) found considerable differences across Australia in levels of disaster preparedness for a range of disasters, and between metropolitan and other areas. They also cited research highlighting how the experience of a disaster, and perceptions of how controllable the disaster is, can affect people's preparedness. They argue for tailored preparedness programs to targeted communities based on community characteristics. More recently Burnside-Lawry, Akama and Rogers (2013) argue for better understanding of how different communities are composed—especially the content and form of 'communication capacity' in different locations. And, after an extensive review of the communication literature about flood risks, Kellens *et al.* (2013) recommended that more research should be conducted on people's preferred information channels for risk information. This is important if emergency communication is to reach all community members, including those most vulnerable, the elderly, the socially disadvantaged, those with disabilities, or groups that might have difficulties with the dominant language. Identifying the best, most suitable channel for emergency information for an intended audience is critical for emergency management planning, particularly in an age of evolving communication technologies. Mobile phone and internet use are growing in popularity and authority during emergency situations. Previously underestimated, they now have prominence in the communication media of modern societies (Murthy 2013) and potential importance in relation to disaster emergency communication (Goudie 2013).

In terms of communicating risk to vulnerable communities emergency managers need to know which emergency information is going to be accessed and acted on. Rural communities, defined as having population densities below 150 inhabitants/km^2 (OECD 1994) are geographically, demographically and culturally different (Donehower, Hogg & Schell 2011). These differences are important during emergency situations when local governments and other agencies work with emergency management planners to help communities meet their own needs for information by connecting with them in a process that allows a two-way interaction (Handmer 2002, Nicholls 2010). Often there is resistance to emergency warnings; 'a wait and see' attitude is not conducive to risk preparation. This makes persuasive and trustworthy communication an imperative to help initiate action and also, just as importantly, to help with the sorts of actions necessary for householder safety needs (Nicholls 2010). For example, a TV or radio announcement about an impending natural hazard with a free call number so that specific questions can be posed is more likely to result in preparedness actions because householders can address particular concerns to their personal circumstances. This, in turn, can provide authorities with a better idea of particular needs and concerns of groups and can lead to more targeted information provision, or response, which could be important for particular vulnerable groups such as the elderly or disabled.

Research focus

The research described here examined emergency communications in two Australian rural communities impacted by flood and fire emergencies respectively. The aim was to find out what communications residents accessed and the links with preparedness and demographic characteristics. Little prior research appears to have been done in the context of small Australian disaster-impacted communities to examine these issues. The selected communities of Beechworth, Victoria (population 4 218 and population density of 22 inhabitants/km^2) and Ingham, Queensland (population 4 768 and population density of 115 inhabitants/km^2) experienced bushfires and floods respectively in February 2009. These sites were selected because they could provide valuable empirical

data about their *actual* preparedness and experiences rather than their *intentions* in a future hazard scenario.

The study was part of a project that examined community resilience to disaster using Bronfenbrenner's bioecological systems theory as a guiding framework (Boon *et al.* 2012). The research gathered empirical data about sources of risk communication used by community members and the links to subsequent preparedness factors, *not merely intentions to prepare*. To obtain accurate contextual data from each community, a mixed methods approach was employed, based on the precept 'the question dictates the method' (Cresswell 2003). Interview data was used to inform in situ the body of risk information literature, followed by a survey to generalise findings.

Methods

Focus group interviews were conducted with *key stakeholders* selected because of their involvement with the disaster and with *community groups* to gather information about individual experiences. Key stakeholders and focus group members for Ingham were Queensland Health, the local Chamber of Commerce, local community support organisations, cane farmers, social workers, Queensland Police, Hinchinbrook Shire Council, Emergency Management Queensland, local government, local aged care facility, local medical centre, and the business community. For Beechworth the key stakeholders and focus group members were the Beechworth Neighbourhood Centre, Beechworth Chamber of Commerce, Bushfire Youth Development Officer, Emergency Management Planning Committee, Community Strengthening Project, Community Planning, Municipal Recovery Manager, Bruarong Hall Committee member, Community Care officer, orchardists, Beechworth Country Fire Authority (CFA), Beechworth Health Service's Planned Activity Group, and local farmers.

In late 2010, 40 Beechworth residents and 79 Ingham residents volunteered to participate in focus interviews using semi-structured interview schedules. Interviews lasted 45-60 minutes and were recorded and transcribed. Key informant notes and focus group transcripts were analysed using qualitative techniques as described by Patton (2002). The content analysis process involved identifying, coding and categorising the primary patterns in the data as they appeared. Responses from key informants and focus groups were analysed in the same way, with key issues and themes coded and compiled. Transcript analyses involved interpretations by two researchers, ensuring investigator triangulation was imposed on the interpretation process within each of the research sites, then across both research sites, to derive common elements. These were used to construct the survey questions. The surveys were piloted and validated using a geographically distinct sample of people who had experienced *Cyclone Yasi*. Final surveys were distributed in each study community from October 2011 to February 2012. Randomised cluster sampling was used to select participating households (Burns 2000). Research assistants approached households identified on map grid points, hand-delivered surveys to occupants, and collected them by arrangement. Surveys were completed only by householders who confirmed they had been through the disaster. The survey response rate was 92 per cent.

The survey comprised eight questions about emergency communications prefaced by the stem: *'I got critical information at regular intervals during the event from'*:

- neighbours or people in my local community
- friends or family
- my local council
- the Country Fire Authority (CFA)/SES
- state government agencies
- my mobile phone
- internet websites
- the radio and television

Additionally the item *'I received the first warning in time to prepare for the event'* was included.

A further seven items assessed resident retrospective preparedness. They were:

- I prepared/secured my home/property well.
- I was prepared to deal with the physical impact of the event.
- I was aware of evacuation routes and centres for my area.
- I had a fire action plan/household emergency plan to follow.
- I had an emergency kit to use in the event.
- I felt I knew enough about how to best prepare myself and my property for the floods/fires.
- I was prepared to deal with the emotional impact of the event.

Responses were collected on a Likert scale coded 1 (Definitely Disagree) to 4 (Definitely Agree). Analyses were conducted on IBM SPSS 20 software.

Results

Table 1 shows some demographic characteristics of the two communities. Analyses of variance (ANOVA) conducted across the whole sample examining sources of communication and preparedness indicators showed significant differences between the two communities (Figures 1 and 2, Table 2). The only similarities were that in both communities 'TV and Radio' were the most highly accessed source of emergency communication and similar proportions of householders had fire or flood emergency plans.

Table 1: Sample characteristics by community.

	Gender		Current Age (Years)				Length of residence in community (Years)					Employed during the event	
	Male (%)	Female (%)	18–25 (%)	26-40 (%)	41-55 (%)	55+ (%)	2-5 (%)	5.5-10 (%)	11-20 (%)	21-44 (%)	45 + (%)	No (%)	Yes (%)
Ingham (N= 287)	34.6	65.4	8.9	15.6	41.1	34.4	10.2	9.8	14.9	34.5	30.5	17.4	82.6
Beechworth (N=249)	35.0	65.0	2.5	16.3	25.5	55.6	15.4	20.3	21.2	28.2	14.9	22.8	77.2

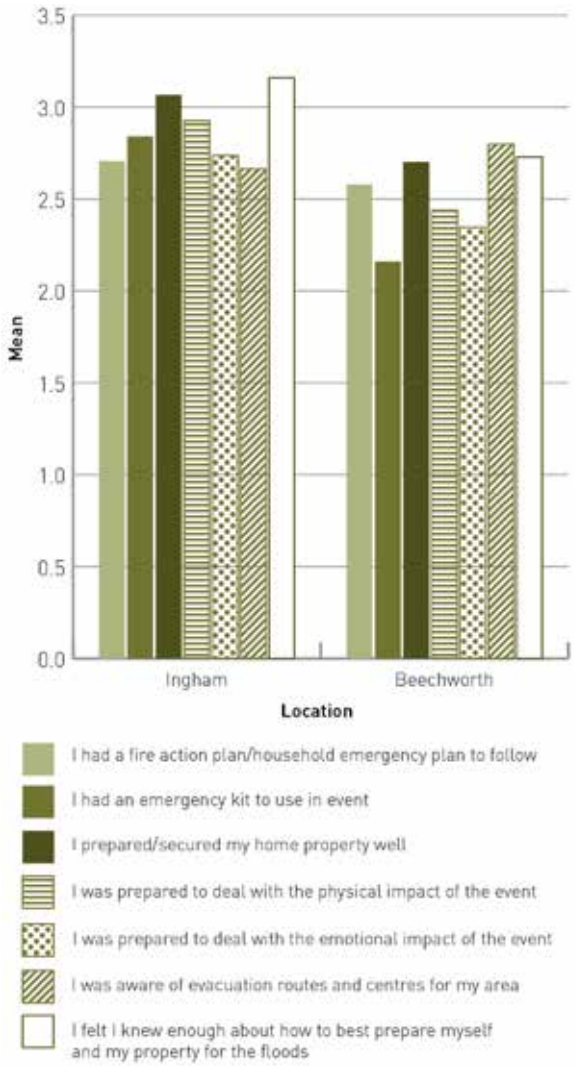


Figure 1: Means of preparedness indicators (lower means indicate less preparedness).

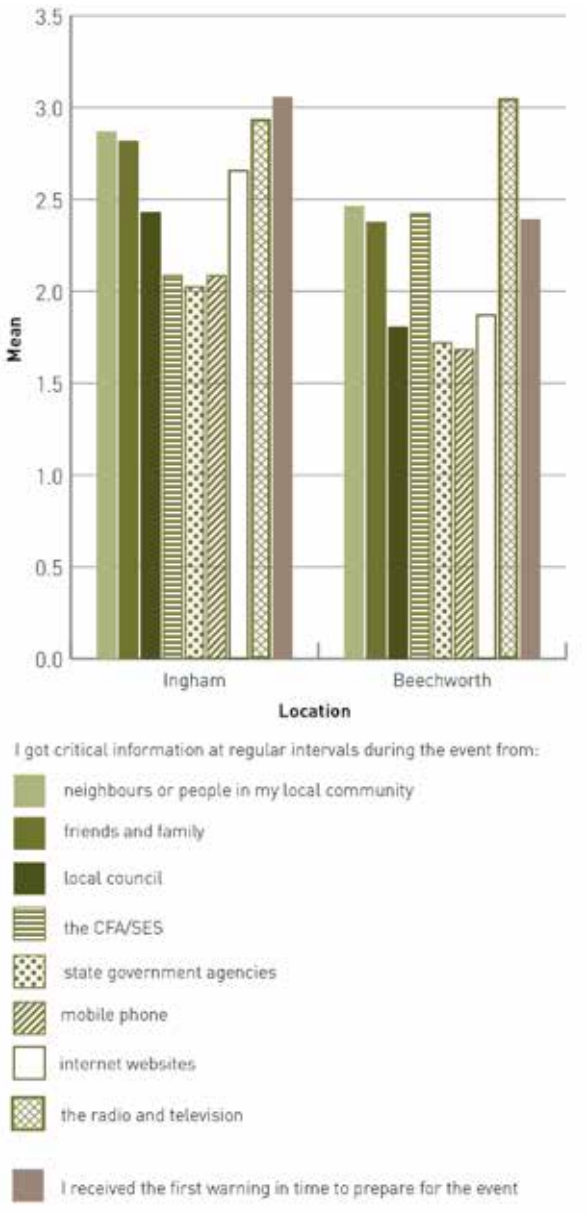


Figure 2: Means of communication timing and sources by community (lower means indicate lower use of the communication type).

Table 2: Preparedness and communications ANOVA results across communities (N=536).

Indicator	F- ratio
I was prepared to deal with the physical impact of the event.	29.60**
I was aware of evacuation routes and centres for my area.	3.92*
I prepared/secured my home/property well.	15.50**
I had a fire action plan/household emergency plan to follow.	NS
I had an emergency kit to use in event.	49.25**
I felt I knew enough about how to best prepare myself and my property for the floods/fires.	27.86**
I was prepared to deal with the emotional impact of the event.	21.75**
I received the first warning in time to prepare for the event.	50.73**
I got critical information at regular intervals from:	
Neighbours or people in my local community	12.97**
Friends or family	18.52**
My local council	41.62**
The CFA/SES	8.63**
State government agencies	8.22**
Mobile phone	18.73**
Internet websites	50.76**
The radio and television	NS

*Significant at p < .05 level; ** Significant at p < .001 level.

A correlation analysis to examine which modes of emergency communications were linked to preparedness (Tables 3 and 4) showed while both groups endorsed 'Radio and TV' most, it did not predict preparedness (r= 0 - 0.2). In Ingham, preparedness was predicted by communications received via:

- the internet, suggesting a proactive approach to risk assessment and access to internet-based communications, a factor associated with higher socioeconomic status, and
- neighbours, friends, family/community members.

By contrast, Beechworth householder preparedness, which was significantly lower than that of Ingham householders (Table 2), was most strongly linked to communications from CFA/SES (r=0.349 -0.442).

Use of the mobile phone at either site was little represented, perhaps due to poor mobile reception or because too few respondents possessed mobile phones, though the latter was not measured by the survey. Some differences between the two communities might be a result of the high social cohesion of Ingham (Boon 2014) and the difference in disasters (due to the longer lead time for communicating flood risk compared to fire risk as shown in differences between the two sites for the item: *'I received the first warning in time to prepare for the event'*). In addition there is a higher proportion of newcomers in Beechworth compared to Ingham (Table 1). Notwithstanding, some demographic vulnerabilities with regard to access to emergency communications across both sites were detected via ANOVA analyses which compared emergency communication access by age group (four age groups) and employment (N=536) (Table 5).

Table 5: Communications ANOVA results by age group (a) and by employment status (b) across the two communities (N=536).

Indicator	F- ratio /age group	F- ratio / employment status
I got critical information at regular intervals from:		
Neighbours or people in my local community	6.29**	7.91**
Friends or family	8.28**	NS
My local council	NS	NS
The CFA/SES	NS	NS
State government agencies	3.70*	4.90*
Mobile phone	5.73**	9.90**
Internet web sites	9.27**	26.65**
The radio and television	NS	NS

*Significant at p < .05 level; ** Significant at p < .001 level.

Table 3: Correlation coefficients (Pearson's r) between preparedness indicators and communications across the Ingham community (N= 287).

Indicator	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I had a fire action plan/ household emergency plan to follow	1															
I had an emergency kit to use in event	.66**	1														
I prepared/ secured my home/ property well	.63**	.62**	1													
I was prepared to deal with the physical impact of the event	.52**	.48**	.71**	1												
I was prepared to deal with the emotional impact of the event	.40**	.38**	.52**	.73**	1											
I was aware of evacuation routes and centres for my area	.42**	.41**	.43**	.44**	.40**	1										
I received the first warning in time to prepare for the event	.36**	.44**	.54**	.63**	.51**	.50**	1									
I felt I knew enough about how to best prepare myself and my property for the floods	.38**	.43**	.56**	.61**	.60**	.47**	.64**	1								
neighbours or people in my local community	.30**	.24**	.37**	.35**	.28**	.26**	.37**	.39**	1							
friends or family	.35**	.37**	.37**	.39**	.31**	.33**	.36**	.39**	.65**	1						
my local council	.22**	.21**	.24**	.25**	.24**	.34**	.33**	.30**	.36**	.35**	1					
the CFA/SES	.21**	.24**	.28**	.16*	.10	.20**	.24**	.20**	.20**	.22**	.46**	1				
state government agencies	.21**	.21**	.18**	.21**	.13*	.20**	.21**	.21**	.21**	.26**	.47**	.63**	1			
mobile phone	.22**	.14*	.23**	.16*	.10	.17**	.09	.09	.20**	.20**	.18**	.41**	.36**	1		
internet web sites	.41**	.31**	.38**	.40**	.30**	.29**	.27**	.32**	.29**	.28**	.13*	.18**	.21**	.38**	1	
the radio and television	.19**	.16**	.19**	.22**	.27**	.26**	.21**	.32**	.29**	.33**	.27**	.12	.22**	.20**	.34**	1

*Correlation is significant at the 0.05 level (2-tailed), **Correlation is significant at the 0.01 level (2-tailed).

Table 4: Correlation coefficients (Pearson's r) between preparedness indicators and communications in the Beechworth community (N= 249).

Indicator	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I had a fire action plan/ household emergency plan to follow	1															
I had an emergency kit to use in event	.56**	1														
I prepared/ secured my home/ property well	.53**	.41**	1													
I was prepared to deal with the physical impact of the event	.40**	.45**	.61**	1												
I was prepared to deal with the emotional impact of the event	.30**	.33**	.39**	.65**	1											
I was aware of evacuation routes and centres for my area	.41**	.34**	.39**	.39**	.35**	1										
I received the first warning in time to prepare for the event	.24**	.25**	.24**	.34**	.31**	.34**	1									
I felt I knew enough about how to best prepare myself and my property for the fires	.49**	.41**	.58**	.50**	.36**	.48**	.38**	1								
neighbours or people in my local community	.19**	.13	.33**	.30**	.20**	.32**	.37**	.39**	1							
friends or family	.17*	.09	.22**	.25**	.12	.29**	.22**	.32**	.71**	1						
my local council	.23**	.20**	.26**	.29**	.21**	.22**	.27**	.22**	.58**	.55**	1					
the CFA/SES	.18**	.14*	.30**	.35**	.23**	.34**	.44**	.39**	.67**	.52**	.66**	1				
state government agencies	.10	.17*	.26**	.28**	.21**	.16*	.31**	.21**	.47**	.42**	.61**	.54**	1			
mobile phone	.04	.03	.09	.16*	.16*	-.01	.10	.044	.25**	.25**	.32**	.36**	.43**	1		
internet web sites	.10	.19**	.16*	.27**	.11	.12	.23**	.14*	.44**	.27**	.52**	.48**	.47**	.47**	1	
the radio and television	.22**	.12	.16*	.25**	.11	.22**	.26**	.31**	.27**	.27**	.18*	.31**	.20**	.15*	.29**	1

*Correlation is significant at the 0.05 level (2-tailed), **Correlation is significant at the 0.01 level (2-tailed).

Bonferroni multiple comparisons show that significant differences arose because participants aged 55+ relied on communications from 'Radio and TV' but had the lowest levels of all other communications (Table 5). In both communities unemployed individuals relied on 'Radio and TV' and neighbours for risk communications; they also had markedly lower access to mobile phone or internet sources. This suggests that older people and the unemployed are more vulnerable due to social isolation and need targeted risk communications to successfully prepare for disaster. Communications from neighbours and community members and the internet (for Ingham) and the CFA/SES (for Beechworth), were most predictive of preparedness.

Discussion

This study examined risk communication methods and their links with preparedness. While many factors not measured by this study contribute to preparedness (Mileti & Fitzpatrick 1992, Paton, Smith & Johnston 2005), results show that certain types of communication activities are stronger predictors of preparedness than others. Specifically, while 'Radio and TV' were most endorsed as sources of risk communication, information received from neighbours and community members were most predictive of preparedness. Access to websites was also very important for predicting preparedness, possibly because those who were independently seeking information about the flood or fire were relatively proactive, a personal characteristic possibly predictive of preparedness. The mobile phone was unimportant in these sites, perhaps due to unreliable or poor mobile phone coverage, not supporting Goudie's (2013) contentions that mobile phones are useful channels of emergency communication.

Findings show that risk communication needs to come from trusted sources and highlight the importance of two-way communications, presumably because a dialogue can minimise concerns and anxieties and point to best practice for minimising risk (Handmer 2002, Nicholls 2010, Paton 2008, Peters, Covello & McCallum 1997). The social element found showed that possibly face-to-face, locally relevant information might be crucial for people to personally act on warning messages (Paton 2008) and to find out what to do for their own safety from a trusted messenger. Informal, personal networks clearly reinforced official communications (Handmer 2002). Such influence of social forces on behaviour has been reported before (Ajzen & Fishbein 2005). Subjective norms and culture-driven beliefs that inform views about what is a good or desirable action, are predicted by beliefs about whether others would approve of our behaviour (Ajzen & Fishbein 2005). The potential strength of such social influences is reflected in these findings. Conversely, lack of social sources of information reported by those 55+ years of age and the unemployed was associated with poorer preparedness.

Different communities, like those in this study, need specifically targeted risk communications, tailored to the disaster type and community composition (Handmer 2002, Marten *et al.* 2009, Nicopoulos & Hansen 2009). The Ingham residents were younger than Beechworth residents which might account for their internet access preferences. Beechworth residents, facing a rapid onset fire event, did not believe they received timely alerts to prepare. The slower onset Ingham flood was better communicated and gave residents a longer period to prepare. The CFA provided effective communications for those who sought information from them, highlighting the importance of access to the internet for more accurate and updated information. However, this option was not available to those who were more socially vulnerable and the elderly. In summary, it seems that for preparedness 'A trusted source of information is the most important asset that any individual or group can have' (Longstaff 2005, p. 62).

Conclusion

When emergency warnings are received by householders a series of thought processes arise before action is initiated. The warning must be understood and trusted, it must be considered applicable to the householder's circumstances to enable deliberation about what sort of action is appropriate, necessary and feasible. The most effective emergency communication seems to be two-way, and locally derived enabling those at risk to get more personalised advice about their household and what action to take to protect themselves and their property. Neighbourhood influences appeared to be important in mobilising preparedness actions. The appointment of neighbourhood flood, fire, or hazard wardens, proposed by Ingham interviewees could prove to be a successful intervention by local government in consultation with emergency managers to help improve preparedness and mitigate disaster, particularly for those who are elderly or unemployed or marginalised in various communities.

References

Ajzen I & Fishbein M 2005, *The influence of attitudes on behavior. In: Albarracin D, Johnson BT, Zanna MP (eds) Handbook of attitudes and attitude change: basic principles. Lawrence Erlbaum, New York, pp. 173-221.*

Boon, HJ 2014, *Disaster resilience in a flood-impacted rural Australian town, Nat Hazards vol.71, pp. 683–701.*

Boon HJ, Cottrell A, King D, Stevenson R & Millar J 2012, *Bronfenbrenner's bioecological theory for modelling community resilience to natural disasters. Nat Hazards, vol. 60, pp. 381-408.*

Burns RB 2000, *Introduction to research, (4th Edition), Frenchs Forest, NSW: Longman.*

Burnside-Lawry J, Akama Y & Rogers P 2013, *Communication research needs for building societal disaster resilience, Australian Journal of Emergency Management, vol. 28, no. 4, pp. 29-35.*

Cresswell JW 2003, *Research design: qualitative, quantitative and mixed method approaches (2nd ed.).Thousand Oaks: Sage.*

Donehower K, Hogg C & Schell EE 2002, *Introduction: Reclaiming the rural. In K. Donehower, C. Hogg, & E.E. Schell (Eds.). Reclaiming the Rural: Essays on Literacy, Rhetoric, and Pedagogy. Essays on Literacy, Rhetoric and Pedagogy. pp. 1-13. Carbondale, IL, USA: Southern Illinois University Press.*

Gissing A, Keys C & Opper S 2010, *Towards resilience against flood risks. Australian Journal of Emergency Management, vol. 25, no. 2, pp. 39-45.*

Handmer J 2002, *Are flood warnings futile? Risk communication in emergencies, The Australasian Journal of Disaster and Trauma Studies, vol. 2000, no. 2.*

IPCC 2013, *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the IPCC [Stocker, T.F., et al (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.*

Goudie D 2013, *Engaging disaster prone communities; pre-impact media blitzing. Universal Journal of Communications and Network, vol.1, pp. 95-104.*

Kellens W, Terpstra T & De Maeyer P 2013, *Perception and Communication of Flood Risks: A Systematic Review of Empirical Research. Risk Analysis, vol. 33, pp. 24-49.*

Longstaff PH 2005, *Security, resilience, and communication in unpredictable environments such as terrorism, natural disaster, and complex technology. Harvard University Program on Information Resources Policy, Cambridge.*

López-Marrero T 2010, *An integrative approach to study and promote natural hazards adaptive capacity: a case study of two flood-prone communities in Puerto Rico. The Geographical Journal, vol.176, no. 2, pp. 150-163.*

Martens T, Garrelts H, Grunenberg H & Lange H, 2009, *Taking the heterogeneity of citizens into account: Flood risk communication in coastal cities – A case study of Bremen. Natural Hazards and Earth System Sciences, Vol. 9, No. 6, pp. 1931–1940.*

Miceli R, Sotgiu I & Settanni M 2008, *Disaster preparedness and perception of flood risk: A study in an alpine valley in Italy. Journal of Environmental Psychology, vol. 28, no. 2, pp. 164-173.*

Mileti DS & Fitzpatrick C 1992, *The causal sequence of risk communication in the Parkfield earthquake prediction experiment. Risk Analysis, vol. 12, no. 3, pp. 393-400.*

Murthy D 2013, *New media and natural disasters, Information, Communication & Society, vol.16, no. 7, pp. 1176-1192.*

Nicolopoulos N & Hansen E 2009, *How well Prepared are Australian Communities for Natural Disasters and Fire Emergencies? Australian Journal of Emergency Management, vol. 24, no. 1, pp. 60-66.*

Nicholls S 2010, *The role of communications in supporting resilient communities, In S. Cork (Ed), Resilience and Transformation, preparing Australia for an uncertain future, CSIRO, Collingwood, Vic., pp. 181-187.*

Organisation for Economic Co-operation and Development (OECD) 1994, *Creating Rural Indicators for Shaping Territorial Policy. Paris: OECD.*

Parker DJ, Priest SJ & Tapsell SM 2009, *Understanding and enhancing the public's behavioural response to flood warning information. Meteorological applications, vol. 16, no. 1, pp. 103-114.*

Paton D 2000, *Emergency Planning: Integrating community development, community resilience and hazard mitigation. Journal of the American Society of Professional Emergency Managers, vol. 7, pp. 109-118.*

Paton D 2003, *Disaster Preparedness: A social-cognitive perspective. Disaster Prevention and Management, vol. 12, pp. 210-216.*

Paton D 2008, *Risk communication and natural hazard mitigation: how trust influences its effectiveness. International Journal of Global Environmental Issues, vol. 8, no. 1, pp. 2-16.*

Paton D, Smith LM & Johnston D 2005, *When good intentions turn bad: promoting natural hazard preparedness. Australian Journal of Emergency Management, vol. 20, pp. 25-30.*

Patton MQ 2002, *Qualitative research and evaluation methods, Sage, Thousand Oaks.*

Peters RG, Covello VT & McCallum DB 1997, *The determinants of trust and credibility in environmental risk communication: An empirical study. Risk analysis, vol. 17, no. 1, pp. 43-54.*

Reininger BM, Rahbar MH, Lee M, Chen Z, Alam SR, Pope J & Adams B 2013, *Social capital and disaster preparedness among low income Mexican Americans in a disaster prone area. Social Science & Medicine, vol. 83, pp. 50-60.*

Renn O 2005, *White Paper on Risk Governance: Towards an Integrative Approach. Geneva, Switzerland: International Risk Governance Council (IRGC).*

UNESCAP & UNISDR 2012, *Asia Pacific Disaster Report 2012: Reducing Vulnerability and Exposure to Disasters. At: www.unisdr.org/archive/29286, [February 2014].*

About the author

Dr Helen Joanna Boon is a senior lecturer in the areas of educational psychology, special needs and behaviour management. She has a strong research interest in climate change and the intersection of ethics, climate change and adaptation to climate change. Dr Boon has conducted research on community resilience to disasters using mixed methods, including Rasch and Structural Equation analytical methods. She teaches educational psychology and research methodology to undergraduates and post graduate students.

Planning for sandbagging as a response to flooding: a tool and case study

Professor Lin Padgham, Professor Ralph Horne, Dr Dhirendra Singh and Dr Trivess Moore, RMIT University, present a simulation tool to explore the implications of the use of sandbags for various flood scenarios.

ABSTRACT

This paper presents a simulation tool that allows local councils, emergency services organisations, and communities to explore the viability and details of sandbagging depots and their operation as one of the components in a preparation and response strategy to flooding. The tool was developed in collaboration with Victorian State Emergency Services and the City of Port Phillip Council. The focus of this case study is the coastal suburb of Elwood, which has a canal through its centre and a worrying increase in damaging flash floods. The tool that was developed is suitable for use in any location, once relevant geographical information and flood maps are supplied.

Introduction

Sandbagging is one of the most well-known and widely used methods of defence against floodwaters (Commonwealth of Australia 2009b). It has been used for centuries around the world with little change in technology and practice (US Army Corps of Engineers Northwestern Division 2004). Materials are generally easily available (all that is needed are bags and sand) and is often cheap for individuals or local authorities (Carmarthenshire County Council 2013). If bags are filled and placed correctly and in time, sandbags can be effective against floodwaters. Despite this, there is relatively little documentation about sandbagging practice beyond 'how to' guides provided by different stakeholders.

There are, however, three areas of literature relevant to this paper. First, there is the broader literature about flooding intensity, frequency and preparedness (e.g. Daliri *et al.* 2013, Li *et al.* 2014). Second, there is the literature relating to social and community capacity in flood response (e.g. Mishra, Mazumdar & Suar 2010, George & Wambura 2013). Finally, there is the fledgling literature relating to the development and use of simulation tools in developing community capacity, awareness and preparedness in a variety of situations (e.g. Mustapha, McHeick & Mellouli 2013, Moore *at al.* 2011).

Changes to climate and settlement mean that flooding events are predicted to become more frequent and more severe with costs already exceeding $420 million per year from damage to property and livestock and serious injury or death (Commonwealth of Australia, 2009a, Garnaut 2008). However these impacts can be reduced by individuals and communities ensuring they have the ability and capacity to respond in a flood event. This preparedness invariably involves two main themes:

1. the provision and storage of materials, and
2. community education with related information and social capacity building initiatives.

A recent evaluation of a flood event in NSW found that there is still an issue with the development of social capital, both in institutions and the community. Unless this is addressed, little can be done to develop an efficient response to flooding events (Manock *et al.* 2013). Community (and institutional) education has been identified as having a role to play in overcoming limited social capital (Commonwealth of Australia 2009a, Molino & Huybrechs 2004).

In recent years, there has been increasing use of simulation tools to help improve the ability of communities to prepare and respond to a variety of emergency situations (e.g. Schoenharl & Madey 2011). For example the World Health Organization uses simulations to prepare and understand how different health outbreaks could unfold and how different responses may or may not work (WHO 2008). Similarly, a number of communities have developed simulation tools to improve capacity and responses to adapting to changing climate impacts. To date there has been limited development of simulation tools with regard to sandbagging.

This paper addresses the gap in research regarding sandbagging by presenting a simulation tool, which has been specifically developed to explore the implications

of the use of sandbags for various flood scenarios. Current sandbag planning practices were considered before the development and application of the simulation tool and the implementation of a case study.

A tool supporting sandbag planning

Planning for sandbagging is typically done at a local or regional level, although strategies have been developed at the federal level in Australia (Commonwealth of Australia 2009a). Many local authorities and emergency response agencies have developed plans with a hierarchy of activities to implement in a flood event (Victoria SES 2013) incorporating the use of sandbags. These are generally distributed to local residents during (not prior to) a flood event (Commonwealth of Australia 2009b). It is not clear from the available online, local authority literature at what point during a flood event sandbags are distributed and how residents find out that they are available.

'How to' guides available online from local authorities and emergency services (Victoria SES 2013) invariably outline resources required, types of sandbags available, how to fill them (and where), the challenges of sandbagging (e.g. it is a slow and labour intensive process), and the different techniques of placing sandbags (e.g. blocking drains, building a wall) (Commonwealth of Australia 2009b).

The simulation tool described in this paper allows for the exploration of sandbagging. The tool was originally developed for the suburb of Elwood in Melbourne but can be adjusted for any area once the street maps, flood mapping, housing and occupancy data are available.

The basic model

The tool is an agent-based simulation (Miller & Page 2009), which is a type of simulation system that allows the modelling of heterogeneous individuals acting autonomously within a simulated environment. This technology is especially useful for social simulations involving modelling of populations. The tool models individuals reacting to a flood situation (Figure 1). The current version is specific to Elwood, Victoria, but is adaptable to other areas. The simulation plays out over a predetermined duration. A flood warning occurs and roads and houses flood according to flood map patterns. Individuals decide whether they will collect sandbags from a depot, drive there, queue and collect sandbags, and drive home. If they encounter floodwaters on the road, they replan a new route to reach their destination. The model can be populated with individuals depending on the available population data, or with lesser numbers of individuals to achieve faster results, which can then be extrapolated.

The simulation can be observed graphically showing:

- cars travelling on roads
- numbers of cars queuing at a given depot
- cars getting caught in floodwaters
- houses successfully sandbagged
- houses becoming flooded, and
- the spread of flood waters.

In order to do a thorough analysis multiple executions should be run for each parameter setting, obtaining averages and variances, and many different scenarios must be explored. This can be done without the graphical display.

There are a number of schemas that facilitate the modelling process. A person's engagement in the use of sandbags is assumed to vary according to how likely it is that their property had been flooded previously (measuring speed of response following a warning). Also, the simulated progress of floodwaters is not continuous, but is sufficient for analysis. Individuals become aware of road flooding only when they enter the portion of road which is affected by floodwaters. At this point the simulation replans their route, or if no option is possible, they are stranded.

Once at a depot participants queue until it is their turn, and then fill or collect sandbags for a specified period of time based on filling and loading time and number of sandbags. Once the individual arrives home further time is required for laying sandbags. If flood waters arrive at a property while it is in the process of being sandbagged it is tagged (and shown) as partially protected.

Outcomes measured

As the simulation runs data is collected and is shown at the end of an interactive simulation (see Figure 2). If multiple simulations are run in batch mode, the data is saved to a .csv file which can then be accessed using Excel or used to create analysis graphs. Key results include the number and percentage of buildings in the flooded area and the number and percentage of agents who decided to sandbag. Of these, the number and percentage of homes that were saved due to sandbagging can be assessed as well as the number and percentage of homes lost where sandbagging was too late, and the number and percentage of homes sandbagged that were not in a flooded area. The number and percentage of unsandbagged houses flooded is also calculated.

A substantial amount of additional data is collected, but not initially displayed. It is available in the .csv file for analysis, including the percentage of agents in various states at simulation end (stuck on road, in transit, waiting at depot, doing sandbagging, completed sandbagging, etc.), as well as the percentage of properties with varying status (e.g. in flood area, protected, protected and not in flood area, protected too late, etc.). Data is also collected on average waiting time at each depot and the number of residents served.

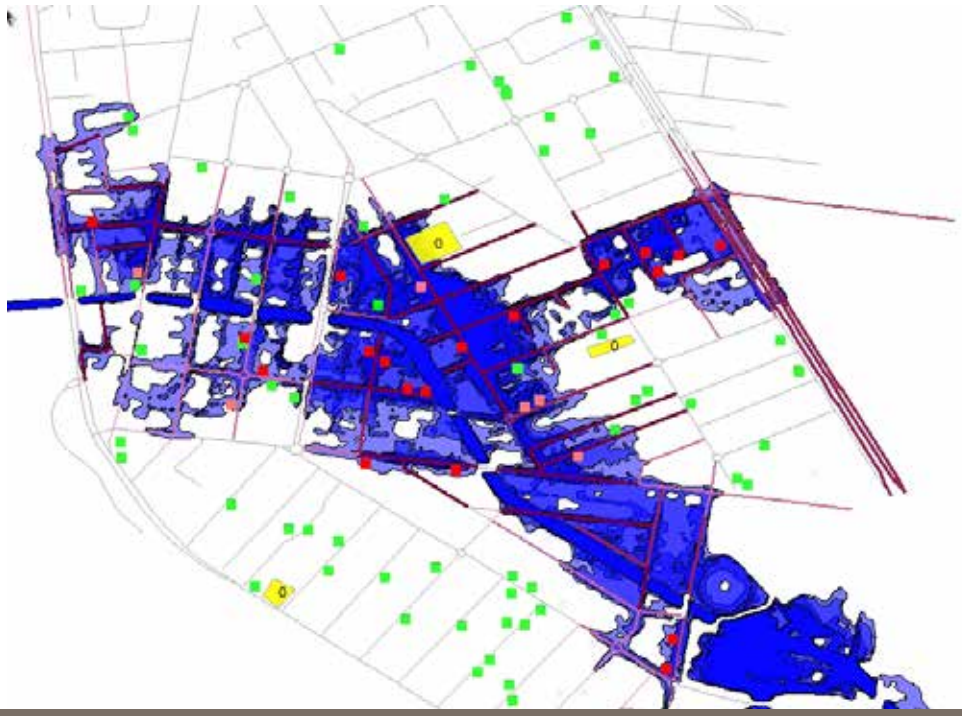


Figure 1: Screenshot showing flood simulation with cars, houses and depots. Green houses are safely sandbagged, red houses are flooded, pink houses are partially sandbagged when floods arrive.

Modifying the scenario

To aid understanding sandbagging scenarios alternative scenarios can be run with different settings. The main configuration settings available include:

- Agent numbers: how many agents and what percentage will respond with either using home sandbags or sandbagging depots.
- Timing parameters: how long after the warning can agents choose whether or not to act, at what times should different flood levels roll out, length of simulated timestep, and duration of simulation.
- Depot information: number of depots, time to fill and load sandbags, and number of queues per depot.
- Sandbagging information: time to lay sandbags and probability of effectiveness of sandbags.
- Road speeds: maximum speed on main and non-main roads.

As there is some non-determinism within the simulation (as agents make choices according to probabilities, not deterministically), there will be variance in how a scenario unfolds, even with the same parameter settings. This can be systematically analysed by running multiple scenarios with the same parameter settings, and computing both average and variance.

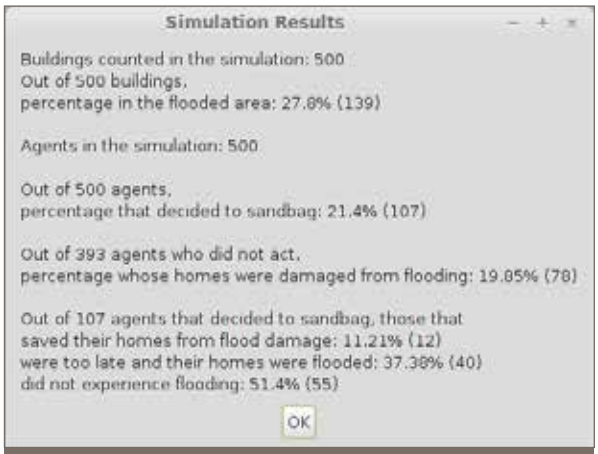


Figure 2: The results window displayed at the end of a simulation.

Running scenarios and analysing outcomes

Due to inherent non-determinism within the model (agents make choices according to probabilities, not deterministically), there will be some variance in how a scenario unfolds each time the simulation is re-run. In order to build confidence in the outputs of the simulation it must be re-run several times for the same inputs and the outputs of these runs aggregated, computing both average and variance. This can be done using a non-interactive 'batch' mode of running, where

the software executes a specified number of runs in succession, with no user interaction or graphical display, saving the outputs of each run to the .csv file. Results can then be loaded into a spreadsheet program for analysis.

For example, Figure 3 shows how sandbag filling time (along the bottom axis) affects such things as houses saved, or queuing times. This was produced by aggregating results from 20 simulation runs.

It is also useful to understand how changes in inputs cause changes in outputs and, importantly, how sensitive some outputs are to changes in certain inputs. This kind of analysis is called 'sensitivity analysis', and can show correlations (or lack of) that may not be obvious at the outset. Sensitivity analysis can be performed using batch mode, where instead of keeping the inputs fixed, they are systematically varied within specified ranges (such as varying the sandbag filling time between 5-30 mins in Figure 3). As before, for each input configuration that results, the simulation is re-run several times to get statistically meaningful results.

Setting up for a specific area

The tool can readily be customised to work for any area, using a provided software wizard and the following information:

- Open Street Map (.osm) file which contains road network information about the suburb. This can be downloaded from http://www.openstreetmap.org.
- Building shapefile (.shp) file, which contains building information about the suburb. This is available from http://services.land.vic.gov.au/SpatialDatamart, although an account is necessary.
- Flood map(s) (.shp), containing timed snapshots of a progressing flood in the area. If these are not available from the appropriate authority (Melbourne Water in the Melbourne area), then they can be hand drawn, based on best available knowledge, using a tool such as MapWindow GIS (http://www.mapwindow.org).
- Landmark shapefile (.shp) file, which contains visual landmarks in the suburb, to assist in visual understanding. This is optional, and if desired can be drawn using a tool such as that above.

These files must be placed in a folder for the new suburb. When the tool launches to create a new suburb, the wizard will step through the process.

Tool access and instructions

The RMIT-developed tool can be downloaded from https://sites.google.com/site/rmitagents/projects/nccarf along with a detailed user guide and tutorial exercises.

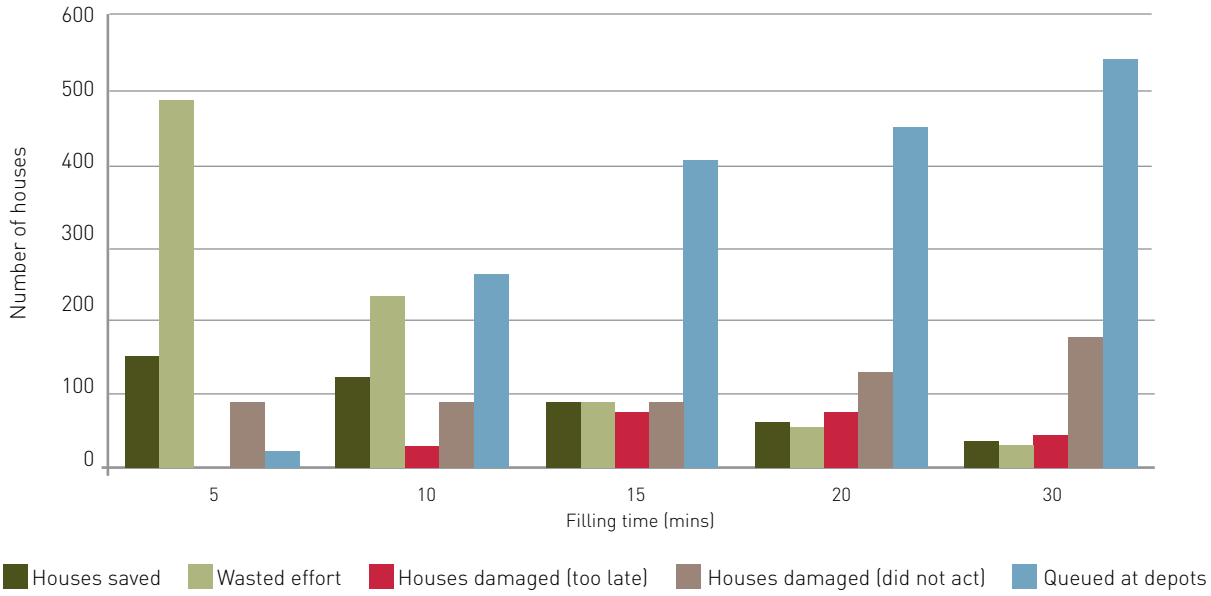


Figure 3: Graph showing effects of varying sandbag filling times, for a 1-in-20 year flood, and six hours of activity.

Image: Australian Historic Shipwreck Preservation Project/C. Philippou

Packing sandbags at a community sandbag depot.

Case study

The tool was developed and applied for Elwood, in the City of Port Phillip council area (CoPP), which is subject to flash flooding from a canal running through it. Over the last seven years there have been two 1-in-100 year flood events, causing millions of dollars of damage. RMIT University, CoPP, and the Victorian State Emergency Services (SES) developed and refined the tool to examine whether sandbag depots are a useful tactic to mitigate against flood damage and, if so, what might preferred locations be, and what management activities may be optimal.

Sandbagging was chosen as a known activity, one with many variables needing analysis, many of which could be explored by modelling and simulation. Initial issues included potential locations of depots, management of sandbag pick-up (multiple queues, dedicated fillers or people filling their own, allocations, parking, etc.), how much damage one might expect to prevent, considering possible timing of events (during work-day, night time, weekend, etc.), and plans to assist particular groups (the elderly, mothers with children, etc.). The researchers interviewed key emergency services experts and community members and attended community meetings to obtain a general understanding of the issues, as presented by relevant resident groups, and an idea of community behaviours. Due to the potential complexities of negotiating actual locations, issues relating to arbitrary depot locations were explored with a view to understanding the actual options at later stages. Maps were obtained from *Open Maps*, population details from the Australian Bureau of Statistics and flood maps from Melbourne Water. The flood maps had actual timings, so it was known how fast floods progressed in a particular flood event.

An initial simulation was constructed and analysed for warning times ranging from 30 minutes to three hours. The number of filling points ranged from three to 12. Unsurprisingly, significant numbers of houses were saved only when warning time substantially exceeded 30 minutes. It also became clear that even given optimistic estimates of time required to fill sandbags (at least 12) possibly more filling points would be required to avoid people spending longer than 20 minutes on average in the queue. These initial results led SES and CoPP to conclude that sandbag depots were unlikely to be a viable strategy to implement, although local or home-based sandbagging options may well be of value. On that basis, it was decided to use the simulation in community discussions rather than do further detailed analysis.

Additional uses of the simulations include:

- limiting sandbags to residents most likely to be affected
- improving modelling for queue management, and
- neighbourhood depots limited to immediate vicinity residents.

The tool allowed preliminary assessment of the viability of sandbagging depots as a local government approach to flood mitigation. It was determined that sandbagging would not be viable as a council or SES-led activity on a large scale. However, there was scope for further exploration of individual or local neighbourhood preparation in this way. Indeed this study has led to the development of an educational game[1] to raise awareness of flood response activities, in particular, sandbagging. There are sand-less alternatives to traditional sandbags that could also potentially be employed by individual householders, however they were not further explored in this study.

Conclusion

The initial simulation tool was built and tested for warning times ranging from 30 minutes to three hours with queues ranging from three to 12 people. The results showed that significant numbers of houses were saved only when warning time substantially exceeded 30 minutes. Also, given estimates of time required to fill sandbags, at least 12 filling points would be required to avoid people queuing longer than

1 Simulation game at https://sites.google.com/site/rmitagents/projects/nccarf.

20 minutes. These initial results indicated that sandbag depots are unlikely to be a viable flood mitigation tactic for the SES and CoPP.

This case study resulted in the development of an educational game that provides an avenue to educate and engage community members in thinking about, and 'practising' their responses to flash flood situations. The interactive simulation has more potential to ensure that key preparation messages are registered and retained than the use of more traditional print materials. Both the simulation tool developed and the game are most effectively used in combination with community meetings as a way to assist community members to prepare for floods. In locations where warning times may be longer than in Elwood, the simulation tool can be valuable for detailed analysis and planning regarding sandbagging depot locations, filling and pick-up policies, access arrangements, and resourcing.

Acknowledgments

This work was carried out with financial support from the Australian Government (Department of Climate Change and Energy Efficiency), the National Climate Change Adaptation Research Facility (grantEM11 05), and the Australian Research Council (grant DP1093290). The views expressed herein are not necessarily the views of the Commonwealth, and the Commonwealth does not accept responsibility for any information or advice contained herein. The tool development and case study were done in collaboration with Victoria State Emergency Service and City of Port Phillip Council.

References

Carmarthenshire County Council 2013, *Policy for the Distribution of Sandbags during Flooding Incidents. At: www.carmarthenshire.gov.uk/English/environment/emergencyplanning/Documents/sandbag_policy.pdf [9 October 2013].*

Commonwealth of Australia 2009a, *Flood Preparedness. Manual 20. Canberra: Commonwealth of Australia.*

Commonwealth of Australia 2009b, *Flood Response. Manual 22. Canberra: Commonwealth of Australia.*

Daliri F, Seraji HS, Kholghi M & Dehghanipour AH 2013, *Prioritizing sub-watersheds flooding intensity for structural Damaging Flood control and managing. Desert, 18(2), pp 153-162.*

Dufty N 2008, *A new approach to community flood education. The Australian Journal of Emergency Management, vol 23, no. 2.*

Garnaut R 2008, *The Garnaut Climate Change Review. Melbourne: Cambridge University Press.*

George MC & Wambura CM 2013, *Community awareness, preparedness and response towards disasters: A case of Kilosa flood disaster. IMTU Medical Journal, 4(1), pp. 41-43.*

Li J, Thyer M, Lambert M, Kuczera G & Metcalfe A 2014, *An efficient causative event-based approach for deriving the annual flood frequency distribution. Journal of Hydrology, 510(0), pp. 412-423.*

Manock I, Islam R, Hicks J, Sappey R & Ingham V 2013, *Perceptions of institutional and social response to frequent flooding in an Australian rural town. Australian Journal of Emergency Management, vol. 28, no. 1.*

Miller J & Page S 2009, *Complex Adaptive Systems: An Introduction to Computational Models of Social Life. USA: Princeton University Press.*

Mishra S, Mazumdar S & Suar D 2010, *Place attachment and flood preparedness. Journal of Environmental Psychology, 30(2), pp. 187-197.*

Molino S & Huybrechs J 2004, *Do education strategies sink and communities swim? Evaluation of the Woronora preparedness strategy five years on. Australian Journal of Emergency Management, vol. 19, no. 2.*

Moore M, Gilles D, Piotrowski J & Young N 2011, *Community-based Tools for Communicating Flood Risk and Improving Public Preparedness [online]. In: Valentine, EM (Editor); Apelt, CJ (Editor); Ball, J (Editor); Chanson, H (Editor); Cox, R (Editor); Ettema, R (Editor); Kuczera, G (Editor); Lambert, M (Editor); Melville, BW (Editor); Sargison, JE (Editor). Proceedings of the 34th World Congress of the International Association for Hydro-Environment Research and Engineering: 33rd Hydrology and Water Resources Symposium and 10th Conference on Hydraulics in Water Engineering. Barton, ACT: Engineers Australia: pp. 286-291.*

Mustapha K, McHeick H & Mellouli S 2013, *Modeling and Simulation Agent-based of Natural Disaster Complex Systems. Procedia Computer Science, 21(0), pp. 148-155.*

North MJ, Collier NT & Vos JR 2006, *Experiences creating three implementations of the repast agent modeling toolkit. ACM Transactions on Modeling and Computer Simulation (TOMACS), 16(1), pp. 1-25.*

Schoenharl T & Madey G 2011, *Design and Implementation of An Agent-Based Simulation for Emergency Response and Crisis Management. Journal of Algorithms & Computational Technology, 5(4), pp. 601-622.*

US Army Corps of Engineers Northwestern Division 2004, *Sandbagging techniques. Portland: US Army Corps of Engineers Northwestern Division.*

Victoria SES 2013, *FloodSafe. What to do during floods. At: www.ses.vic.gov.au/prepare/floodsafe/what-do-do-in-a-flood, [25 October 2013].*

WHO 2008, *World Health Organization Outbreak Communication Planning Guide. Geneva: World Health Organization.*

About the authors

Professor Lin Padgham is a Professor in Artificial Intelligence and **Professor Ralph Horne** is Professor and Director of Research in the College of Design. **Dr Dhirendra Singh** and **Dr Trivess Moore** are both Post-doctoral Fellows in the Schools of Computer Science and Global and Urban Studies respectively. Lin Padgham and Ralph Horne lead a cross disciplinary research team of computer science and social science.

Regional and sub-sector impacts of the Canterbury earthquake sequence for tourism businesses

Dr Caroline Orchiston, University of Otago, Dr Erica Seville, Risk Strategies Research and Consulting, and Associate Professor John Vargo, University of Canterbury, present empirical findings from a survey of Canterbury tourism operators one year after the Christchurch earthquakes. ®

ABSTRACT

The tourism industry suffered significant losses as a consequence of the Canterbury earthquake sequence. The sequence began in September 2010, followed by a significant aftershock in February 2011 that caused an unprecedented and sustained reduction in tourism arrivals to the city of Christchurch and the wider region. This paper reports empirical findings from an impact and recovery survey of Canterbury tourism operators one year after the earthquake sequence. Results illustrate the different impacts experienced across three tourism sub-sectors of activity/attraction, accommodation, and visitor transport. These were largely a consequence of location and degree of damage coupled with the drop in international visitor arrivals.

Introduction

Christchurch is the second largest city in New Zealand (population 340 000), and contributed 16 per cent of the total tourism activity nationwide prior to the September 2010 earthquake (Ministry of Economic Development 2012). Christchurch is the aviation gateway to the South Island, with 85 per cent of international visitor arrivals and departures to and from the South Island taking place through Christchurch Airport (CIAL 2012). In 2009 international tourists stayed for a total of 6.6 million guest nights in Canterbury, in addition to similar numbers of domestic visitor nights (Tourism Strategy Group 2012). Christchurch received 555 000 international visitors in 2010, compared to 398 000 in 2013 (Christchurch Canterbury Tourism 2013).

Christchurch experienced a series of damaging earthquakes in September 2010 (magnitude 7.1) and again in February 2011 (magnitude 6.3) where the destruction resulted in 185 deaths and major disruption to critical infrastructure. Two-thirds of existing hotel stock and many backpacker hostels were destroyed. The significant damage to hotels and the convention centre in the central city resulted in a major decline in the Meetings, Incentives, Conventions and Events (MICE) market, reducing this segment of the industry to five per cent of pre-earthquake levels (Hunter & Cossar 2011). The consequences of this event for the tourism industry were immediate, significant and sustained, not only for the city of Christchurch but across the tourism economy throughout the South Island.

Recovery and reconstruction of tourism infrastructure has been slow, largely because of the uncertainty caused by a significant number of aftershocks (above magnitude 5) over an extended period of time from September 2010 to December 2011. Aftershocks created extremely complex insurance issues, which also contributed to slowing the pace of recovery (Brown, Seville & Vargo 2013). As a consequence, planning for the renewal of the city took place over an extended period, and it wasn't until July 2012 that a blueprint for the future central city was unveiled (CERA 2012). Meanwhile, the tourism industry continued to experience reduced visitor arrivals, with no prospect of significant improvement until accommodation capacity increased and the range of attractions was restored (Hunter & Cossar 2011, The Press 2012).

The experience of Christchurch differs from other natural disasters because of the on-going nature of the aftershock sequence over a period of 18 months. As a result, the events in Canterbury presented an opportunity to study tourism business impacts generated by an on-going natural disaster involving multiple events. The purpose of this paper is to provide an operator perspective on the impacts of the earthquakes on business revenue and visitation, and to draw conclusions about impacts felt across Christchurch and regional Canterbury. It also investigates how operators perceive the recovery of the industry one year on from the February 2011 earthquake. In doing so, this paper draws conclusions about the impacts experienced across the Canterbury region, illustrating the range of both positive and negative outcomes for tourism businesses as a

consequence of location and business type. The findings reported here represent part of a wider program of research focussed on the outcomes of the Canterbury earthquakes for tourism. A companion paper describing recovery marketing and knowledge management (currently in review) explores communication and crisis management after the earthquakes, with specific reference to medium to long-term recovery in Canterbury as described in the Scott, Laws & Prideaux (2008) addition to the Faulkner (2001) framework for long-term recovery.

Research context

Natural disasters affect tourism destinations regularly worldwide, with recent examples such as the Japanese earthquake and tsunami (2011), Australian bushfires (2009) and floods (2011), illustrating how damaging these events can be to tourism infrastructure and tourist perceptions of affected destinations (Henderson 2002, Sharpley 2003, Cioccio & Michael 2007, Scott, Laws & Prideaux 2008, Ritchie 2009). Meanwhile tourism-reliant businesses bear the brunt of reduced visitor arrivals and have little control over the timeframe for recovery (Faulkner & Vikulov 2001). Disaster management principles have been described by Faulkner and Vikulov (2001) and Faulkner (2001) outlining several key phases for destination disaster management, including pre-event, response, recovery and resolution. Of specific relevance to this research project are the phases relating to the post-disaster recovery of infrastructure and tourism activity over the longer-term.

Crises precipitate both negative and positive outcomes during the recovery period, and act as 'turning points' for destinations (Faulkner & Vikulov 2001, p. 340). The Katherine floods in 1998 caused significant damage to the tourism industry in the region, and generated a range of outcomes in terms of marketing, infrastructure and investment, disaster preparedness, organisational cohesion and human resources (Faulkner & Vikulov 2001). Some of these outcomes are relevant to the Christchurch experience, particularly the positive consequences of the renewal and redevelopment of tourism infrastructure. Over the long-term, disasters have the capacity to deliver transformational change to destinations (Faulkner & Vikulov 2001) with the aim of 'building the destination back better than it was prior to the disaster' (Beirman, in Pforr & Hosie 2001, p. 209).

Faulkner and Vikulov (2001) describe the importance of a marketing strategy during the emergency and intermediate phases of the disaster management process. Ritchie (2009) agrees, suggesting tourism managers at regional and national levels of jurisdiction need to act swiftly to communicate with markets and to initiate marketing approaches designed to reassure visitors when it is safe to return.

The nature of the aftershock sequence in Christchurch made efforts to remarket the city impossible for a period of six months after February 2011, primarily because it was an unsafe environment for visitors. Marketing efforts by the regional tourism organisation restarted in September 2011 with a campaign promoting 'South Island Road Trips' to the Australian market (Christchurch Canterbury Tourism 2011). This campaign was designed to encourage visitors to arrive in Christchurch and travel around the South Island. Visitor arrivals to Christchurch increased 18 per cent in the second half of 2012, coincident with the reopening of several large hotels in the central city (Christchurch Canterbury Tourism 2013). On-going accommodation developments will see hotel room numbers increase from 4 532 in December 2012 to an estimated 6 196 by December 2015 (36 per cent increase, The Press 2013).

Method

A postal survey was developed to capture data on business impacts and recovery one year after the February 2011 earthquake. It was distributed both within the areas worst affected by the September 2010 and February 2011 earthquakes, as well as across the Canterbury region. The worst affected area was defined using intensity maps of public 'felt reports' to describe how individuals and their properties were affected by shaking. Felt reports for both the September and February earthquakes were extracted from the GeoNet website (GeoNet 2011), and then a combined contour was generated that encompassed the full extent of the Modified Mercalli[1] (MM) VI zones of both earthquakes (Figure 1).

Figure 1: Map of the South Island showing the Canterbury region, and the MMVI contour dividing the Impact Zone and the Rest of Canterbury.

1 More detail on the Modified Mercalli Scale can be found at http://info.geonet.org.nz/display/quake/New+Zealand+Modified+Mercalli+Intensity+Scale MMVI results in minor damage to some buildings, with shaking felt by most people, and some damage to interior of houses.

Areas within the MM VI contour were described as the 'Impact Zone', and those outside the contour but within the Canterbury region were called the 'Rest of Canterbury'.

The sample included all tourism businesses involved in activity/attraction, accommodation and visitor transport throughout Canterbury. A total of 498 postal surveys were distributed to tourism business managers in the Impact Zone. Of these, 205 were valid responses and 42 were 'returned to sender', resulting in a 46 per cent response rate. In the Rest of Canterbury, 221 surveys were sent and 60 were returned (29 per cent response). The relatively poor response for the Rest of Canterbury group may be a consequence of the indirect nature of the earthquakes' impacts on businesses compared to urban operators. The difference in both sample size and response rates should be noted when interpreting results.

Results

Profile of respondents

Survey respondents in the Impact Zone came from the accommodation sector (61 per cent), activity/attraction (26 per cent) and visitor transport sectors (14 per cent). Hosted accommodation (bed-and-breakfast, farmstay, 22 per cent) and motels (14 per cent) were the largest sub-sectors in the accommodation category. The proportions of tourism businesses were similar for the Rest of Canterbury sample, however there were fewer transport companies (4 per cent). In both the Impact Zone and Rest of Canterbury, 75 per cent of businesses in the sample are micro in size, i.e. employ fewer than five fulltime, part-time or temporary staff (using the definition of Cameron & Massey 1999).

Impacts on visitor type and business revenue

Operators were asked if the earthquakes had changed the types of visitors they received compared to before September 2010 (see Figure 2) and the relative change (increase, decrease or about the same) across four visitor groups:

- local visitors (from their town or area)
- regional visitors (from Canterbury)
- national (domestic NZ visitors), and
- international visitors.

Seventy-six per cent of Impact Zone operators stated that their visitors had changed. The most striking result was the decrease in the international market reported by 75 per cent of respondents. Domestic visitors from the rest of New Zealand declined for 44 per cent of operators. In comparison, the indirect impacts of the earthquakes in Christchurch resulted in 87 per cent of Rest of Canterbury operators reporting that their visitor types and numbers had changed, with the international downturn the most notable change.

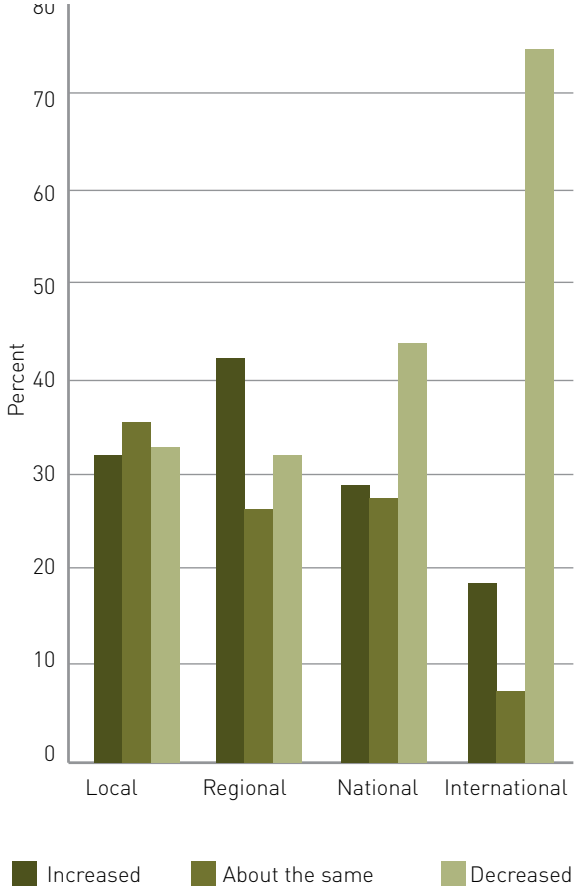


Figure 2: Change in types of visitors to Impact Zone businesses.

Changes in visitor types varied as a consequence of location. Banks Peninsula (located immediately south east of Christchurch, Figure 1) was particularly hard hit with declines of 67 per cent or higher across all four categories. Christchurch operators reported a very large drop in international visitor numbers (86 per cent), as did all districts to varying degrees. Figure 3 illustrates the reported increases in local, regional, national and international visitors to their business operation. Most notably, regional visitor numbers increased in Waimakariri, Selwyn, Timaru and Ashburton by 57-73 per cent, reflecting the outflow of residents from Christchurch seeking respite from the aftershocks, and escape from damaged homes and workplaces.

Activity/attraction and visitor transport Impact Zone businesses were significantly more likely to report a decline in international visitor numbers compared to accommodation businesses that reported increases from all markets. This result reflects the reliance of Christchurch on international visitor arrivals in the summer season, with foreign visitors traditionally outnumbering domestic visitors during peak season (Ministry of Economic Development 2012). The timing of the February earthquake was particularly unfortunate for this reason, but also because forward bookings for the following summer season were affected. Activity/attraction and transport operators were especially

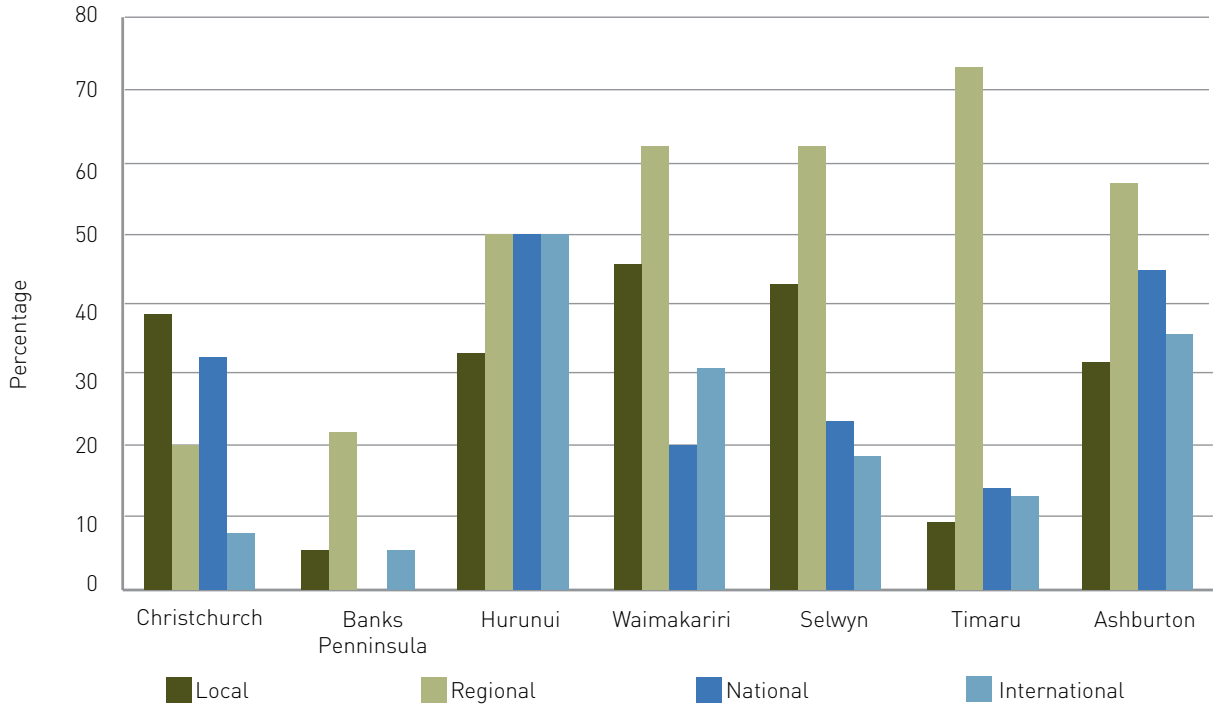


Figure 3: Reported increases in local, regional, national and international visitors.

negatively affected because of the reliance on international visitors. Accommodation businesses that remained open were in demand from the influx of relief workers and local people displaced from their homes due to building damage.

Both earthquakes resulted in decreased revenue for half of the tourism businesses in the Impact Zone sample. Interestingly, the February earthquake generated a larger proportion of 'winners' with increased revenue compared to after the September earthquake. This result varied across sub-sectors. Activity/attraction (64 per cent) and visitor transport (85 per cent) businesses experienced reduced revenues after the February earthquakes, and hotels (75 per cent) were the worst affected accommodation sub-sector. In contrast, motel (74 per cent) and holiday park (67 per cent) operators were significantly more likely to report increased revenue compared to any other accommodation types in the sample. This reflects the reduced hotel availability in the central city and increased demand for temporary accommodation by Christchurch residents, which created a boom for some accommodation providers. Meanwhile, for operators in regional Canterbury, the September event had only a minor impact while the February event reduced revenue for 46 per cent of operators. Thus, while the majority of businesses were undamaged by the earthquakes they suffered financial losses as a direct result of negative media and visitor perceptions of Christchurch as being unsafe and unfit to host visitors.

Changes in revenue after the February earthquake varied significantly as a consequence of business location. Banks Peninsula and Christchurch businesses suffered widespread declines in revenue after the February earthquake, with between 61–80 per cent of businesses reporting a reduction in revenue. In contrast, 56 per cent of Timaru businesses experienced an increase in revenue.

Recovery

The outcomes on businesses in the aftermath of the earthquakes generated a wide spread of results. Table 1 shows that one-third of Impact Zone businesses believed they were significantly worse off after the earthquake. This made up the largest proportion of responses. However 35 per cent reported being better off. In the Rest of Canterbury group more operators reported no change in their business performance compared to the Impact Zone, however more than half reported being worse off. The Rest of Canterbury group businesses were less likely to make significant gains from the earthquakes, with only two per cent in the 'significantly better off' category. Chi square analysis illustrated that business outcomes were sector dependent for Impact Zone businesses. Again, the accommodation sector was significantly more likely to report positive outcomes after the earthquakes (49 per cent) compared to activity/attraction (21 per cent) and visitor transport (five per cent). Motel operators had the most positive business outcomes (72 per cent) compared to all other accommodation types, reinforcing the favourable business conditions for motel operators outside the Christchurch CBD.

Table 1: Business outcomes for Impact Zone and Rest of Canterbury operators after the earthquakes.

Sample	Significantly better off	Slightly better off	The same	Slightly worse off	Significantly worse off
Impact Zone	13%	22%	13%	21%	30%
Rest of Canterbury	2%	20%	27%	33%	18%

Operators were asked two questions investigating their perceptions of tourism recovery (Table 2). Perceptions of the industry bouncing back to pre-earthquake levels were generally negative, illustrating a widespread perception of the slow recovery of the tourism industry (bearing in mind that the survey was conducted 17 months after the first earthquake in September 2010). In contrast, 'Our business is still struggling' produced a wider spread of opinion in the Impact Zone, with 53 per cent agreeing and 46 per cent disagreeing, with similar perceptions in the Rest of Canterbury sample. Accommodation providers in the Impact Zone were significantly more likely to disagree that their business was still struggling (58 per cent) compared to visitor transport (23 per cent) and activity/attraction (32 per cent) operators, illustrating the range of outcomes for both 'winners and losers' in the post-earthquake environment. These results also highlight that while regional Canterbury was not directly impacted by earthquake damage, the indirect affects on visitor flows had a major impact on their business, with many still reportedly struggling a year on from the February event.

Several questions regarding preparedness for future disasters were used to investigate whether the experience of the earthquakes had prompted operators to improve business crisis and emergency planning. Almost half the operators did not have a back-up of Information Technology systems for their business. Slight, but statistically insignificant increases in disaster and crisis planning after the earthquakes were noted. Operators commented they had little time for planning, instead relying on their ability to react to situations as they present themselves, with the majority reporting they are happy with their current level of preparedness. Faulkner and Vikulov (2001) highlighted improvements in disaster preparedness as a positive outcome of the Katherine floods, however one year on from the Canterbury earthquakes, few operators had made significant steps towards improving their business planning for disasters. It is likely operators have been otherwise engaged with surviving in a very challenging operating environment, alongside a perception that they had experienced a once-in-a-lifetime disaster and may not need to test themselves against another significant earthquake in the immediate future.

Conclusion

The results of this study offer insights into the impacts on and recovery of tourism operators not only in the worst affected areas, but across regional Canterbury.

The timing of the study one year after the February earthquake represents a period of great challenge and uncertainty for tourism operators, including a complete cessation in marketing activity, on-going aftershocks, and continued damage to the city. It also reflects a period of realisation that the former image and identity of Christchurch as a tourism destination was destroyed and that the reconstruction and reassessment of tourism infrastructure and services in the city, described in Faulkner's (2001) model, requires many years to implement.

Tourism operators reported a range of both negative and positive outcomes for their business. For Christchurch businesses these outcomes were largely a function of business type, location and the level of damage sustained, while negative perceptions and reduced arrivals to Christchurch caused indirect damage to the wider Canterbury tourism industry. The loss of hotel and backpacker accommodation facilities in the CBD caused a boom in demand for motel and bed-and-breakfast accommodation in the less damaged outer suburbs of Christchurch. A key finding from this research was the significant change in visitor origins after the earthquakes. The international market suffered the largest drop, while the outflow of Christchurch residents seeking respite from the aftershocks was evidenced by the reported increase in regional visitors to other Canterbury destinations.

Tourism operators continue to face major challenges in responding to rapidly changing visitor markets. It is recommended that regional and national tourism marketing agencies work towards restoring the international visitor market segment for Canterbury, while also attracting domestic visitors to the region. Individual tourism businesses should participate in regional marketing efforts by developing web presences that are in-line with regional marketing approaches. It is also important for business operators to embed the lessons learned from their experience of the earthquakes into improved disaster and crisis planning for future events. The results of this research provide little evidence of this occurring one year on from the disaster.

The tourism industry in Canterbury has not achieved a new state of 'normal' post-disaster, nor should it be expected to. Instead, the earthquakes have resulted in a 'turning point' for Christchurch, with the long-term transformation of the city presenting opportunities to design and develop a vibrant and forward-thinking tourism product with greatly improved facilities, access and infrastructure.

Table 2: Response to two recovery questions on a four-point scale.

Recovery question	Sample	Strongly agree	Agree	Disagree	Strongly Disagree	Don't know
'The tourism industry has bounced back to where it was prior to the earthquakes'	Impact Zone	2%	4%	35%	53%	7%
	Rest of Canterbury	3%	14%	42%	29%	12%
'Our business is still struggling'	Impact Zone	18%	35%	29%	17%	1%
	Rest of Canterbury	10%	34%	44%	10%	2%

References

Brown C, Seville E & Vargo J 2013, *The role of insurance in organizational recovery following the 2010 and 2011 Canterbury earthquakes. Resilient Organisations Research Report 2013/4.*

Cameron A & Massey C 1999, *Small and medium-sized enterprises: A New Zealand Perspective. Auckland: Longman.*

CERA 2012, *Christchurch Central Recovery Plan. Report by the Canterbury Earthquake Recovery Authority (CERA), with Christchurch City Council. July 2012. At: http://ccdu.govt.nz/the-plan, [26 June 2013].*

Christchurch Canterbury Tourism 2013, *Business Plan 2013/14. At: www.christchurchnz.com/media/293280/cct-2013-14-business-plandocx.pdf, [26 March 2014].*

CIAL 2012, *Christchurch International Airport Ltd Annual Report 2012. At: www.christchurchairport.co.nz/media/557923/cial_annual_report_2012.pdf, [27 November 2012].*

Cioccio L & Michael E 2007, *Hazard or disaster: tourism management for the inevitable in Northeast Victoria. Tourism Management, vol. 28, no. 1, pp. 1-11.*

Faulkner B & Vikulov S 2001, *Katherine, washed out one day, back on track the next: a post-mortem of a tourism disaster. Tourism Management, vol. 22, pp. 331-344.*

Henderson J 2002, *Managing a tourism crisis in Southeast Asia: the role of national tourism organisation. International Journal of Hospitality and Tourism Administration, vol. 3, no. 1, pp. 85-105.*

Hunter T & Cossar T 2011, *Joint submission to the Christchurch City Council on the Draft Central City Plan for Christchurch released in August 2011. Date of submission: 12 September 2011.*

Ministry of Economic Development 2012, *Commercial accommodation monitor data for Canterbury. At: www.med.govt.nz/sectors-industries/tourism/tourism-research-data/commercial-accommodation-monitor-data, [28 June 2013].*

Pforr C & Hosie P 2009, *Crisis management in the tourism industry: beating the odds? Farnham, England. Ashgate.*

Ritchie BW 2009, *Crisis and Disaster Management for Tourism: Channel View Publications.*

Scott N, Laws E & Prideaux B 2008, *Tourism crises and marketing recovery strategies. Journal of Travel and Tourism Marketing, vol. 23, no. 2-3, pp. 1-13.*

Sharpley R 2005, *The tsunami and tourism: a comment. Current Issues in Tourism, vol. 8, no. 4, pp. 344-349.*

The Press 2013, *Convention Centre project pivotal. At: www.stuff.co.nz/the-press/business/8295754/Convention-centre-project-pivotal, [10 April 2013].*

Tourism Strategy Group 2012, *Commercial Accommodation Monitor. At: www.med.govt.nz/sectors-industries/tourism/tourism-research-data/commercial-accommodation-monitor-data, [16 November 2012].*

Tourism New Zealand 2012, *South Island Road Trips campaign a winner with the Aussies. At: www.tourismnewzealand.com/markets-and-stats/australia/marketing-activity/2012/04/south-island-road-trip-campaign-a-winner-with-the-aussies/, [1 April 2014].*

About the authors

Dr Caroline Orchiston is a Research Fellow in the Department of Tourism, University of Otago. She has a background in earth science, and her research has investigated natural hazards and their potential impact on society. More recently she has focussed on the Christchurch earthquakes and their outcomes for tourism.

Associate Professor John Vargo is a senior researcher and co-leader of the Resilient Organisations Research Programme (www.resorgs.org.nz) based at the University of Canterbury. His interests focus on building organisational resilience in the face of systemic insecurity in a complex and interconnected world.

Dr Erica Seville is co-leader of the Resilient Organisations Research Programme (www.resorgs.org.nz), which has been researching what make organisations resilient in the face of major crises since 2004. Erica is a director of Risk Strategies Research and Consulting and an Adjunct Senior Fellow with the Department of Civil and Natural Resources Engineering at the University of Canterbury.

Do we need specific disaster management education for social work?

Professor Lesley Cooper, University of Wollongong, and Associate Professor Lynne Briggs, Griffith University, examine the activities of social workers in disasters and discuss the gaps in education and training.

ABSTRACT

Social workers play important roles in disaster rescue, recovery and preparation for future disasters. However, their professional education has few elements that prepare them for specific disaster management roles and activities. This paper provides a review of the activities of social workers in disasters in the Asia Pacific, identifies specific training needs, and notes gaps in education and training. Based on this, curriculum initiatives are proposed that go beyond formal education based on concepts and principles of disaster management to include simulations and practice scenarios reflecting the complexities associated with disaster management in the health, community and human services areas.

Introduction

This paper discusses the tasks and activities of social workers during all phases of disasters using the authors' practice experiences and professional literature. A module of disaster management based on the literature, existing curriculum arrangements, and experiential learning is proposed. Although social workers are actively involved in disasters, they are rarely identified as such. Little attention has been given to specialised professional education programs and training agencies to better prepare social workers who are called on to provide crisis services, specialised assessments in mental health, and assist with a variety of community building activities.

Social work values and expertise

Social work as a profession is committed to social justice, enhancement of the quality of life, and development of the full potential of the individual, group and community in society (IFSW 2012, O'Brien 2011). As part of their professional activities, social work activities include:

- working with individuals and communities to improve social circumstances
- acting to reduce societal inequities while recommending fairer distribution of resources
- advocating for marginal and disadvantaged groups
- engaging in social and community research, and
- analysing and challenging social policies (AASW 2012, p. 3).

Practitioners with this capacity to work in these diverse ways individually and collectively provide a valuable skillset to communities in crisis situations and complement the work of other professional groups.

It is estimated that 19 300 social workers are employed in Australia (2014) in agencies and fields of practice such as the Department of Human Services, Child and Family Welfare, health and mental health organisations, local government and the not-for-profit sector (AASW 2011, p. 5). This workforce is distributed across Australia and is known for its close connection to local communities, its capacity to respond to practical and mental health needs, and the short and long-term operational activities of human service delivery. These professionals are a considerable resource that is essential to disaster management capabilities.

Contributions of social workers to disaster management

Social workers have historically contributed to disaster management in four major and overlapping areas of:

- working with individuals and families
- accessing resources
- managing complex interagency co-ordination, and
- working with communities (Zakour 1996).

This work has predominately taken place during the rescue and recovery phases although social workers are increasingly involved in risk mitigation and preparation for future events at the community level.

Literature about the involvement of social workers during disasters is not extensive, however social

workers involved in field activities have detailed their work following earthquakes, tsunamis, hurricanes and cyclones, fires and the SARS outbreaks. They describe work in the post-disaster phase as providing services that are immediately practical and crisis oriented. These practical aspects include access to food, shelter, clothing, providing counselling and advice for people manning help lines and connecting individuals to resources such as financial assistance providers. Their roles include providing and co-ordinating support to families looking for missing relatives. During the response to earthquakes in Iran in 2003, social workers were directly involved in supporting individuals and families with grief counselling and working with those with PTSD. According to Javadian (2007) social workers linked people with resources and prevented physical and mental health problems and family breakdown, intervening in service delivery systems to advocate for change. Similarly social workers working after earthquakes in New Zealand and Wenchuan, China provided numerous social work activities and noted the hidden and informal work many women perform by providing low-key and low-cost initiatives such as providing tea and coffee for people queuing for fresh water (Maidment & Tudor 2013) with social workers following through with long-term advocacy and community development efforts. In the Wenchuan earthquake in China the non-government organisations (NGOs) performed similar activities, the largest involvement being with young children and adolescents. Social workers also visited and consoled families, provided psychological counselling, organised donation activities, and provided services for older people. NGOs also provided assistance in mediation of family disputes, emergency settlement, and investigating disaster information (Huang, Zhou & Wei 2012).

Resources may be scarce or unavailable following an emergency event. Obtaining and accessing needed resources is a key social work role requiring purposeful dialogue, co-operation, information sharing, and advocacy with emergency management, government organisations, international relief organisations and NGOs providing relief activities. It can mean finding support for individuals and families, providing grief counseling and post-disaster support, linking individuals with available resources (finance, emergency housing special programs), and with instigating prevention programs for those with health and mental health difficulties. Accessing and co-ordinating resources often means assisting with make-shift program delivery arrangements. For example, in Christchurch, New Zealand, the head office of Presbyterian Support, a major agency, was red zoned. This meant staff, clients and other agencies were unable to access its services. At-risk mothers, babies and older people were particularly vulnerable (Milner 2013). Other local agency buildings remained intact and offered short-term temporary accommodation to allow services to operate. Social workers also used their homes as offices and offered extensive use of personal mobile phones to communicate with clients.

Helping individuals affected by emergency events is undertaken in complex organisational systems. This complexity is illustrated by a description of practical help to Australian families caught in the Thai tsunami in 2004. Practical help was mediated through a whole-of-government approach including Australian government departments of Department of Human Services (Centrelink), the Department of Foreign Affairs and Trade, the Australian Federal Police, Emergency Management Australia, and the Australian Defence Force. Centrelink social workers, in their role as Family Liaison Officers, supported Australians by providing personal support to those affected and family members and worked with government agencies to provide assistance (Manning *et al.* 2007). Personal support included contact with Australian families caught up in the event and families arriving in Thailand to search for loved ones.

Many social workers are familiar with local communities and have long-standing relationships with diverse community groups. They understand the demography and characteristics of specific disadvantaged populations (e.g. Aboriginal and Torres Strait Islanders, migrants, public welfare recipients) and actively advocate for their specific needs. Social workers work with communities in the recovery phase, working directly with locals in discussing post disaster restoration and reconstruction of their community and participating in a range of planning activities (Kane & Smith 2013). These may include assisting community members to consult with other stakeholders regarding housing resettlement or creation of new economic opportunities, as well as participation in education programs regarding prevention (Goodman & Proudley 2008) and training officials in participatory techniques and ongoing community development.

Curriculum

Curriculum is generally regarded as a formal statement about course content. This statement includes course aims, objectives, learning outcomes and necessary assessment tasks to demonstrate what learning has taken place. Key aspects of curriculum include the values, knowledge, and skills that students are expected to acquire. Curriculum also refers to a designed set of planned learning activities where students actively engage with learning material in a way that encourages deep learning, critical thinking skills and the capacity to reflect on theory and practice. Good curriculum design involves both dimensions.

The Australian social work curriculum is a prescriptive statement, specified by the professional association (AASW 2012). Education for emergency management is not included. Nonetheless, much of the core content can be directly used when working in emergency response situations. What is missing is content developing an understanding of the interpersonal, interagency and legal complexities of working in disaster situations. Frontline work with apparently practical activities sounds simple but delivery of practical services, and provision of sensitive personal, social and psychological support in the face of logistical and practical challenges can be highly complex. These

barriers can include communication difficulties, priority public health concerns, language and cultural barriers, working with foreign nationals who do not share similar understandings of protocols and operations, and location challenges across different disaster sites. Challenging aspects of interpersonal practice include assisting in preparation of memorial services, supporting families looking for loved ones at the site of the disaster, and working with families conflicted over competing claims for personal belongings or remains. This is not a day-to-day experience. Family dynamics, complicated at the best of times, are frequently exacerbated at times of stress resulting in increases in family violence, particularly against women (Maidment & Tudor 2013). A complicating factor is that frontline social workers, health workers and emergency workers may also be impacted by the events and personally distressed themselves. Sensitive personal care and supervision of frontline workers is essential.

Content on disaster management could readily be mainstreamed and infused across the whole curriculum if there is agreement between academic staff about the relevance of knowledge and skills required for emergency management. When opportunities arise for curriculum revision, there are inevitably completing claims for new material. There are clear opportunities to provide learning about disasters as part of modules, in electives or specialised post-graduate courses. Alison Rowland (2013), a champion for the inclusion of disaster management in the curriculum outlined a module on disaster recovery management taught at the National University of Singapore. Human rights and strengths-based approaches guided the case-based approach. Other topics could include community development and associated strategies to assist with prevention and mitigation of risk. In the USA, Healy (2007) proposed inclusion of disaster management in the study of international social work. This proposal assumes that disasters happen 'out there' or 'over there' and 'not in my backyard' or 'at home'. Recent experiences of New Zealand social workers demonstrate how far from reality this might be.

In professional education programs theory is frequently separated from practice being regarded as more important than development of practice knowledge and skills. Missing from academic discussion on disaster education is the best way for students to understand relevant theories in the context of practice realities and complexities of disaster management. To ensure effective learning in disaster management, students need to engage in active and experiential learning activities where they are challenged to deal with the intricacies of real life situations. In this way they develop an appreciation of, and learn to deal with, the uncertainties, barriers and moral problems that exist and can better respond to situations where there may not be a 'best way' to proceed.

Experiential learning

Experiential learning is a powerful pedagogy. It offers opportunities for students to practice, use knowledge and skills, make decisions, work with others and experience strong emotions (Hofstede, de Caluwe & Peters 2010). Experiential learning is both an educational philosophy and method. Dewey (1933) was the first to advocate experience as central to learning. He was critical of educational approaches where the focus was teacher-centred and there was an emphasis on knowledge to the exclusion of experience. Other theorists followed Dewey including David Kolb (1984) who developed a learning model that included concrete experience, reflection, development of abstract concepts and their application to new situations. Reflection is central to experiential learning and approaches to reflective learning are critical for instructors and learners. As an Australian approach, Boud, Keogh and Walker (1985) outlined their model of reflection in learning that starts with experience (behaviours, attitudes, ideas and emotions), moves to reflective processes and then returns to outcomes that include new ideas, behaviours, attitudes and feelings about the experiences. At the practice level, experiential learning means students learn by doing through a process of personal discovery about themselves and the motivations and behaviours of others. Making mistakes is part of the process. Experiential learning arouses many different emotions and attitudes with many feelings not being anticipated by the learner, other learners or facilitators. Along with these emotions, learners develop insight into their emotional responses and use this awareness in future situations.

Learning the intricacies and difficulties of emergency situations requires involving learners in experiential learning and exposing them to the realities involved in emergency management, the need for decision-making in the field often under extreme situations, hierarchical 'command-and-control' approaches and the practice complexities and ethical dilemmas that inevitability arise. Examples of experiential learning include such things as service learning, where students are placed with organisations for a short period of time to learn about the services and operational features of that agency, and internships and placements with emergency services organisations and various relief organisations such as Red Cross and other international relief organisations. Some social work academics in the US have taken students on field trips to disaster zones such as *Hurricane Katrina* in New Orleans where students participated in the recovery process.

Simulations

This paper proposes the use of experiential exercises to complement formal courses, e.g. role-plays and simulations where learners are assigned roles of people involved in disaster management. Their briefing includes character outlines and specific individual and team goals. Simulations have been used extensively in

Social workers provide services that are immediately supportive and practical for members of local communities.

disaster training focusing on a hypothetical scenario with participants playing roles that match their work responsibilities. The proposed role-play, by assigning roles outside work responsibility parameters allows students to understand the knowledge, skills and expectation of personnel in a variety of professional roles, and the complexity of decision-making faced by emergency management and social workers in disaster situations. Learning takes place in the act of doing, discussion, problem solving and reflection on practice. Emergency management scenarios differ as their focus is on the efficiency of policy and procedures, reactions to them and learning from enacting them.

These simulations could focus on a particular event and time such as the rescue or recovery phase, the management of an agency where infrastructure has been destroyed and client and personnel records missing and not recoverable. In health and human service organisations, privacy of personal information about clients and patients looms large. It is not possible in such extreme situations to share information about clients but interagency sharing of information may resolve difficult situations fairly quickly. Numerous real examples from the Christchurch earthquakes in 2010 and 2011 could be used as the basis of teaching simulations. These include:

- management of services and core activities when the service cannot be accessed (Milner 2013)
- supporting frontline human service workers under stress (van Heugten 2013)
- analysing the challenges of community recovery for the homeless, indigenous and marginalised people (Kane & Smith 2013)
- understanding the struggles associated with the terminology of victim survivor, homeless and simultaneously being a volunteer helper to others who may be more fortunate (Briggs & Roark 2013), and
- evacuation of end stage renal patients for treatment in safer locations (Stewardson & Crump 2013).

Throughout these simulations and similar table-top exercises, characters can be given messages about the situation and asked to respond. These messages can include requests from the media, information on serious breakdown of communication and goodwill between agencies, finding clients who are at risk of abuse, neglect or self harm, and the need to establish a program to provide social and psychological help for disaster management personnel. Additional tasks can be added depending on the situation. These experiential exercises differ from drills and simulations where people provide leadership and practice responses to their policy and procedures for the management of disaster under different situations. Understanding policy, procedures and routines is important, but thinking about and responding to complexity is essential. Being able to appreciate the stress of working cohesively and effectively in emergency situations is of prime importance.

There are some key ideas to consider when planning experiential learning including seeking support and advice of experts in disaster management in planning simulations and attending workshops run by disaster management organisations. These experts have practical knowledge, wisdom and experience invaluable in thinking about learning. The social work professional commitment is to seek the views and experiences of service users, survivors and volunteers.

These groups can also assist with thinking about the scenarios, design of learning, and the challenges for all participants.

It is important that consideration be given to a disaster management curriculum for social work and for all professions engaged in this area. A starting point may be to consider what sort of professional characteristics are required for those working in the field; the knowledge, skills and values needed for practice in this area; the competencies and capabilities necessary for all practitioners; the various educational activities and tasks to engage learners in a challenging area; the profession specific activities and the more general disaster management responsibilities. Most importantly there is a need for a comprehensive approach where theory is learned in practice not separately from it.

Conclusion

Disaster management is a neglected area in social work education. This could be remedied by the inclusion of electives in undergraduate and graduate programs. Simulations have been proposed as a pedagogical approach, which enables practitioners to develop skills in managing the complex reality of disaster management.

References

AASW 2012, *Australian Social Work Education and Accreditation Standards, AASW, Canberra.*

AASW 2011, *AHMAC: Consultation Paper about Options for Regulation of Unregistered Health Practitioner, AASW, Canberra.*

Boud D, Keogh R & Walker D 1985, *Reflection: Turning Experience into Learning, Kogan Page, London.*

Briggs L & Roark MH 2013, *Personal reflections: What happens when disaster hits?, Aotearoa New Zealand Social Work, vol. 25, no. 2, pp. 98-104.*

Dewey J 1933, *How we think: a restatement of the relation of reflective thinking to the educative process, Heath, Boston.*

Goodman H & Proudley M 2008, *The social contexts of responses to bushfire threat. A case study of the Wangary fire, in Community Bush Fire Safety, eds J. Handmer & K. Haynes, CSIRO publishing, Collingwood, Vic.*

Healy L 2007, *Disaster in the Curriculum, in Disaster Planning, Management, and Relief: New Responsibilities for Social Work Education, Barbados. At: www.cswe.org/CentersInitiatives/KAKI/KAKIResources/25187/25191.aspx, [10-12 January 2014].*

Hofstede GJ, de Caluwe L & Peters V 2013, *Why simulation games work – in search of the active substance: a synthesis, Simulation and Gaming, vol. 41 no. 6, pp. 824-843.*

Huang Y, Zhou L & Wei K 2011, *Wenchuan Earthquake Recovery Government Policies and Non-governmental Organizations participation', Asia Pacific Journal of Social Work and Development, vol. 21, no. 2, pp. 77-91.*

IFSW 2012, *'Definition of social work'. At: http://ifsw.org/policies/definition-of-social-work/.*

Javadian R 2007, *Social work responses to earthquake disasters: A social work interventions in Bam, Iran, International Social Work, vol. 50, no. 3, pp. 334-346.*

Kane R & Smith J 2013, *Inner City East – One Christchurch community's story, Aotearoa New Zealand Social Work, vol. 25, no. 2, pp. 90-97.*

Kolb DA 1984, *Experiential Learning, Prentice-Hall, New York.*

Maidment J & Tudor R 2013, *Editorial, Aotearoa New Zealand Social Work, vol. 25, no. 2, pp. 1-5.*

Manning C, Miller S, Newton T & Webb S 2007, *After the Wave: The Centrelink Response Off Shore, Journal of Social Work in Disability and Rehabilitation, vol. 5, no. 3-4, pp. 81-95.*

Milner V 2013, *In the Zone: Keeping hope alive through shaky times Aotearoa New Zealand Social Work, vo. 25, no. 2, pp. 45-57.*

O'Brien M 2011, *Equality and fairness: linking social justice and social work, Journal of Social Work, vol. 4, no. 2, pp. 711-722.*

Rowland A 2013, *Social Work Curriculum in Disaster Management, Journal of Social Work in Disability and Rehabilitation, vol. 12, no. 1-2, pp. 130-144.*

Stewardson AC & Crump N 2013, *Reflections from the end of the Earth: Social work, planning, preparation and intervention with evacuees on haemodialysis treatment following the 2011 Christchurch Earthquake, Aotearoa New Zealand Social Work, vol. 25, no. 2, pp. 105-115.*

van Heugten K 2013, *Supporting human service workers following the Canterbury Earthquakes, Aotearoa New Zealand Social Work, vol. 25, no. 2, pp. 35-44.*

Zakour M 1996, *Disaster research in social work, Journal of Social Service Research, vol. 22, no. 1-2, pp. 7-25.*

About the authors

Lesley Cooper is the Professor of Social Work at the University of Wollongong. She has diverse research interests in the human services including housing and working with vulnerable populations. Her particular curriculum interest is professional practice, researching work-integrated learning and exploring how best to teach about the complexities and unpredictability of situations that arise in practice.

Lynne Briggs is an Associate Professor of Social Work at Griffith University. She teaches into the Griffith MSW qualifying program mainly in the area of applied counseling but she also has overall responsibility for the field education program. Her main research focus is on health outcomes with recent research endeavours exploring how social work responds to disasters and curricula development for inclusion of disaster management in social work education programs in the future.

This paper was developed for the UNISDR Hyogo Framework for Action Thematic Review and as an input to the Global Assessment Report on Disaster Risk Reduction 2015.

Progress made with early warning systems in Australia since 2005

Neil Dufty summarises the findings of detailed research in early warning systems and outlines possible improvements.

ABOUT THE AUTHOR

Neil Dufty is a Principal at Molino Stewart Pty Ltd, an environment and natural hazards consultancy based in Parramatta, NSW. He has completed numerous evaluations of early warning systems including for the Victorian Floods Review and the Victorian Fire Services Commissioner. The detailed input paper from this research can be found at http://works.bepress.com/neil_dufty/35/.

Early warning systems defined

Early warning can be defined as:

> *'the provision of timely and effective information, through identified institutions, that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response.'* (ISDR 2006, p. 2)

Early warning systems detect impending disaster, give that information to people at risk, and enable those in danger to make decisions and take action (Mileti 1999). The objective of people-centred early warning systems is to empower individuals and communities threatened by hazards to act in sufficient time and in appropriate manners so as to reduce the possibility of personal injury, loss of life, damage to property and the environment, and loss of livelihoods (ISDR 2006).

According to the Second International Conference on Early Warnings (UNISDR 2003), there are four parts of an effective early warning system:

1. Risk knowledge—knowledge of the relevant hazards and of the vulnerabilities of people and societies to these hazards.
2. Monitoring and warning service—the technical capacity to monitor hazard precursors, to forecast the hazard evolution, and to issue warnings.
3. Dissemination and communication—the dissemination of understandable warnings, and prior preparedness information, to those at risk.
4. Response capability—knowledge, plans and capacities for timely and appropriate action by authorities and those at risk.

A weakness or failure in any one part could result in failure of the whole system (ISDR 2006, p. 2).

Hazards in Australia

Australia is prone to a range of natural hazards including bushfires, floods, droughts, severe storms, tropical cyclones, heatwaves, earthquakes and landslides. As shown in Table 1, there are also several non-natural hazards that Australia is exposed to.

While some natural hazards have the potential to occur anywhere in Australia (e.g. severe storm), many occur only in reasonably well-defined regions (e.g. tropical cyclone) and are confined by topography (e.g. storm surge). Similarly, some natural hazards have the potential to occur at any time of year (e.g. tsunami) while others are often seasonal (e.g. thunderstorm) (Middelmann ed. 2007).

In recent years, there have been several significant disasters in Australia including the 2009 Black Saturday bushfires in Victoria and the 2011 floods in Queensland and Victoria. There is evidence to show that the number and intensity of weather-related disasters will increase in the future due to anthropogenic climate change (Steffen, Hughes & Perkins 2014, CSIRO & Australian Bureau of Meteorology 2014).

Early warning systems in Australia

Some hazards may occur suddenly (e.g. earthquake) while others may be identified in advance and a warning provided (e.g. flood, bushfire, cyclones). Early warning systems have therefore been developed in Australia particularly for those hazards where there is an opportunity for warnings to have (or may have) the greatest impacts. Under Australia's constitutional arrangements, State and Territory emergency management legislation identifies control agencies and guides early warning practices. The control agencies are responsible for delivering warnings to the public.

The Australian Government provides national leadership around emergency warning activity, contributing to a whole-of-nation, resilience-based approach to preventing, preparing for, responding to, and recovering from disasters (Attorney-General's

Table 1: Main Australian hazards.

Natural	Technological	Human-caused
Resulting from acts of nature	Involves accidents of failures and structures	Caused by intentional actions of an adversary
• Bushfire • Cyclone • Drought • Earthquake • Epidemic • Flood • Heatwave • Storm • Tsunami	• Aeroplane crash • Dam/levee failure • Hazardous materials release • Power failure • Radiological release • Train derailment • Urban conflagration	• Civil disturbance • Cyber incidents • Sabotage • School violence • Terrorist acts

Department 2013). This includes assisting States and Territories to enhance their warning capabilities (e.g. the national telephone-based emergency warning system, Emergency Alert) and developing resource material, such as *Emergency Warnings: Choosing your Words* (Attorney-General's Department 2008a).

Under the authority of the *Meteorology Act 1955*, the Bureau of Meteorology (BOM) disseminates warnings, watches and advises on weather events such as severe thunderstorms, fire weather, coastal hazards, high winds, flood and tropical cyclone warnings and, in collaboration with Geoscience Australia, tsunami warnings. A significant number of warnings issued for natural hazards in Australia are issued by the BOM.

Communities and individuals also have responsibilities including preparing themselves for emergencies that might affect them and taking appropriate action in response to emergency warnings. According to the Australian Government:

> *'A key element in building the disaster resilience of Australian communities is that individuals, households and businesses should be prepared and have action plans for emergencies that might affect them. Preparation and planning at the individual, household and community levels supports informed decision making.'*
> (Attorney-General's Department 2013, pp. 5–6)

Broadcast media plays an important role in emergencies, both in disseminating and collecting information about an incident. Codes of practice ensure that broadcasters have well-established procedures in place to enable, in consultation with emergency services organisations, the timely and tailored broadcast of warnings and information to the public during an emergency.

In October 2008, the then Ministerial Council for Police and Emergency Management – Emergency Management (MCPEM–EM) endorsed 12 National Emergency Warning Principles[1]. The principles (Attorney-General's Department 2008b) provide a framework that guides public warning activities. A number of States and Territories have developed their own protocols that reference these principles.

International Hyogo Framework for Action

The ten-year *Hyogo Framework for Action* (HFA) came out of the World Conference held in Kobe, Hyogo, Japan in January 2005. The HFA is the first plan to explain, describe and detail the work that is required from all sectors and actors to reduce disaster losses. It was developed and agreed to by the many partners needed to reduce disaster risk — governments, international agencies, disaster experts and many others — bringing them to a common system of co-ordination.

In 2015 the HFA will be updated. The United Nations Office for Disaster Risk Reduction (UNISDR) issued a call for input papers as part of the development of its 2015 Global Assessment Report (GAR15). The GAR15 will be published prior to the World Conference on Disaster Risk Reduction in 2015, in which governments will adopt a successor framework to the HFA.

This paper is a summary of a more detailed input paper that addresses Research Area 4, Priority for Action 2 — Core Indicator 3 from the HFA:

> *Early warning systems are in place for all major hazards, with outreach to communities.*

It attempts to broadly evaluate the progress made with early warning systems used in Australia since the commencement of the HFA in 2005.

1 National Emergency Management Principles at www.em.gov.au/Emergency-Warnings/Pages/Emergencywarningsguidelinesandprinciples.aspx.

Evaluation methodology

The National Emergency Warning Principles were used as a general evaluation framework to examine the progress made with early warning systems in Australia since 2005. However, international literature provided some additional measures and issues that were considered in the evaluation. For example, Parker and Neal (1990) identified approaches that should be considered in post-flood evaluation of flood forecasting and warning systems. This evaluation focussed on the main hazards for which early warning systems have been developed in Australia i.e. floods, bushfires, tropical cyclones and tsunamis.

The data for the qualitative evaluation was collected from a variety of sources including:

- consultations with emergency services agencies from Australian States and Territories. About half of these agencies responded to the request for data for this evaluation. They provided agency strategies, relevant reports, articles and papers
- post-disaster evaluations, including reports from royal commissions, government inquiries and after-action reviews, and
- between-event evaluations, conducted to gauge progress in particular improvements e.g. recommendations from a previous disaster inquiry.

Progress

The emergency management agencies consulted for this review all believed there had been considerable progress in early warning systems in Australia since 2005. Much of this progress had been triggered and guided by post-disaster reviews and inquiries such as the 2009 Victorian Bushfires Royal Commission, the Queensland Floods Commission of Inquiry and the Victorian Floods Review.

The progress identified included:

1. Forecasting and prediction. The BOM has upgraded its forecasts and warnings services. For example, in Queensland the number of locations across the State that obtain weather forecasts for seven days significantly increased after October 2013. The forecasts were presented as a combination of text and graphics. During 2014, services expanded further to include map-based graphical forecasts and the capability to generate a forecast for any location, including the coastal waters zones. The recently-launched MetEye™ provides access to maps of temperature, rainfall, winds and weather that are designed to make weather-based decision-making easier. In addition, rainfall information, including forecast probabilities of rain and average rainfall amounts, are issued for major centres across Queensland.

   The Bureau also provides predictions of the expected height of a river at a town or other important locations along a river, and the time this height is expected to be reached. This type of warning is normally the most useful in that it allows local emergency authorities and people in the flood-threatened area to determine the area and likely depth of the flooding. This type of warning can only be provided where there are specialised flood warning systems and where flood forecasting models have been developed. Progress has been made since 2005 in increasing the coverage of these warning systems and flood-forecasting models across Australia.

2. Intelligence. Emergency management agencies identified improvements in risk assessment and related GIS mapping as evidence of progress since 2005. With better understanding of the hazard risks and resultant emergency planning, agencies can provide more effective response and recovery.

3. Interoperability. There has been considerable improvement in emergency management agencies working together to prepare and disseminate warning messages. Provision of warnings is an important function of the Australasian Inter-Service Incident Management System (AIIMS). The widespread use of the system provides a structure for cross-agency co-operation during incident control.

   Progress with interoperability is also demonstrated by the integration of online warning and messaging into cross-agency alert websites. For example, Vic Emergency (http://emergency.vic.gov.au/map#now) is a single cross-hazard, cross-agency portal to communicate warnings across Victoria.

4. Public information officers. In those States and Territories that responded to the research, the role of the Public Information Officer in the Incident Control Centre (ICC) has been elevated to being directly responsible to the Incident Controller in the ICC. The public information officer and other public information staff have the role of preparing and disseminating warning messages during an emergency. According to the emergency agencies, direct involvement with the Incident Controller appears to provide more efficient and effective dissemination of warnings to the public.

5. Range of warning mechanisms. All levels of Australian government support a multi-modal approach to issuing emergency warnings. A multi-modal approach maximises the likelihood that as many people as possible will receive and comprehend a warning. These warning mechanisms range from traditional methods such as television and radio broadcasts, community meetings and sirens, to more modern methods, such as mobile telephone SMS messages and social networking posts (e.g. Facebook and Twitter). This makes it more likely that people will be in a position to take appropriate action to protect against loss of life, or injury, and to mitigate against damage to property (Attorney-General's Department 2013).

Of particular note is the Emergency Alert and use of social media platforms. Emergency Alert is the national telephone warning system used by emergency services to send voice messages to telephone landlines and text messages to mobile phones within a defined area related to possible or actual emergencies. It was established by the Australian Government in response to the Black Saturday bushfires of 2009.

The first widespread use of social media in an Australian disaster was by the Queensland Police Service in the Queensland floods in 2011. It provided an additional effective warning mechanism in this event (Bruns *et al.* 2012) and in subsequent emergencies across Australia.

6. The Standard Emergency Warning Signal (SEWS). In September 2004 the then Australian Emergency Management Committee (AEMC) supported a recommendation from the BOM that a set of clear, prescriptive and nationally-consistent guidelines for the use and application of SEWS should be developed. These guidelines provide direction and support to the State and Territory emergency management authorities. The States and Territories implement these guidelines as appropriate to their jurisdiction.

7. Principles and protocols. National documents such as the *National Emergency Warning Principles* (Attorney-General's Department 2008b) and the *Manual 21 Flood Warning* (Attorney-General's Department 2009) provide guidelines for early warning systems. Furthermore, several States have produced cross-hazard, cross-agency guidance documents such as the *Victorian Warning Protocol* (Victorian Government 2013). The protocol commenced in 2009 and provides emergency response agencies with co-ordinated and consistent direction on advice and/or warnings that inform Victorian communities of a potential or actual emergency event.

Future improvements

According to the responses from the Australian emergency agencies and major disaster reviews and inquiries, there are some aspects of early warning systems that can still be improved. These include:

1. Low levels of community preparedness. For tropical cyclones that occur reasonably regularly there appears to be relatively high levels of preparedness (King & Goudie 2006). For less frequent events such as flooding it appears that less than 20 per cent of people and businesses impacted have some kind of emergency plan that includes warnings (Molino Stewart 2009). More effective community education is recommended (Dufty 2008) to improve preparedness levels and adherence to early warnings.

2. Flash floods. Flash flooding in Australia is defined as flooding that occurs within six hours of the start of rain that causes it (Bureau of Meteorology 1996). The Victorian Floods Review (Victorian Government 2011) clarified the role of the BOM in providing flash flood warning services and the roles of government in the purchase, installation and maintenance of flash flood warning systems. The Review identified five core issues underpinning flash flood warning systems in Victoria:
   - The lack of definitive policy and direction on roles and responsibilities – the role of the BOM and other stakeholders in the delivery of forecasts and warnings of conditions likely to lead to flash flood events is not as clear as it needs to be.
   - Local government ability, in terms of financial and technical capacity, to establish, maintain and operate an effective flash flood warning system with regard to both technical and social aspects; unless there is active participation from local government, the framework breaks down.
   - The value of weather radar and timely local access to raw information on the likelihood of rainfall leading to flash flooding.
   - Awareness within the at-risk community that flash flooding is a credible risk and the circumstances that may give rise to an event.
   - Dissemination of meaningful and timely pre-scripted warning messages (that impart essential information in a way that is understandable and elicits appropriate responses) to those at risk from flash flooding.

3. Understanding response behaviours. There still appears to be public confusion and reticence, particularly about bushfire warnings and appropriate responses, even though the warning messaging is much clearer (in terms of evacuating early), and more relevant and tailored since the 2009 Black Saturday fires. Social research into community responses to bushfires in Western Australia in 2011 (Heath *et al.* 2011) found that:

   'Approximately one-half of all residents indicated that they either had no plan or that they wanted to wait and see how bad a fire was before taking any action. This result is quite concerning as the investigation into the Victorian bushfires of 2009 revealed that many bushfire related deaths occur after last-minute changes in plan.'
   (Heath *et al.* 2011, p. 2)

   Social research into the bushfires in NSW in January 2013 (Mackie, McLennan & Wright 2013) identified issues related to the effectiveness of bushfire warnings. The main findings included that few residents understood the implications of the different fire danger levels to their safety, and actions to take at each, apart from 'Catastrophic'.

Further work is being conducted by the Bushfire and Natural Hazards Cooperative Research Centre into the psychology of defending or evacuating once warnings are heard (e.g. McNeill *et al.* 2013).

4. Evaluation of early warning systems. The evaluation of early warning systems after emergencies and disasters is patchy (Dufty 2013). It is confined mainly to major inquiries and reviews for major disasters and agency after-action reviews. As cited in the findings, in some cases reports are commissioned to evaluate some aspects of early warning systems. Unfortunately, these evaluations are not consistently conducted after major emergencies and are not based on a standard set of indicators for the assessment of early warning system performance (Dufty 2013).

Conclusion

The research found that there has been considerable progress in Australian early warning systems over the past ten years. Progress particularly has been made in forecasting and prediction, intelligence systems, interoperability, and the increase in the range of available communication methods such as Emergency Alert and social media.

However, the research identified that further improvement could be made in some aspects of early warning systems such as raising low levels of community emergency preparedness in many Australian communities, designing effective flash flood warning systems, and understanding potential community response behaviours. Consistent evaluation of early warning systems – before and after emergencies – is also required.

References

Attorney-General's Department 2008a, *Emergency Warnings: Choosing your Words. Commonwealth of Australia. At: www.em.gov.au/Emergency-Warnings/Documents/EmergencyWarningsChoosingYourWordsEdition2.pdf.*

Attorney-General's Department 2008b, *Emergency warnings guidelines and principles. Commonwealth of Australia. At: www.em.gov.au/Emergency-Warnings/Pages/Emergencywarningsguidelinesandprinciples.aspx, [25 March 2014].*

Attorney-General's Department 2009, *Manual 21 Flood Warning. Australian Emergency Manuals Series, Commonwealth of Australia. At: www.em.gov.au/Documents/Manual%20 21-Flood%20Warning(2).PDF.*

Attorney-General's Department 2013, *Australia's Emergency Warning Arrangements. Commonwealth of Australia. At: www.em.gov.au/Emergency-Warnings/Documents/Australias%20 Emergency%20Warning%20Arrangements.PDF.*

Bruns A, Burgess B, Crawford K & Shaw F 2012, *#qldfloods and @QPSMedia: Crisis communication on Twitter in the 2011 south east Queensland floods. Brisbane, Queensland: ARC Centre of Excellence for Creative Industries and Innovation, Queensland University of Technology. At: http://cci.edu.au/floodsreport.pdf.*

Bureau of Meteorology 1996, *Bureau of Meteorology Policy on the Provision of the Flash Flood Warning Service.*

CSIRO & Australian Bureau of Meteorology 2014, *State of the Climate 2014. Canberra: Commonwealth of Australia.*

Dufty N 2008, *A new approach to community flood education, Australian Journal of Emergency Management, vol. 23, no. 2, pp. 4-8.*

Dufty N 2013, *Evaluating emergency management after an event: gaps and suggestions. Australian Journal of Emergency Management vol. 28, no. 4, pp. 15-19.*

Heath J, Nulsen C, Dunlop P, Clarke P, Bürgelt P & Morrison D 2011, *Community response to the February 2011 Bushfires. Summary Report. Bushfire CRC. At: www.bushfirecrc.com/sites/default/files/managed/resource/residents_report_-_bushfires_2011.pdf.*

ISDR 2006, *Global Survey of Warning Systems. A report prepared at the request of the Secretary-General of the United Nations.*

King D & Goudie D 2006, *Cyclone Larry March 2006 Post Disaster Residents' Survey. Centre for Disaster Studies, James Cook University and Australian Bureau of Meteorology.*

Mackie B, McLennan J & Wright L 2013, *Community awareness and understanding of bushfire safety: January 2013 Bushfires. Bushfire CRC. At: http://www.bushfirecrc.com/resources/research-report/community-understanding-and-awareness-bushfire-safety-january-2013-nsw-bus.*

McNeill I, Dunlop P, Flatau H, Skinner T & Morrison D 2013, *Defend or Evacuate? Why residents delay this decision. Fire Note, Bushfire CRC, Issue 112, July 2013.*

Middelmann MH (Editor) 2007, *Natural Hazards in Australia. Identifying Risk Analysis Requirements. Geoscience Australia, Canberra.*

Mileti DS 1999, *Disasters by design: a reassessment of natural hazards in the United States. Washington D.C.: Joseph Henry Press.*

Molino Stewart 2009, *May 2009 East Coast Low Flood Warning Community Feedback Report. Report prepared for the NSW State Emergency Service.*

Parliament of Victoria 2010, *2009 Victorian Bushfires Royal Commission. Final Report Summary.*

Parker DJ & Neal J 1990, *Evaluating the performance of flood warning systems. In Hazards and the Communication of Risk, Handmer JW & Penning-Rowsell EC (eds). Aldershot: Gower Technical Press: pp. 137–156.*

Queensland Floods Commission of Inquiry 2012, *Queensland Floods Commission of Inquiry Final Report. Queensland Government.*

Steffen W, Hughes L & Perkins S 2014, *Heatwaves: Hotter, Longer, More Often. Climate Council of Australia.*

UNISDR 2003, *Early Warning as a Matter of Policy. The Conclusions of the Second International Conference on Early Warning. 16-18 October 2003, Bonn, Germany.*

Victorian Government 2011, *Review of the 2010-11 Flood Warnings and Response. Final Report by Neil Comrie AO, APM. State of Victoria.*

Victorian Government 2013, *Victorian Warning Protocol Version 2.0. At: http://fire-com-live-wp.s3.amazonaws.com/wp-content/uploads/Victorian-Warnings-Protocol-v2.0-1August13.pdf.*

This paper is based on a presentation given at the ANZDMC Conference (Brisbane) in March 2014.

'All that I'm hearing from you is white noise': social media aggregation in emergency response

Tracy Whitelaw and Dr Donna Henson, Bond University, explain the Social Hub facility used by Brisbane City Council as a channel for emergency communication. ®

ABSTRACT

This paper provides a summary of the process used by Brisbane City Council to develop a Social Hub as a key social media aggregation tool to deliver critical messaging during the devastating weather event of January 2013 in Brisbane. It explores the power of social media aggregation as a validation tool of time-sensitive crisis information. Practical steps used by Brisbane City Council are addressed within a wider theoretical framework considering the importance of ensuring clear, easy-to-find social media messaging during a crisis.

Introduction

Government organisations tasked with emergency response must ensure that critical, validated messages cut through social media 'white noise'. With increased use of social media, emergency messages often originate from members of the public before traditional emergency response organisations are activated. Faced with a multitude of channels and social media updates in emergency response operations, identifying authoritative sources and their most current messaging can prove difficult for the public in a heightened state of emergency response.

Social media and emergency management

Social media refers to 'interaction among people in which they create, share and/or exchange information and ideas in virtual communities and networks' (Ahlqvist *et al.* 2008, p. 39). Common examples of social media include platforms such as Facebook, Twitter, YouTube, and Instagram, with Facebook and Twitter being the dominant channels chosen for use in emergency response (Using Social Media for Emergency Notification 2010). Recent emergency response events have demonstrated an increase in social media use as a crisis communication tool by individuals and emergency response organisations. For example, the earthquake events in Haiti (2010) and New Zealand (2011) saw the emergence of social media at the forefront of crisis response, with crowd mapping in the former (Yates & Paquette 2011), and Facebook employed widely in the latter (Dabner 2011). Similarly, Instagram images provided emergency responders with useful insight during *Hurricane Sandy* (Coscarelli 2012).

For crisis communicators, ensuring the right audiences receive the right message and respond accordingly is a significant part of effective social media use in a crisis. Crisis communication is defined for the purpose of this paper as:

> *'a perception of an unpredictable event that threatens important expectancies of stakeholders and can seriously impact an organisation's performance and generate negative outcomes'* (Coombs 2007, p. 2).

During a natural disaster, social media messages may centre on the people affected, or issues such as shelter, transport, food and other key necessities (Bird, Ling & Haynes 2012, Shaw *et al.* 2013, Taylor *et al.* 2012, Velev & Zlateva 2012). Wendling, Radisch and Jacobzone (2013) posit that there are increased expectations for government to use social media as part of their emergency response procedures. Use of social media at the height of a crisis can, however, be problematic. For example, Hart (2011) suggests the rapid and consistent release of information during an emergency can be fraught with delays and difficulties, including issues of access to technology, service disruptions, or general confusion about information sources.

Previous emergency responses show that mobile networks are relatively resilient and often remain operational during emergency events (Dufty 2011). A key challenge is that sharing content can lead to a rapid penetration of information in a short period of time that can eventuate in a 'long tail' (Anderson 2006). The term 'long tail' refers to a phenomenon in which posted information that has become redundant 'lives on' via social media sharing; this impacts on the viability of new, relevant information. If social media channels are not effectively used and monitored, 'social media information and activity simply becomes undistinguishable white noise that neither alerts nor corrects, which can be disastrous when a quick and effective response is critical' (Crowe 2014, p. 123). One solution to eradicate this 'noise' and ensure that key

information is received is to aggregate content in one central area that consistently updates.

Use of social media has become a key method of communication allowing emergency services agencies to broadcast and amplify critical information and emergency warnings to the public and other lead agencies (Banks 2011). In the evolution from traditional, centralised emergency response to a decentralised, citizen-led response process, it is crucial that organisations work to combat the risk of 'white noise' in social media during an emergency situation and, instead, find ways of collating and promoting information that is current, relevant and timely. This became evident for Brisbane City Council during the January 2013 weather event.

This paper examines the social media communication approach taken by Brisbane City Council during the January 2013 extreme weather event. It focuses on the use of Council's Social Hub social media aggregation tool during the period 24-31 January 2013. The objective is to show the problem, solution, justification and execution of deploying a Social Hub as a means of cutting out white noise in social media during an emergency or disaster situation. Key metrics and information from the Social Hub have been examined as part of the larger methodology including growth, number of visitors, content, reach and public feedback. To obtain these metrics, the inbuilt analysis tools of the Social Hub were used alongside a more detailed analysis from social media monitoring program.

Problem: Australia Day weather event, 2013

During the Australia Day weekend in 2013, Brisbane faced a significant flood emergency. Floodwaters were expected to inundate the city and Brisbane City Council activated their Local Disaster Coordination Centre (LDCC).

To address the risk of important emergency messages being buried in social media channels, the Council deployed a social media aggregation tool known as a 'Social Hub'. The Social Hub is a 'one-stop-shop' interactive web-based page where individuals can find relevant emergency information and information from other lead agencies, emergency responders, media and the community. It was deployed to deal with three imperatives, which were set by Council and derived from recent flood experiences in 2011. The imperatives were:

1. Council must share information about an impending disaster situation to a key target audience as quickly as possible.
2. Council must improve on previous communication via social media to meet the increasingly sophisticated demands of online communities.
3. Council must ensure that essential crisis communication information is easily accessible on smart devices.

Brisbane City Council has an active and engaged online community and it was important that information was provided through the various stages of the crisis event. This included the preparedness stage to the recovery stage. Many businesses were closed for the Australia Day holiday so traditional methods of sharing information proved more difficult.

Solution: a Social Hub?

A Social Hub is a social media aggregator tool that can be customised and deployed via a public URL (social.brisbane.qld.gov.au). By putting key information in one location it is easier to minimise 'white noise'. Emergency managers use the tool to validate information, while the community views it to make decisions on their safety. Without 'tools to aggregate and validate the plethora of rumours, anecdotes and buzz-worthy information, it was challenging for impacted individuals to get a clear, concise, and accurate picture of what had happened' (Crowe 2014, p. 122).

Brisbane City Council deployed the Social Hub in mid-2012. It was not promoted as a critical source of emergency information, but rather as a general location for Council information. The Social Hub works by aggregating content from Facebook, Twitter, YouTube, Flickr, Pinterest, Instagram and RSS feeds based on keywords or specific accounts. Content from the Council's website and content from other lead agencies was aggregated. Figure 1 shows the Social Hub during an emergency response.

Figure 1: Brisbane City Council Social Hub, Australia Day 2013.

The Social Hub allowed the Council to arrange information based on 'latest' or 'greatest'. During an emergency information is displayed as 'latest' to show newest information first, rather than highest engaged content. The information dynamically updates ensuring critical information appears at the top of the page. Crowe (2014) highlights the importance of aggregation by stating that:

> *'... aggregation is critical to the validation of time-sensitive social media information. This type of information is most common in disasters and emergencies due to the ever-changing flow of information during an event and immediately afterward as the picture comes into focus. It is critical to understand whether information is event related or simply indistinguishable white noise.'* (p.125)

The system features a manual override where important information can be pinned to the top of the page to ensure as many individuals as possible see it when they first visit. A 'collective voice' also means content valued highly by the community can be featured on the Social Hub. The ability to 'vote up' content is similar to sites such as StumbleUpon and Reddit. This facility allows the community, as well as content providers, to use a collective voice and promote content on the Social Hub.

The Theory of Social Validation (Weinschenk 2009) states, 'when people are uncertain about what to do we will look to other people to guide us... and we do this automatically and unconsciously.' (as cited in Akil 2009). Within the Social Hub, the application of social validation is evident. Content the Council and the community views as important is pinned to the top to be shared with others or voted as critical. Within Brisbane City Council Digital Services Team, there is an accepted benchmark for validating content that is often summed up as 'if ten people tell you the road is closed, the road is closed'. The guiding principle behind this ideology is that in the social media space community members validate each other's content and original posters have vested interests in being seen as authoritative sources. Via the Social Hub, the social validation of information translates to an ability to prioritise information and an improved situational awareness. Validation is an important step in both the public consumption and internal use of information.

Consistent with Social Validation Theory, site content was collated from pre-approved social media accounts from Brisbane City Council, Queensland Police, SES, Energex, 4BC Brisbane, 612ABC Brisbane, ABC Radio Brisbane and TransLink. These agencies are part of Council's 'Credible Sources List' and their information is deemed trusted, authoritative and is prioritised. During the Australia Day storm, the Council's Social Hub received over 230 001 page views with 72 per cent of visitors returning. Council's tweets about the Social Hub reached over 93 266 people on Twitter. Figure 2 shows one of the tweets shared.

Justification: evolution of aggregated content

Issues identified from the 2011 flood event influenced the strategic implementation of the Social Hub by Brisbane City Council. For example, despite factual information being released via social and traditional media, questions around the safety of drinking water continued for 48 hours after erroneous reports. In an attempt to stem this misinformation and the 'long tail' effect (Anderson 2006) the Queensland Police Service used the #mythbuster hashtag as shown in Figure 3.

Figure 2: Tweet from Brisbane City Council on the Social Hub.

Figure 3: QPS Media tweet regarding false information about drinking water.

The collective voice or wisdom of the crowd, when influenced by key agencies, also enables self-correction (Surowiecki 2004). The community is motivated to amend erroneous information, particularly when external authorities intervene. Social media eventually has a leveling effect where erroneous information is corrected due to users being invested in ensuring their information is validated (Crowe 2104). Emergency response agencies using social media aggregation tools can also easily see misinformation and can intervene.

As a visual representation of social media in real-time, the Social Hub was strategically deployed to increase visibility of key messages to users who may not be comfortable using dedicated social media channels such as Facebook and Twitter. By having a 'one-stop-shop' available via a website, people without Facebook or Twitter accounts are able to get the same information as others, as exemplified in the story of a Sydney resident who used the Social Hub to update her elderly mother in Brisbane. With important content being pinned to the top of the Social Hub, the resident was able to call her mother and inform her about evacuation information, transport disruptions and weather updates.

The Social Hub is an evolution from existing aggregation tools that have proven successful in crisis, such as Twitter lists (Holdeman 2009). In the January 2011 floods, the Council created a Twitter list of all relevant lead agencies, media and influential community members. It was used as an active means of consolidating information and reducing noise, clearly demonstrating the utility of aggregating social media content to improve validity and extend the reach of messages.

Summary

Brisbane City Council's experience suggests that aggregation tools in social media can combat white noise during an emergency situation and provide validated, easily located content to both the public and emergency management staff. To achieve cut-through and validation in the space, crisis communications delivered by organisations must be:

1. Easy to access — pages contain relevant, validated content in an easy-to-find location that works on all smart devices and desktop computers.
2. Authoritative — single source of truth is endorsed by a credible organisation and provides the online community with key information.
3. Useful — internal parties can easily see the information needed without having to search across various networks.
4. Shareable — content can be easily shared with individuals via their own social media networks, increasing the reach and impact of important information.
5. Time-sensitive — real-time information is shared on the Social Hub as it is created, allowing content to be highlighted or shared as needed.

To deliver viable communication via social media during an emergency, organisations can ensure they achieve cut-through by implementing a social media aggregation tool. Without this, white noise in social media can become distracting, be detrimental to preparedness, action and recovery, and can be misleading. The adoption and evolution of social media use requires organisations to find ways of sharing information in a visually appealing, easy-to-access way that lends itself to social validation and easy syndication. The Social Hub is an integrated part of Disaster Operations at Brisbane City Council and is used across areas such as the city's Contact Centre. The Social Hub has been a successful deployment of a social media aggregation tool during an emergency response and offers a model for other organisations to consider.

References

Ahlqvist T, Bäck A, Halonen M & Heinonen S 2008, *Social media road maps exploring the futures triggered by social media. VTT Tiedotteita – Valtion Teknillinen Tutkimuskeskus (2454): p. 13.*

Akil B 2009, *The Theory of Social Validation. Psychology Today. At: www.psychologytoday.com/blog/communication-central/200909/the-theory-social-validation, [3 February 2014].*

Anderson C 2006, *The Long Tail: Why the Future of Business Is Selling Less of More. New York: Hyperion.*

Banks L 2011, *Q&A: Emergency 2.0 Wiki. At: www.computerworld.com.au/article/400312/q_emergency_2_0_wiki, [17 February 2014].*

Bird D, Ling M & Haynes K 2012, *Flooding Facebook – the use of social media during the Queensland and Victorian floods. The Australian Journal of Emergency Management, vol. 27, no. 1, pp. 27-33.*

Coombs J 2007, *Ongoing Crisis Communication. Planning, Managing and Responding (second edition). Thousand Oaks: Sage Publications Inc.*

Coscarelli J 2012, *Hurricane Sandy: A Perfect Social Media Storm. Retrieved March 10, 2014. At: http://nymag.com/daily/intelligencer/2012/10/hurricane-sandy-perfect-social-media-storm.html.*

Crowe A 2014, *Disaster 2.0: The Application of Social Media Systems for Modern Emergency Management [Kindle Edition]. CRC Press. Retrieved from Amazon.com.*

Dabner N 2011, *'Breaking Ground' in the use of social media: A case study of a University earthquake response to inform educational design with Facebook. The Internet and Higher Education, 15, 1, pp. 69-78.*

Dufty N 2011, *Using Social Media for Natural Disaster Resilience. DCAP.*

Hart L 2011, *Social media in Doorley, J. and Garcia, H.F. (Eds) Reputation Management: The Key to Successful Public Relations and Corporate Communication, CRC Press, Boca Raton, FL, pp. 113-33.*

Holdeman E 2009, *Fort Hood Shooting and Social Media Accuracy. Emergency Management Magazine, Nov 7.*

Shaw F, Burgess J, Crawford K & Bruns A 2013, *Sharing news, making sense, saying thanks: Patterns of talk on Twitter during the Queensland floods. Australian Journal of Communication, 40(1), pp. 23-40.*

Surowiecki J 2004, *The Wisdom of Crowds. Doubleday: Anchor.*

Taylor M, Wells G, Howell G & Raphael B 2012, *The role of social media as psychological first aid as a support to community resilience building: a Facebook study from 'Cyclone Yasi' Update. Australian Journal of Emergency Management, vol. 27, no. 1, pp. 20-26.*

Using Social Media for Emergency Notifications 2010, *At: http://idisaster.files.wordpress.com/2010/06/socialmediaforemergencymanagers.pdf, [8 February 2014].*

Velev D & Zlateva P 2012, *Use of social media in natural disaster management.* International Procedure of Economic *Development and Research. 39, pp. 41-45.*

Weinschenk S 2009, *Neuro web design: What makes them click? Berkeley: New Riders.*

Wendling C, Radisch J & Jacobzone S 2013, *The Use of Social Media in Risk and Crisis Communication. OECD Working Papers on Public Governance, No. 25, OECD Publishing. http://dx.doi.org/10.1787/5k3v01fskp9s-en.*

Yates D & Paquette S 2011, *Emergency knowledge management and social media technologies: A case study of the 2010 Haitian earthquake. International Journal of Information Management, 31, pp. 6-13.*

About the author

Tracy Whitelaw is researching social media use in crisis communication as a PhD student at Bond University. She works as a Senior Social Media Strategist for Brisbane City Council.

Co-author, **Dr Donna F Henson** is an Assistant Professor of Communication in the Faculty of Society and Design at Bond University. Her research interests currently center on meaning-making post-trauma, narrative, autoethnography and communication.

Bracing for the 'new normal': how communities are preparing for disasters

Journalist Rosemarie Lentini talks with Gwen Camp, Director of Individual and Community Preparedness, FEMA.

Gwen Camp, Director of Individual and Community Preparedness at the United States Federal Emergency Management Agency

When it comes to disasters, resilient communities are prepared communities.

From the outbreak of disease to the devastation of bushfires, people who have planned for emergencies are usually the first to recover. But despite a spike in the frequency and severity of hazards, less than half of all Americans know what to do before, during or after them. Most don't think they will be affected.

Gwen Camp, Director of Individual and Community Preparedness at the United States Federal Emergency Management Agency (FEMA) said, 'Some of the numbers around Americans being prepared actually really shocked me.

'In 2012, FEMA did a national household survey[1] and found that only 39 per cent of individuals have a household emergency plan. That's the sort of thing that tells me we have a long way to go,' she said.

To improve resilience and stem the increasing economic cost[2] of disasters, US President Barack Obama signed the Presidential Policy Directive-8 (PPD-8) in 2011.

It requires that all levels of government, the private and nonprofit sectors, and citizens, 'share responsibility' for national preparedness.

The directive prompted FEMA to launch *America's PrepareAthon!* — a national community-based campaign to get people thinking about, and planning for, emergencies that are common in their region. FEMA has provided online tools and templates to guide local actions, including information on registering for alerts, finding shelters, and what to pack in the event of a disaster.

Australia has also adopted a whole-of-nation resilience-based approach to disaster management. In 2009, the Council of Australian Governments (COAG) agreed that a national, co-ordinated effort was needed to enhance the country's ability to handle and recover from manmade and naturally occurring hazards. The Australia–New Zealand Emergency Management Committee subsequently developed the *National Strategy for Disaster Resilience* (NSDR), adopted by COAG in February 2011.

'The goal is getting people to take responsibility for preparedness. It lies in people taking action in their own communities,' Ms Camp said, referencing the objectives of PPD-8.

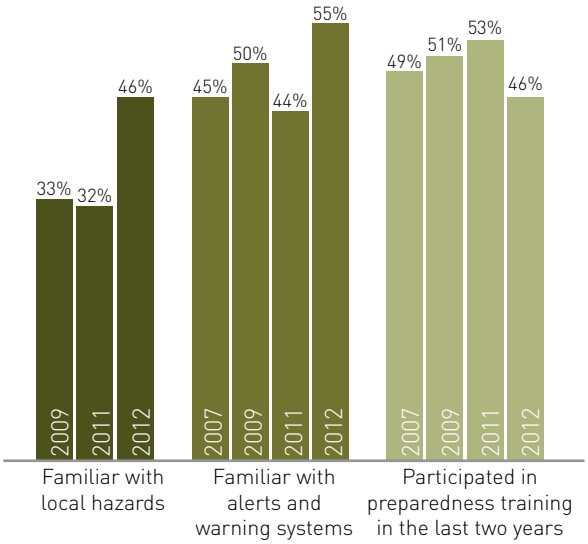
'You might think about disasters fairly regularly but have you actually had a conversation about what you would do if a disaster occurred when you're at work and separated from your kids? Do you know if your kid's school has an emergency response plan? That's what we're trying to move the needle on (with *PrepareAthon*),' she said.

On April 30, FEMA ran its first *America's PrepareAthon!* to 'test what a national day of action would look like', hoping that at least 250 000 Americans would get on board. More than four million registered.[3] Communities and organisations spent at least 30 minutes undertaking actions including fire drills and building emergency kits.

1 FEMA 2013, 'Preparedness in America: Research insights to increase individual, organizational, and community action'. US Department of Homeland Security.

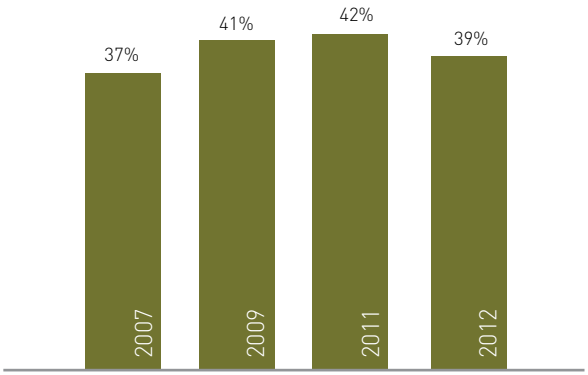
2 National Academies. 'Disaster Resilience: A National Imperative' (2012).

3 Individuals and organisations register to participate in America's PrepareAthon online. At: www.community.fema.gov/connect.ti/AmericasPrepareathon.



Data source: Federal Emergency Management Agency

Figure 1: Americans informed about disasters.



Data source: Federal Emergency Management Agency

Figure 2: Americans who have an emergency plan and have discussed it with household.

'It showed there's a real hunger for (preparedness) at the community level. We had participation from all 50 states and all the territories, with everyone from faith-based groups to schools to college campuses,' Ms Camp said.

Incredibly, the whole town of Smyrna in Georgia's north got involved.

'They had a new facility in their hospital built that they wanted to exercise. They tested the tornado sirens for the whole town. All the kids in the elementary school practiced doing a tornado drill. The kids in the high school signed up for smart phone alerts,' Ms Camp said.

FEMA was tasked with replicating this local effort in towns across America for their next (and first fully fledged) *PrepareAthon* on September 30. Drawing on lessons from the test-run, FEMA revised its online materials and filmed interviews with 'disaster survivors' to engage more community partners and participants.[4]

Building resilience to natural disasters is not only an American priority. Australia, known for its harsh extremes in climate, is prone to bushfires, drought, tropical cyclones and floods. For Ms Camp, Australian experiences of managing disasters have helped guide her thinking in the development of *PrepareAthon* programs.

'Australia is similarly a big and complicated country to the US, with a lot of different environments. It's a pretty natural marriage,' Ms Camp said.

Ms Camp attended the Disaster Resilient Australia School Education Network (DRASEN) forum in Australia in March[5] this year at the Australian Emergency Management Institute (AEMI). She was a keynote presenter and said the experience was 'inspirational'.

DRASEN is comprised of 35 educational and government representatives from more than 25 agencies and aims to develop and improve disaster education in Australia.

'You have this international body of emergency management agencies, you have policy makers and representatives from the Fire Commission, Red Cross, Save the Children.

'What DRASEN is already doing is something we are striving for (with *PrepareAthon*) which is to bring all the partners you need to the table to have these conversations.

'Emergencies are not going to be managed well if only emergency managers are at the table making these plans. DRASEN was a great example of Australians being really smart about disaster awareness. DRASEN is just exactly the kind of conversation that's going to build resilience in a very real way,' she said.

Developing relationships with specialists in other countries is critical to building national resilience, Ms Camp said.

'We just this year upgraded our 24/7 points of contact. The US National Response Coordination Center and the Australian Crisis Coordination Centres are now connected 24/7. We can now exchange information a lot more quickly,' Ms Camp said.

The Memorandum of Understanding between Australia's Attorney-General's Department and the

4 Participants register online at: www.ready.gov/prepare.

5 The Disaster Resilient Australia School Education Network forum was held at the Australian Emergency Management Institute on March 24 and 25 2014.

Gwen Camp and her team used social media to educate millions of people in the US about disaster resilience.

US Department of Homeland Security, signed in 2010 to strengthen emergency response co-operation, requires that both countries establish a framework to facilitate ongoing dialogue. Opportunities to share information, including through DRASEN forums, has enabled Ms Camp to address *PrepareAthon* campaign shortfalls. Drawing on international experiences and the knowledge of experts is key to enhancing resilience and saving lives, she said.

'Raelene Thompson, the Executive Director of AEMI, is just a wealth of information. She is doing a lot of great work around uniting health officials and professionals with emergency management officials which is something we have been working extensively on here (in the US) for the last five years.

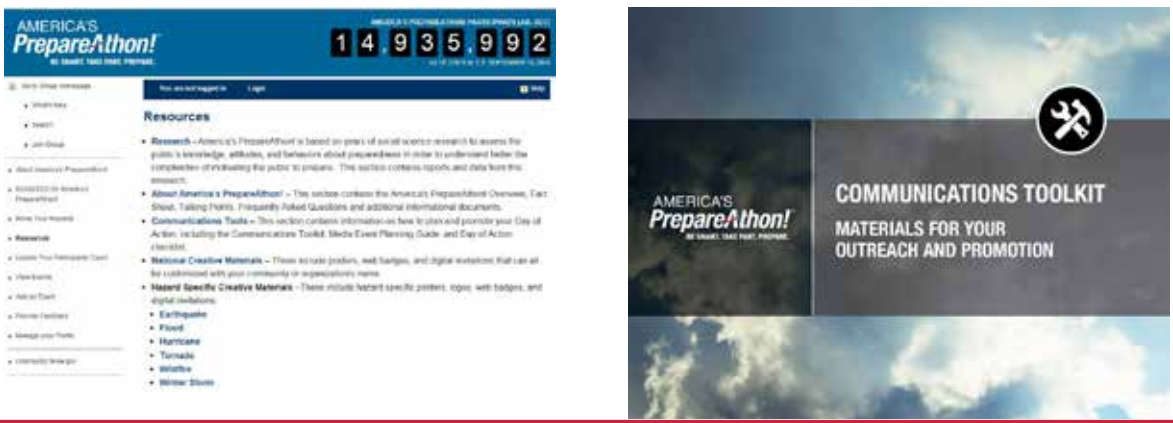
'I was amazed in my previous role as Director of Intergovernmental Affairs for FEMA and going into some places where emergency managers and health officials didn't even know each other.

'One of the expressions in our business is "a disaster is no place to exchange business cards".

'AEMI is great at identifying who the community partners are that we should be talking to and training them up, because it's not just emergency managers that we need,' Ms Camp said.

About the author

Rosemarie Lentini is an Australian journalist based in New York City. She has worked as a reporter and columnist at The Daily Telegraph and presenter at Radio 2ser 107.3FM. She was also a policy analyst at the Australian Communications and Media Authority.



Resources on the US *PrepareAthon!* website include the Communications Toolkit, Media Event Planning Guide, and Day of Action checklist.

This paper is based on a presentation given at the EMPA NZ Conference (Auckland) in May 2014.

Enhancing community resilience: what emergency management can learn from Vanilla Ice

Dan Neely, Manager, Community Resilience, Wellington Region Emergency Management Office, shares the practical ways community resilience is being built in New Zealand.

ABOUT WREMO

The Wellington Region Emergency Management Office is a semi-autonomous organisation that co-ordinates civil defence and emergency management services on behalf of the nine councils in the Wellington region in New Zealand.

Website: www.getprepared.org.nz

Email: wremo@gw.govt.nz

Facebook: www.facebook.com/WREMOnz

It might seem odd to think that Vanilla Ice should act as a guidepost for the future of the emergency management sector, but stay with me, and I'll do my best to explain how *Ice Ice Baby*[1] has become a mantra in Wellington.

Nearly three years ago, the nine local councils throughout the Wellington Region were amalgamated to form the Wellington Region Emergency Management Office (WREMO). The goal was to adopt a singular approach across the region as well as rethink how emergency management is practiced in our communities. This directive gave the new Regional Manager, Bruce Pepperell, the mandate to explore non-traditional organisational models and methodologies. With the Christchurch earthquakes fresh in our minds, 'community resilience' became a particular area of focus for the new WREMO, with one-third of the organisation's resources dedicated to delivering resilience outcomes.

Resilience is, quite possibly, the buzzword of the decade and much nuanced discussion has been made regarding what a resilient community looks like. Unfortunately for practitioners, there are few guideposts that outline how to operationalise resilience and what our role should be in that process. The Christchurch earthquakes of 2010 and 2011 reframed the sector's understanding of just how amazingly capable and innovative the public is during response and recovery. The challenge for emergency managers is how to harness that energy to help build stronger, more connected and prepared communities. One of the keys to unlocking this challenge is to help communities function well every day, not just during and after an emergency event.

1 Ice Ice Baby is the title of a song by artist, Vanilla Ice, from the 1989 album 'Hooked'.

Build capacity, increase connectedness and foster co-operation

In 2013 the editor of *TIME* magazine wrote, 'we are living through the most immense transfer of power from institutions to individuals in history' (Sept 30, 2013). This decentralisation of power is occurring across the world in the forms of Wikileaks, citizen journalism via Twitter, and the spontaneous formation of groups like the Student Volunteer Army that largely shaped the Christchurch response. The internet and mobile phone are empowering individuals to organise themselves in ways unimaginable in the recent past. As one of the institutions of power, emergency management needs to embrace this shift and recognise it as an opportunity to create meaningful partnerships with our community leaders across all phases of emergency management.

Relationships matter. There is a significant body of research that highlights the important role of social relationships in response and recovery. Just as our everyday lives rely on the support of family, friends and wider acquaintances, these established relationships are often the best resource during and after an emergency event.

For the new Community Resilience team, the first step was to move past 'public awareness' and 'survival' towards increasing the connectedness of communities and enabling people to feel empowered to manage their households and neighbourhoods in the event of an emergency. We needed to move from promoting can openers to promoting co-operation. The team wanted to work with community leaders in more collaborative ways, become facilitators of *their* ideas and help them create pathways to connect with each other, and us.

Finally, we wanted to create a system that linked the informal community response and recovery to the formal government one. To achieve this, we had to step away from the command-and-control comfort zone towards something more akin to community development. This required a re-examination of what we thought we knew and resulted in some upskilling of the team with training in facilitation, storytelling, Design Thinking, and marketing. Most importantly, we had to learn to listen better to communities and partners. If we are going to create an environment that empowers others to be more connected and prepared, we must really understand their diverse interests and needs. If command-and-control is the appropriate model for response, then communicate-and-collaborate has become WREMO's complementary model for enhancing community resilience. It is an organisational structure that is more akin to a plate of spaghetti where relationships intertwine and overlap, instead of connecting through a defined structure like an incident command system. This 'messy' connectedness approach aligns with WREMO's goal of being a 'network enabled' organisation, whereby a small team is leveraging off the efforts of others as well as the benefits of modern technology.

Stop. Collaborate and listen

Setting aside the artistic merits of *Ice Ice Baby*, the song's opening line provides sufficient guidance for practitioners to begin effectively engaging with communities. By adopting a communicate-and-collaborate mindset, we cease doing things *to* communities and approach our work with them as partners.

To help guide our resilience compass north, the team developed a *Community Resilience Strategy* that provides a set of engagement principles, such as '*listen first*' and '*focus on local solutions*', as well as a range of tools for individuals and organisations to get involved in ways that are appropriate for them, not us. Instead of educating everyone to achieve 'Rambo Level 5' preparedness, the approach has focussed on developing a wide range of tools that cater to diverse interests and levels of commitment. For the less enthusiastic, minimal engagement might be through a painted blue tsunami marker line on the road or nothing more than following WREMOnz on Facebook. For those who have greater interest or time, completing a CDEM volunteer training program or participating in the creation of community response plans helps build capacity and foster co-operation. A Continuum of Engagement model presented in Figure 1 provides an example of how these tools are represented by a person's level of interest.

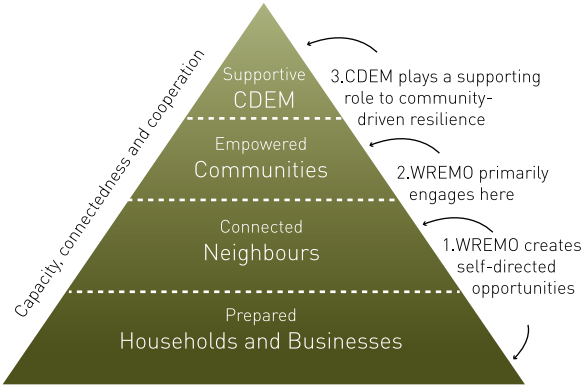
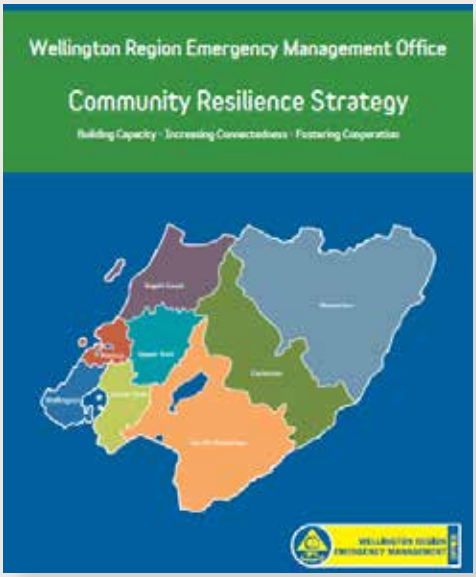


Figure 1: Model of Community-Driven Emergency Management.

To implement this communicate-and-collaborate model, each team member is given a geographical area of responsibility with a staff-to-resident ratio of roughly 1:75 000. When viewed from this perspective, the large connectedness challenges are obvious, which is why, philosophically, we have moved away from presenting to classrooms of children, onto meeting with school principals to implement school-wide response and education plans. This approach begins by building capacity, increasing connectedness and fostering co-operation with householders and businesses as the foundation of connectedness, represented by the System of Community-Driven Emergency Management shown in Figure 2.



Community Resilience Strategy.
At: www.getprepared.org.nz/publications.

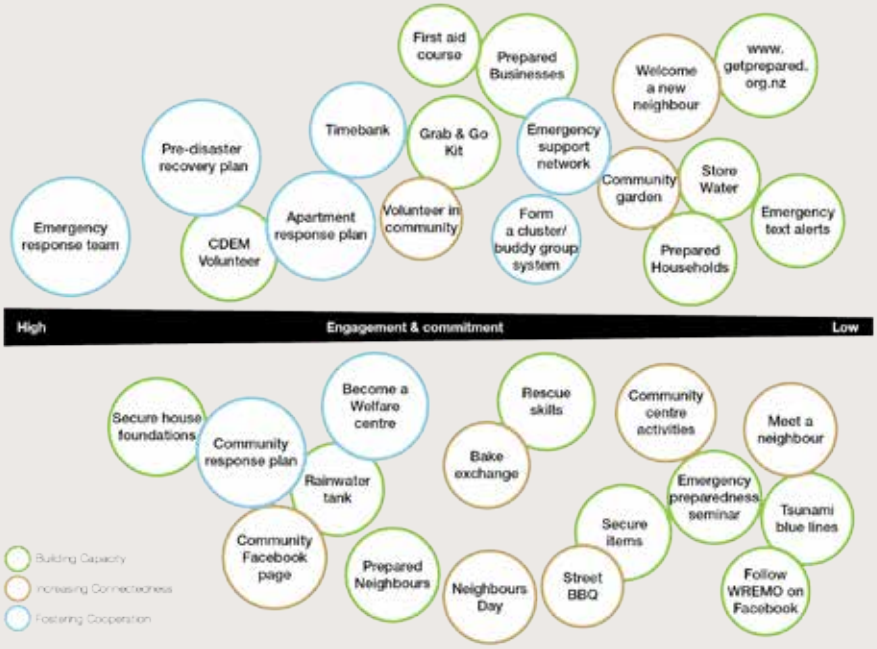


Figure 2: WREMO tools on a continuum of engagement.

Building on this foundation the next level emphasises the relationships of neighbours, which is our number one preparedness resource promoted before, during and after an emergency. The majority of tools developed for these two groups, such as the *It's Easy* suite of emergency preparedness guides, can be applied without the guidance or support from an Emergency Management Advisor.

The third level illustrates the focus on working with local leaders to bring about change within their networks. Some of the drivers of change include school principals, managers of social agencies, and locally elected community members. Finally, representing the least amount of space in this model is the overarching role of a 'supportive CDEM'. This is a change of mindset for our organisation and reflects how we have evolved to seeing our community as partners.

Armed with this diverse set of tools (and a razor thin budget), each member of the team is embedding themselves into their defined geographical areas. They are seeking out community leaders, listening to what matters to them, and helping with initiatives that increase their area's connectedness and preparedness. Another way we are achieving this is by allocating ten per cent of the team's time to support community organisations in ways that have little or nothing to do with emergency management. This might take the form of spending a couple hours just getting to know the people in their environment or providing hands-on assistance at a community event. All of these inputs lead to the enhanced resilience of our region, whether it be in preparing for an inevitable large earthquake or managing the stressors of life's day-to-day challenges.

Community resilience tools

Tsunami Blue Lines

Capturing the public's attention and motivating them to act is one of the biggest challenges facing planners and communicators. A pilot community was established to look at the use of tsunami signage in Wellington. The community could choose between traditional signage and 'something else' they could design. Community members jumped at the opportunity to create their own solution, which they did by painting big blue lines on roads to mark the maximum run-up height of a tsunami. The impact and buzz around the concept has been remarkable and independent researchers have found it has raised tsunami awareness by both locals and visitors. This innovative approach was made possible by creating the 'white space' for communities to consider and design their own solutions. The result was powerful and cost-effective solution that would never have been considered within the office environment.

CDEM volunteer training

The CDEM volunteer program teaches community members how to promote preparedness in two-minute conversations within their own networks (without sounding like fanatics), provides assistance to the official CDEM response, and supports their community after a large disaster. We no longer maintain a team format, we do not require a time commitment, we do not issue NZ Unit Standards nor teach CIMS. Instead, the CDEM volunteer training involves teaching large numbers of people the basics of emergency co-ordination and how to provide comfort in an emergency so that a community response is more

effective and efficient from the outset. We have experienced a huge surge of interest since revamping this program because the approach supports a way for anyone to get involved and contribute.

Community members are encouraged to promote preparedness in their local areas.

Preparedness enablers

To make preparedness products affordable and fit-for-purpose, we worked with private suppliers to create preparedness enablers that sell for half the price of similar products on the market. Examples include the Grab & Go Emergency Kit and the 200L Emergency Rainwater Tank. These products have been hugely popular and have helped householders and businesses make tangible improvements in preparedness. Creating ways to leverage off the private sector is the future for our team.

Social media

Increasingly, emergency management planners recognise the value of using social media to push messages and gather information during a response. Although it might seem counterintuitive, the WREMO team seldom posts emergency preparedness messages on its Facebook page. Instead, posts are generally about community events and ideas that bring people together. The guideline is that social media postings must be interesting to followers and somehow lead to stronger communities. Of course during an emergency posts are relevant and provide information for the public. This community approach has enabled Facebook/WREMOnz to build trusted relationships with its users and has fostered one of the largest followings for an emergency management office in the world with more than eight per cent of our public following the page.

Community-driven response plans

Ideally, communities should be able to look after themselves without the assistance of emergency services for the first few days after a disaster. We are helping to achieve this by bringing together leaders and managers of large resources within communities to meet each other, often for the first time, to work together to determine how they would address a set of common challenges following a devastating earthquake. Each plan is enabled by a Memorandum of Understanding with the local council to support and fund a community-driven response. This simple act goes a long way to build trust between community leaders and local government. The goal is to keep the working groups together by facilitating their collaboration and ideas on other projects that *'make their community even more awesome'.*

We're learning as we go and we need your help

The approach to community resilience is an ongoing and adaptive process based on research, existing good practices in community development, and the willingness to trial and make errors. We are doing the best we can by our communities and in many respects, learning as we go. WREMO is working with other practitioners in the region and across the country such as our local councils, NZ Red Cross, and Marae. We are collaborating with leading international practitioners such as Daniel Homsey from the City of San Francisco Neighbourhood Empowerment Network and researchers like David Johnston and the team at NZ's Massey University Joint Centre for Disaster research. In a shared initiative, the *Community Resilience Strategy* has become the foundation document for an International Centre of Excellence in Community Resilience (ICoE:CR) through the Integrated Research on Disaster Risk, a program within the United Nations Office for Disaster Risk Reduction. The goal of the Centre is to bring researchers and practitioners together to help answer the question, *'how does a community make itself resilient to future disasters?'*

The Resilience Toolbox

Enhancing community resilience is a challenge many cities around the world are actively exploring. We are asking for your help to advance the practice of community resilience by sharing your work and research with us at www.resiliencetoolbox.org. Through the ICoE:CR, we have developed the Resilience Toolbox as an online knowledge-sharing bank of tools and practical research that helps answer the 'how' question. All of WREMO's tools, as well as a growing list of partner resources, are freely available online.

Taking a cue from Vanilla Ice: the more we collaborate and listen to one another, the more our communities will benefit.

Notes from the field

Learning from adversity at a key industry conference

By Nathan Maddock, Communications Officer, Bushfire and Natural Hazards CRC

This year's AFAC and Bushfire and Natural Hazards CRC conference was one of the best yet. Top quality keynotes speakers and sessions were accompanied by award presentations that recognised leaders in the industry.

Nearly 1 100 emergency services representatives and researchers converged on Wellington, New Zealand in early September for the annual Australasian Fire and Emergency Services Authorities Council (AFAC) and Bushfire and Natural Hazards Cooperative Research Centre conference. The conference is the leading knowledge-sharing event for fire, land management and emergency services, with delegates attending from across Australia and New Zealand, as well as the US, UK, Korea and many Pacific Islands.

The theme for the conference was 'After Disaster Strikes – Learning from Adversity'. Unfortunately there is no shortage of disasters to learn from. Last summer, Australia experienced some of its most extreme heatwaves. New Zealand is still coping with the devastating Canterbury earthquakes, while several Pacific neighbours are still recovering from cyclones and tsunami.

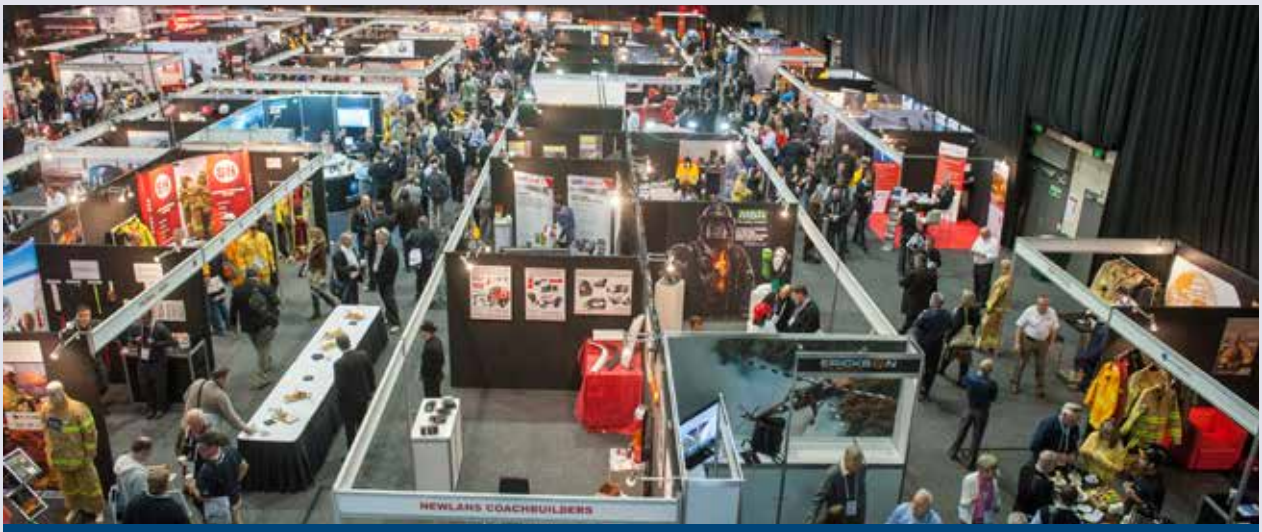
Natural and man-made disasters strike all countries, but particularly in our region, said AFAC CEO Stuart Ellis.

'The conference was designed to bring together and share the combined wisdom of experience, research and analysis from across the sector to enable a deeper understanding of the approaches needed to secure the region's future and prosperity,' he said.

Bushfire and Natural Hazards CRC CEO, Dr Richard Thornton, said the conference showed why research and innovation are more important now than ever.

'The week was a great opportunity for all emergency management practitioners to learn what we are discovering about the biggest challenges in emergency management across Australasia, especially learning from New Zealand's Canterbury earthquake experience, and finding ways to use this knowledge every day to make our communities safer,' Dr Thornton said.

National Commander of the New Zealand Fire Service Paul Baxter, Chief of the Chicago Fire Department Jose Santiago, and AFAC CEO Stuart Ellis share a laugh.



The trade show was a popular aspect of the conference.

BNHCRC CEO Richard Thornton opened the Research Forum.

A traditional Māori pōwhiri opened the conference.

This year's conference saw the Bushfire and Natural Hazards CRC partner with AFAC for the conference, taking over from its predecessor the Bushfire CRC. The research of the CRC was on show all week, but kicking off the conference on day one was the sold out Research Forum. The Forum showed why research and innovation are vital precursors for safer communities and better environmental management. Latest research by 31 researchers from universities and agencies across Australia, New Zealand and the US covered severe weather, community safety, heatwaves, flood risk, the economics of natural hazards, infrastructure planning, fire modelling, and volunteer management.

Several awards were presented to industry personnel during the conference opening. The Laurie Lavelle Awards, acknowledging significant contribution to the knowledge or skills, operations, performance or public profile of the emergency services sector, was jointly presented to Anthony Clark of the New South Wales Rural Fire Service and Mark Wright from the Tasmania SES. The Motorola Knowledge Innovation Awards, recognising innovation, creativity and contribution to the advancement of knowledge management, were taken out by the New Zealand Fire Service and the Country Fire Authority, with an individual award presented to Richard Host from Fire and Rescue New South Wales. Poster awards, sponsored by Dräger, were also presented. The judge's award went to Lisa Langer and Mary Hart of Scion Research, while the People's Choice award was taken out by Fire and Rescue NSW Samantha Colwell. A special award was presented to outgoing Bushfire CRC CEO Gary Morgan for his contribution to establishing the national science and research program for bushfires and natural hazards.

The week also featured four Professional Development Programs covering: an introduction to emergency management for those new to the sector; the Australasian Inter-agency Incident Management System; a mission command masterclass; and how to navigate emergency intelligence feeds. Four field study tours took place, with participants visiting Christchurch to see the earthquake recovery firsthand, touring New Zealand's Crisis Management Centre in Wellington, exploring the Fraser Trucks factory, and learning about the fuel types, typography and fire risks in the upper South Island.

Speaker audio recordings, abstracts, papers, presentations and research posters can be downloaded from www.afac.com.au/events/proceedings.

Laurie Lavelle (left) presenting the award named in his honour to Anthony Clark of the NSW RFS.

Dinner entertainment by Wellington cultural group Nga Taonga Mai Tawhiti.

Gary Morgan of the Bushfire CRC (left) receives his special recognition award from the BNHCRC's Richard Thornton.

The poster exhibition is a vital part of the conference.

All photos by AFAC and BNHCRC.

Notes from the field

Emergency Management Australia's Connection! 2014 event (14–18 July)

The Australian Emergency Management Institute (AEMI) was buzzing with a full week of workshops, forums, masterclasses and expert panels that brought together national and international thought leaders on strategic foresight and social media trends in emergency management.

Delegates were drawn from across Australia from the emergency management, government, non-government organisations, academia and private sectors. They discovered, networked, and discussed cutting-edge topics from their emergency management perspectives.

Delegates had the opportunity to learn about horizon scanning for emergency management trends over the next 30 years and how the emergency management landscape is changing dramatically in this world of real-time data and rapid technological advances.

Highlights of the Connection! 2014 program included:

Strategic Foresight Forum and Masterclass

The Strategic Foresight Forum and Masterclass was hosted by Mike McAllum and Liam Egerton who led participants through the strategic foresight process and applications in a practical interactive environment. Topics related to how rapidly changing political, economic, technological and social environments can create significant new pressures and challenges for emergency management planners.

'Strategic foresight' is an approach that explicitly aims to disrupt the thought patterns that frame people's current worldview and inhibit their ability to foresee and adapt. This aspect of the program looked at how strategic foresight enables people to distil the capabilities required to meet future challenges and design a strategy that is fit for a particular purpose.

There were discussions about how the sector needs to build a shared vision of the future, be prepared, and adapt to meet the challenges that the future will hold.

Image: AEMI

Connection! 2014 presenters, Strategic Foresight: Dr David Connery, Ms Carolyn Thompson (Director, Education, Research and Training, AEMI), Mr David Parsons, Mr Michael McAllum, Mr Peter Hayward, Ms Dianne Cooper (Connection! 2014 Coordinator), Mr Mark Crosweller AFSM, Col. Joseph Booth, Ms Raelene Thompson (Executive Director, AEMI), Mr Liam Egerton.

Presenters included:

- Mr Mark Crosweller AFSM, Director-General, Emergency Management Australia
- Col. Joseph Booth, Executive Director, Stephenson Disaster Management Institute, Louisiana, USA
- Dr Peter Hayward, Program Coordinator, Master of Management (Strategic Foresight), Swinburne University
- Mr David Parsons, Manager, Emergency Management, Sydney Water
- Dr David Connery, Senior Analyst, Australian Strategic Policy Institute
- Mr Liam Egerton, Future Analyst, Global Foresight Network
- Mr Michael McAllum, Founder, Global Foresight Network
- Dr Ray Canterford PSM, Division Head, Bureau of Meteorology

Social Media Masterclass and Forum

The Masterclass exercises demonstrated the essential role of social media in effective emergency management communication. Discussions highlighted the importance of community engagement before, during and after a crisis.

The Forum explored how the emergency management sector and communities can work together to exchange information, validate data and incorporate social media intelligence into business-as-usual practice.

Image: AEMI

Col. Joseph Booth presenting on Strategic Foresight: USA perspective.


Image: AEMI

Social Media Masterclass with conference attendees and guest presenter, Mr Craig Thomler.

Image: AEMI

Mia Garlick, Facebook, presenting during the Social Media Masterclass.

Presenters of Connection! 2014 included:

- Mr Craig Lapsley PSM, Fire Services Commissioner Victoria
- Mr Craig Thomler, Managing Director, Delib Australia
- Ms Mia Garlick, Head of Policy, Australia and New Zealand, Facebook
- Mr John Sheridan, Chief Technology Officer, Australian Government
- Ms Jeanette Gray, Regional Director, Strategic Accounts, Asia Pacific Region, Hootsuite
- Mr Danny Keens, Director of Media, Twitter
- Ms Kym Charlton, Assistant Secretary, Australian Department of Agriculture
- Mr Tim Gerritsen, Executive Producer, ABC
- Mr Darren Whitelaw, Assistant Director, Strategic Communication and Protocol Branch, Department of Premier and Cabinet, Victoria
- Ms Caroline Milligan, Social Media and Emergency Management Consultant, NZ
- Mr Martin Anderson, Digital Media Manager, Country Fire Authority, Victoria
- Mr Michael Turnley, National Manager, Digital Media, Australia Red Cross
- Mr Jason Pemberton, Co-Founder, General Manager, Volunteer Army Foundation, New Zealand
- Ms Melanie Irons, Founder of the 'Tassie Fires – We can help' Facebook page

Thanks to all Connection! 2014 attendees, presenters and facilitators who offered lively and stimulating insight. The shared resources, tools, and information will benefit the emergency management community.

Social Media Masterclass presenter, Mr Danny Keens, Twitter.

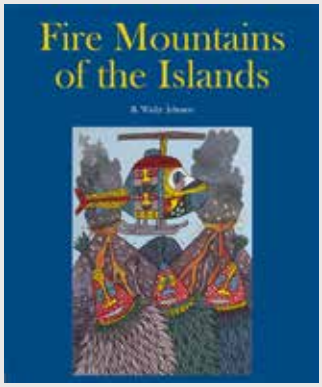
Social Media Forum presenters Melanie Irons, Michael Turnley, Martin Anderson, Darren Whitelaw, Jason Pemberton #AEMICX14.

REVIEW:

Fire Mountains of the Islands: a history of volcanic eruptions and disaster management in Papua New Guinea and the Solomon Islands

by R. Wally Johnson.

Reviewed by Ken Granger



Published by ANU e-press in 2013, eISBN: 978-1-922144-23-2.

Very few Australian disaster managers will ever be called on to respond to a volcanic eruption at home. The last active volcano on the Australian mainland ceased activity about 4000 years ago. Their counterparts in our northern neighbours, in the arc extending from Indonesia, through Papua New Guinea (PNG) and down into Solomon Islands and Vanuatu, are much more familiar with such events and their experience in managing such major disasters holds lessons for us all.

Wally Johnson's passion for volcanoes and the people who live in their shadows shines through in this book which concentrates on the volcanoes of PNG and Solomon Islands and their eruption histories. He elaborates on how that history and modern technology together are being used to understand the threats posed and thus make the people who are at risk a lot safer. This is not a dry scientific publication, rather it is written for a general audience and reads much more like an adventure story than a text book.

The lessons contained in some of the case studies and the accounts of how they were managed are as applicable to any other natural disaster such as bushfire, flood or cyclone as they are to volcanic eruptions. The 1937 eruption that did much damage to Rabaul and killed 500 people led to the establishment of the first scientific monitoring of volcanoes in the region. It also led to the promulgation of emergency information to all households within the Rabaul township. Certainly in the 1960s I recall that every house in Rabaul had an information poster detailing what to do in the event of an eruption—one of the earliest community awareness programs run by Australia.

The tragedy of the massive 1951 Mt Lamington eruption on the northern side of Papua's Owen Stanley Range remains Australia's worst disaster with some 3 000 dead. The heroics of the local survivors, as well as the numerous government and mission workers who rushed to the area to bring relief, is a story that deserves much wider exposure. The experience of the Lamington eruptions, however, made government officials highly sensitive to threatened eruptions in other volcanoes. When Bam Island showed signs of activity in 1954 the Bam Islanders were forcibly evacuated to the mainland. They were resettled on swampy land and unhealthy area and 24 evacuated Bam Islanders died before the population was returned to their island. As Johnson observes, 'an evacuation based on scientific assessment of the volcano and recommended with the best of intentions, was turned into a tragedy'.

Naturally the 1994 eruption of the Rabaul volcanoes that led to the permanent abandonment of much of the town receives a lot of attention, but here again the lessons to be learned are important. A very aware community, both local Tolai people and expatriates, self-evacuated even before the official warning to evacuate was given. Only four people died in this eruption which was very similar to that of 1937, though the destruction, both from the eruption and from the uncontrolled looting and vandalism that followed, left both citizens and authorities in shock.

Perhaps the most controversial discussion relates to the effectiveness of scientific monitoring, early warnings and false alarms. Johnson lists 13 Papua New Guinea volcanic events that led to evacuations. Of these evacuations nine took place without them first being declared by authorities and, of the remainder, only one was based on instrumental warning of an impending eruption. Johnson's conclusion is that reliance on the monitoring and warning technologies should always be balanced by a comprehensive disaster risk assessment, local knowledge, and effective and ongoing community awareness. How often have we heard that conclusion after a bushfire or flood!

Fire Mountains of the Islands is available as a free download at http://epress.anu.edu.au/titles/fire-mountains-of-the-islands or can be ordered in hard copy for $40 from the same address.

EM Online: Australian Government Organisational Resilience website

www.organisationalresilience.gov.au

Organisational resilience is critical for business to be able to respond to short-term shocks such as natural disasters or significant changes in market dynamics, and to take advantage of long-term trends and challenges.

In particular, organisational resilience helps critical infrastructure organisations better manage unforeseen or unexpected risk and threats to the continuity of essential services.

The Australian Government Organisational Resilience website is an important source of information for Australian businesses and individuals. It also features the Organisational Resilience HealthCheck – a free tool to help respondents identify their organisation's resilience potential.

Whatever position you hold in your organisation, the HealthCheck can assist you and your team develop a shared understanding of your organisation's progress towards resilience and identify possible treatment actions.

For more information, visit www.organisationalresilience.gov.au

Page 1 of 3

Indicator		Low resilience indicator	ANSWER (Low 1 2 3 4 High)	High resilience indicator	Your score	Possible max score
		Leadership and culture attribute				
1.1 Leadership		*Strong leadership to provide good management and decision making during times of challenge and adversity, as well as continuous evaluation of strategies and work programs against organisational goals.*			0	28
	L1	Leaders display behaviours fearful of adversity	○ ○ ○ ○	Leaders display decisive leadership, innovation and seek opportunity, including in times of adversity		
	L2	Leaders do not 'walk the talk' nor demonstrate behaviours aligned with the organisation's values	○ ○ ○ ○	Leaders 'walk the talk' and demonstrate behaviours aligned to the values of the organisation		
	L3	Leaders are reactive and act under duress	○ ○ ○ ○	Leaders are balanced and strategically focussed to ensure the organisation is acting with control and foresight		
	L4	Leaders are compliance driven, process focused	○ ○ ○ ○	Leaders are outcome driven / results focused		
	L5	Leaders are oblivious to the needs of people working below them	○ ○ ○ ○	Leaders care for the wellbeing of their people and their ability to thrive in times of adversity		
	L6	Leaders are afraid or unwilling to make decisions without permission from senior management	○ ○ ○ ○	Leaders are empowered to make decisions and are supported in doing so by senior management		
	L7	Lack of visible executive and management buy-in to the need for resilience	○ ○ ○ ○	Highly visible executive/senior management resilience champions and leader advocacy of the resilience agenda		

The HealthCheck tool helps users rate their organisation according to a set of low and high level descriptors for 13 resilience indicators. These indicators are grouped under three overarching resilience attributes that build business-as-usual effectiveness as well as robust and agile response and recovery capability.

Index of articles

Australian Journal of Emergency Management, Volume 29, 2014

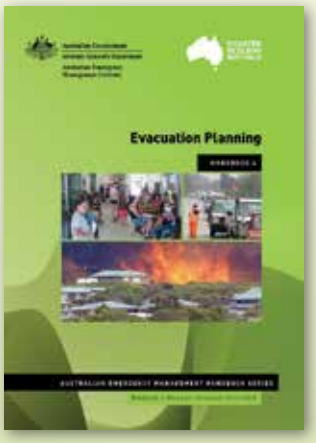
AUTHOR	ARTICLE TITLE	NO.
AEMI	2013 Resilient Australia Awards	1
Anderson, Sarah	Surf Life Saving Disaster Forum	1
Anikeeva, Olga; Steenkamp, Malinda and Arbon, Paul	Earthquake preparedness in South Australia: recommendations based on previous earthquakes in Australia, New Zealand and the United States of America	2
Arbon, Paul	Developing a model and tool to measure community disaster resilience	4
Astill, Sandy and Griggs, Peter	Investigating the hazard preparatory information-seeking habits of coastal far north Queensland communities	3
Attorney-General's Department	Emergency Management in Federated Countries Workshop: international experts from federated countries meet in the spirit of 'learning from each other'	4
Bird, Deanne and Gísladóttir, Guðrún	How the children coped with the April 2010 Eyjafallajökull eruption in Iceland	1
Boon, Helen	Investigation rural community communication for flood and bushfire preparedness	4
Boon, Helen; Brown, Lawrence and Pagliano, Paul	Emergency planning for students with disabilities: a survey of Australian schools	1
Bourk, Michael and Holland, Kate	From silos to flows: spatial metaphor and communication responses to the Christchurch earthquakes	2
Bruce, David	Out of uniform: building community resilience through non-traditional emergency volunteering	2
Cavallo, Antonella	Integrating disaster preparedness and resilience: a complex approach using System of Systems	3
Cherry, Nita	The frontline: a new focus for learning	2
Clarke, Andrew	Coober Pedy Mine Rescue Squad/State Emergency Service	2
Cooper, Lesley and Briggs, Lynne	Do we need specific disaster management education for social work?	4
Davie, Susan and Towers, Briony	Children and disasters community of practice	1
Davie, Susan; Stuart, Marie; Williams, Fiona and Erwin, Elise	Child friendly spaces: protecting and supporting children in emergency response and recovery	1
Dominey-Howes, Dale; Michael, Carolyn and Labbate, Maurizio	Why emergency management should be interested in the emergence of antibiotic resistance	3
Dufty, Neil	Opportunities for disaster resilience learning in the Australian curriculum	1
Dufty, Neil	Progress made with early warning systems in Australia since 2005	4
Eburn, Michael and Dovers, Stephen	How chief officers view success in fire policy and management	3
Every, Danielle and Thompson, Kirrilly	Disaster resilience: can the homeless afford it?	3
Gibbs, Lisa; Di Pietro, Melissa; Ireton, Greg; Mordech, Samantha; Roberts, Michelle; Sinclair, Joanne and Wraith, Ruth	Core principles for a community-based approach to supporting child disaster recovery	1
Gonzalez-Mathiesen, Constanza and March, Alan	Nine design features for bushfire risk reduction via urban planning	3
Granger, Ken	Book Review: Fire Mountains of the Islands: a history of volcanic eruptions and disaster management in Papua New Guinea and the Solomon Islands by R. Wally Johnson.	4
Harwood, Sharon; Haynes, Katharine; Bird, Deanne and Govan, Jeanie	Children's perceptions and adaptive behaviours in response to seasonal change and extreme weather in Broome, Western Australia	1
Hocking, Agnes; Taylor, Bethany and Tupek, Kylie	Macedon Ranges youth experiences in emergency management planning	1
Hon Nikki Kaye, Minister of Civil Defence, New Zealand	Foreword	3
Johnston, David and Ronan, Kevin	Children's understanding of natural hazards in Christchurch: reflecting on a 2003 study	1
Kargillis, Christina; Kako, Mayumi and Gillham, David	Disaster survivors: a narrative approach towards emotional recovery	2
Lahey, Kate	Recognising the vulnerability and capacities of young people	1
Lahey, Kate	Youth Preparedness Council	1
Lahey, Kate	Lessons from Louisiana, and a 'new normal' in disasters	2
Lahey, Kate	From a message in a bottle to best practice in communications	2
Lentini, Rosemarie	Bracing for the 'new normal': how communities are preparing for disasters	4
Leahy, Brenda	Online forums showcase three years of Bushfire CRC research	4
Maddock, Nathan	Experience counts: research finds lessons from bushfires	3
Margareta Wahlström, Head, United Nations Office for Disaster Risk Reduction	Foreword	4
McDermott, Brett	Opinion: Disasters, children and families: have we arrived at a comprehensive model of emotional health care?	1
McGowan, Jim AM	Opinion: Promoting resilience: a contemporary and integrated policy and funding framework for disaster management	2
McLennan, Blythe; Weir, Jessica; Eburn, Michael; Handmer, John; Dovers, Stephen and Norman, Barbara	Negotiating risk and responsibility through law, policy and planning	3
McLennan, Jim; Elliott, Glenn and Wright, Lynsey	Bushfire preparations by householders in at-risk areas of south-eastern Australia	2
Mitchell, Megan, National Children's Commissioner	Special Edition Foreword	1
Mora, Kate; Thomas, Jared; Nankivell, Katherine and Flude, Stephen	Using existing social networks to improve emergency preparedness of supported community members	2
Neely, Dan	Enhancing community resilience: what emergency management can learn from Vanilla Ice	4
Orchiston, Caroline; Seville, Erica and Vargo, John	Regional and sub-sector impacts of the Canterbury earthquake sequence for tourism businesses	4
Padgham, Lin; Horne, Ralph; Singh, Dhirendra and Moore, Trivess	Planning for sandbagging as a response to flooding: a tool and case study	4
Raphael, Beverly and Burns, Penelope	Opinion: Children in disasters: the way forward	1
Ronan, Kevin	Opinion: Solving 'wicked problems' linked to disasters, risk and uncertainty-children are truly our future	1
Serratore, Rose	Rare atmosphere: introducing the National Meteorological Library	2
The Hon Michael Keenan MP, Minister for Justice	Foreword	1
The Hon Tony Abbott MP, Prime Minister of Australia	Foreword	2
Towers, Briony; Haynes, Katharine; Sewell, Fiona; Bailie, Heather and Cross, David	Child-centred disaster risk reduction in Australia: progress, gaps and opportunities	1
Walker, Wendy	Development of pharmacy emergency management guidelines	2
Whitelaw, Tracey	'All that I'm hearing from you is white noise': social media aggregation as a solution for Brisbane City Council in emergency response	4
Wilkie, Linley	Urban planning and disaster	3
Worldring, Eke	A closer look at the Australian Institute of Police Management Library service	3

Australian Government
Attorney-General's Department
Emergency Management Australia

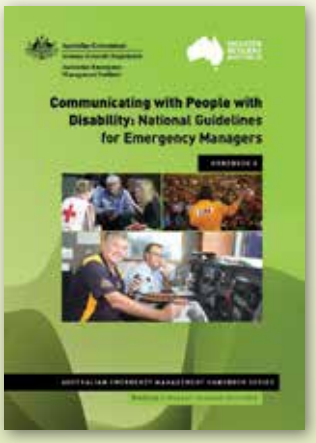
Australian Emergency Management Handbooks

NEW RELEASES

HANDBOOK 3
Managing Exercises

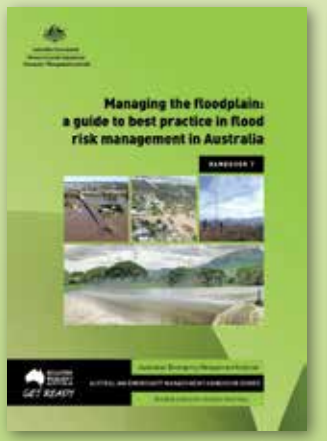


HANDBOOK 4
Evacuation Planning



HANDBOOK 5
Communicating with People with Disability

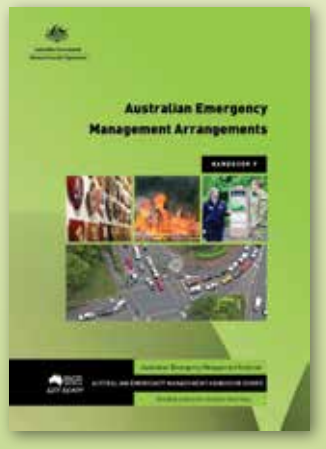
HANDBOOK 6
Community Engagement Framework



HANDBOOK 7
Managing the Floodplain

HANDBOOK 8
Lessons Management
English version

HANDBOOK 8
Lessons Management
Arabic version



HANDBOOK 9
Australian Emergency Management Arrangements

DISASTER RESILIENT AUSTRALIA
GET READY

Download free eBook or order your own hardcopy via our new print-on-demand service at: www.em.gov.au/publications

Building a disaster resilient Australia