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Please note that 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.

Foreword

By Mike Rothery, First Assistant Secretary, National Security Resilience Policy Division, Attorney-General's Department.

Organisational resilience: Withstanding and responding to unforeseen or unexpected hazards

A number of business organisations across both the public and private sectors play a special role in our society and economy. These organisations deliver essential services that are necessary for everyday life (power, water, telecommunications, banking, health, food and transport) and are also known as critical infrastructure.

When faced with a crisis most businesses can make a decision to discontinue normal operations until the threat passes, and minimise losses by relying on insurance to cover lost assets and business interruptions. However, given the dependency of the economy, government and the community on the essential services provided by many critical infrastructure organisations, this approach to managing risk is not appropriate. In fact the effect on community may be many times more severe than on the company itself. As the community has a strong expectation of the continuity of essential services governments have a role to assist critical infrastructure organisations to manage their risks, including those from unforeseen or unexpected hazards.

The Australian Government's Critical Infrastructure Resilience (CIR) Strategy seeks to enhance the resilience of our critical infrastructure and introduces the concept of organisational resilience to better manage unexpected or unforeseen risks.

Organisational resilience is an approach that seeks to build an organic capacity in organisations to deal with rapid-onset shock. This complements the more traditional approach to business continuity which is driven by likely risk. Importantly, organisations that build resilience (for example, through distributed decision making, unified by a strong sense of purpose over the response priorities, and aided by adaptable tools and techniques) have an enhanced ability to deal with both foreseeable and unforeseen events.

The organisational resilience approach helps to address the fact that the world economy is growing in complexity. Globalisation and the proliferation of digital technologies are creating a range of challenges for businesses to completely understand and control their supply chain. These challenges create both opportunity (for example, efficiencies gained through streamlined supply chains and zero inventory systems) and risk (such as technology-driven interconnectivity which can create interdependency). Being able to confidently identify, assess and manage risks in this constantly changing environment can be problematic. Therefore, building a capability to respond or adapt to any scenario that may place the organisation under stress becomes an increasingly attractive proposition.

This concept is of relevance to disaster resilience for the community as a whole. Australia experiences a range of extreme weather events and the effects of these events are exacerbated when they disrupt our critical infrastructure.

In February 2011, the Council of Australian Governments (COAG) agreed to a whole-of-nation resilience-based approach to disaster management through the National Strategy for Disaster Resilience. The approach recognises that a national, coordinated and cooperative effort is required to enhance Australia's capacity to withstand and recover from emergencies and disasters. It also recognises that disaster resilience is a shared responsibility for individuals, households, businesses and communities, as well as for governments.

Continued access to essential services provided by some critical infrastructure organisations increases the resilience of communities to withstand and recover from disasters. This is the link between the CIR Strategy and disaster resilience.

The Attorney-General's Department is working to build a common understanding and the value proposition for business to adopt an organisational resilience approach through the introduction of a number of activities and initiatives, including a resilience training program, research and development, and real life case studies. Further information is available from www.tisn.gov.au.

Standing Council on Police and Emergency Management

COMMUNIQUÉ

Melbourne, 29 June 2012.

The Standing Council on Police and Emergency Management (SCPEM) met in Melbourne on 29 June 2012, chaired by the Hon Peter Ryan MLA, Deputy Premier of Victoria and Minister for Police and Emergency Services. The Council comprises Australian and New Zealand ministers for police and emergency management together with a representative from the Australian Local Government Association.

Leading the agenda was consideration of the illicit use and trafficking of firearms, the urgency of which saw the Council convened a month earlier than scheduled. Ministers also discussed a range of national emergency management matters including the implementation of the National Strategy for Disaster Resilience. The Council appointed the Hon Jennifer Rankine MP, South Australian Minister for Police, Correctional Services and Emergency Services as the Champion Minister for disability issues on SCPEM.

Policing

Illicit use and trafficking of firearms

Ministers invited the CEO of the Australian Crime Commission (ACC), Mr John Lawler APM, to present the findings of the ACC's National Illicit Firearms Assessment. The assessment was commissioned by Commonwealth Minister for Home Affairs and Minister for Justice, the Hon Jason Clare MP, in February 2012 to look into the illicit firearms market and its links to gang activity in Australia. The ACC worked with State and Territory police, the Australian Customs and Border Protection Service and the United States Bureau of Alcohol, Tobacco and Firearms to gather current firearms related intelligence, import and export data, registration and licensing data as well as to trace firearms manufactured in Australia and overseas.

Ministers considered the assessment and agreed to a range of activities to progress a national response to firearms crime. These initiatives include opportunities to improve information systems and sharing across jurisdictions, legislative responses to deter and deal with illicit firearms, and enhanced coordination of operational activities through:

- In-principle agreement to the development of a national ballistics identification network;

- Development of a national firearms registry, which was agreed in principle;

- Implementation of a National Firearms Identification Database, consistent with the Interpol Firearm Reference Table;

- The ACC, working in conjunction with CrimTrac and in consultation with all jurisdictions, establishing a set of nationally agreed key data for both registered and unregistered firearms;

Back left to right: Cr Paul Bell AM (ALGA), *President, Local Government Association of Queensland;* **The Hon Anne Tolley MP (New Zealand),** *Minister of Police;* **The Hon Robert Johnson MLA (WA),** *Minister for Police and Road Safety*;* **The Hon David O'Byrne MP (TAS),** *Minister for Police and Emergency Services;* **The Hon Nicola Roxon MP (CWLTH), Attorney-General; The Hon Jack Dempsey MP (QLD),** *Minister for Police and Community Safety.*

Front left to right: Mr Simon Corbell MLA (ACT), *Minister for Police and Emergency Services;* **The Hon Jennifer Rankine MP (SA),** *Minister for Police, Minister for Emergency Services;* **The Hon Jason Clare MP (CWLTH),** *Minister for Home Affairs, Minister for Justice;* **The Hon Peter Ryan MLA (VIC and Chair of SCPEM),** *Deputy Premier, Minister for Police and Emergency Services, Minister for Bushfire Response;* **The Hon Michael Gallacher MLC (NSW),** *Minister for Police and Emergency Services.*

- Establishing a working party to analyse further gaps and opportunities to strengthen legislation governing firearms possession and use;

- Developing a coordinated national operational response to serious organised crime involving firearms, including targeted enforcement measures against high risk groups;

- Working with the Commonwealth's newly established Firearm Intelligence Target Team (FITT) inside the Australian Customs and Border Protection Service to fuse together all available intelligence from law enforcement agencies and target criminal key groups at the border; and

- Developing a national community awareness campaign in relation to unlicensed firearms.

The Commonwealth Minister for Home Affairs and Minister for Justice also updated the Council on further measures being undertaken by the Commonwealth to identify and target vulnerabilities in the international airstream, including the international mail environment.

Strategic directions for Australian and New Zealand policing

Ministers approved the new Directions in Australia New Zealand Policing 2012-2015. The Directions reflect Ministerial priorities for policing under a shared vision and a joint commitment to safe and secure communities in Australia and New Zealand and set out a broad strategy to improve the focus of policing services, encourage cooperation between police agencies, and so enhance the quality of overall service delivery. The Directions document will assist in shaping jurisdictional police strategic and business plans.

National efforts to counter organised crime

Ministers were updated on work Attorney's-General around Australia are undertaking to develop nationally consistent Criminal Organisation laws. These laws aim to provide a nationally consistent approach to dealing with criminal organisations and the serious threats that these groups pose. The national response to organised crime is a shared responsibility between SCPEM and the Standing Council on Law and Justice.

New South Wales Minister for Police and Emergency Services, the Hon Michael Gallacher MLC, presented an update on recent legislative amendments in NSW targeting organised crime. Police have sought additional measures to combat the recent upsurge in violent organised criminal activity and the NSW Government has responded by introducing a suite of legislative amendments that targets gang crime at a number of levels, including consorting and criminal association offences as well as tattoo parlour regulation.

Cybercrime

Ministers discussed the evolving challenges presented by cybercrime, and efforts being undertaken to develop a coordinated national response to this type of crime.

Ministers were updated on work by the National Cybercrime Working Group (NCWG) to develop the proposed Australian Cybercrime Online Reporting Network (ACORN). The ACORN would provide a centralised online portal to allow victims to report instances of cybercrime, refer complaints to the most appropriate agency for further action, where appropriate, and collect data to inform improved responses to cybercrime by law enforcement and other government agencies. The Commonwealth Attorney-General's Department and CrimTrac are working together on behalf of the NCWG to develop a business case to provide a detailed examination of technical, timing and cost considerations associated with implementing the ACORN. Ministers will give further consideration to these issues following the completion of the business case in late 2012.

Ministers noted the completion of the Cybercrime Capability Assessment by the Australian New Zealand Policing Advisory Agency (ANZPAA). The Assessment, which contains an analysis of existing police capabilities to combat cybercrime and a series of recommendations to enhance that capability, is an important component of the national response to this issue. Implementation of these recommendations will now be progressed by ANZPAA.

Ministers also noted the upcoming release of the Cyber White Paper by the Department of Prime Minister and Cabinet. The Cyber White Paper, which will outline national policy objectives across the full spectrum of cyber issues, including cybercrime, is due to be released in mid-2012.

Social media

Ministers considered the value of social media in supporting law enforcement and community safety and received a presentation on the NSW Police Eyewatch project. Project Eyewatch relies on Facebook as an easily accessible vehicle for new, online Neighbourhood Watch forums. It places a strong emphasis on sharing information and seeking assistance from local communities. It has demonstrated itself as an effective medium as part of law enforcement's repertoire of tools to deal with crime and engage with the community and offers the potential to be the modern face of Neighbourhood Watch.

Emergency management

Ministers noted that significant progress has been made on a range of national emergency management matters and on strengthening Australia's resilience to disasters since the introduction of the National Strategy for Disaster Resilience in February 2011.

Key achievements over the last 12 months include: agreement on a nationally consistent methodology for disaster risk assessment; measures to improve hazard mapping; development of the National Disaster Resilience Communication Strategy; review of the effectiveness of disaster relief and recovery payments; agreement on a national disaster discussion exercise

program; and the introduction of an annual forum to harness new and emerging technologies in the emergency management sector.

Risk assessment and communication

Ministers endorsed the publication by states and territories of state-wide disaster risk assessment information. They also noted that the National Emergency Management Committee would undertake further work on the use and publication of risk registers as an important means to communicate risk information to the general public. The publication of appropriate risk assessment information will support community resilience by better informing people about the risks they face, enabling them to act accordingly.

Furthermore, Ministers agreed that the development of future state and territory risk assessments would be undertaken in line with the National Emergency Risk Assessment Guidelines, which will be revised to provide improved advice and information to users.

Hazard mapping

Ministers endorsed Part 1 of the National Guidelines for the National Flood Risk Information Program and noted progress on the National Flood Risk Information Portal. This important initiative will provide a single access point for flood information and improved quality and comparability of data.

Ministers endorsed key bodies of work completed as part of the National Work Program on Flood Mapping. This includes the Jurisdictional Flood Risk Mapping Stocktake, which provides an overview of flood mapping across states and territories, highlights key gaps and outlines important next steps to improve mapping data across the country.

Land use planning and building codes

Ministers considered the Enhancing Disaster Resilience in the Built Environment Roadmap to improve the consideration of natural disaster hazards in land use planning and building code regulation.

The Roadmap sets out a range of immediate and medium term activities to enhance disaster resilience in the built environment and identifies seven key areas for improvement: integrated legislation; process enhancements; comprehensive data and mapping; collaborative vendor disclosure; governance partnerships; lifelong education and training; and inter-jurisdictional collaboration.

Ministers will work with their planning and local government colleagues to obtain agreement on the Roadmap's implementation within their respective jurisdictions. Ministers also noted that successful implementation will lead to significant long term improvements to the resilience of Australian towns and cities.

Volunteers

Volunteers make significant contributions to the emergency management sector. They play a major role in emergency response services and are also active in disaster preparedness, recovery and community education activities.

Governments at all levels are committed to supporting the emergency management volunteer sector, and to this end Ministers endorsed the National Emergency Management Volunteer Action Plan 2012. The plan includes 22 recommended actions that focus on issues such as volunteer training and qualifications, recognition, legal issues and measures to strengthen volunteer attraction and retention. Ministers also endorsed the associated Summary of Achievements which outlines jurisdictional achievements in support of emergency volunteers and implementation of the previous National Action Plan for the Attraction, Support and Retention of Emergency Management Volunteers 2009. These are available on www.em.gov.au.

Research and knowledge management

Ministers acknowledged the importance of adopting a strategic national approach to natural hazards research and training as key to strengthening Australia's resilience to disasters.

Ministers endorsed the concept of a national platform to oversee natural hazards research, knowledge management and training. Such a platform will adopt a collaborative, integrated approach that capitalises on existing facilities and networks, and builds on the work of the Bushfire CRC and other research bodies to advance natural hazards research.

Ministers also agreed that the Australian Emergency Management Institute should continue to work with jurisdictions to develop national models and structures for training methodologies, skills development, and knowledge and information sharing.

National Search and Rescue

Ministers present endorsed the revised Inter-Governmental Agreement on Search and Rescue which brings national cooperative arrangements up to date with contemporary practice. The agreement makes provision for resourcing, planning and coordination throughout the national search and rescue system.

Ministers also discussed a range of other Emergency Management items including: Triple Zero surge capacity; public mobile broadband; the Queensland Flood Commission of Inquiry and the Victorian Floods final reports; and the National Guidelines on Donated Goods.

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*Note: At 4pm on 29 June 2012, The Hon Liza Harvey MLA was sworn in as Minister for Police and Road Safety (WA).
Apologies: The Hon Troy Buswell MLA – Minister for Emergency Services, The Hon Paul Henderson MLA – Chief Minister – Minister for Police, Fire and Emergency Services and The Hon Chris Tremain MP – Minister of Civil Defence.

Changes to training qualifications for emergency management volunteers

NATIONAL EMERGENCY MANAGEMENT COMMUNIQUÉ

What are the implications of recent changes to the Determination of Trainer and Assessor Competencies for emergency management volunteers?

In December 2011 the National Skills Standard Council (NSSC) changed the Determination for Trainer and Assessor competencies. These changes will affect qualification requirements for emergency management volunteer trainers and assessors.

What do the changes mean?

For volunteer trainers and assessors

The current Certificate IV in Training and Assessment is being upgraded.

From 1 July 2013, emergency management volunteer trainers and assessors will be required to obtain the new qualification OR demonstrate equivalent competencies.

Date	Now	From 1 July 2013
Course	Certificate IV in Training and Assessment (TAA40104) **OR** Demonstrate equivalent competencies	Certificate IV in Training and Assessment (TAE40110) **OR** Demonstrate equivalent competencies

For supervised volunteer trainers

People who are currently delivering training to volunteers and working under the direct supervision of a qualified trainer are not required to hold formal qualifications.

From 1 July 2013, supervised trainers must hold the TAE10 Enterprise Trainer Skill Set OR demonstrate equivalent competencies.

Date	Now	From 1 July 2013
Course	No requirements	TAE10 Enterprise Trainer Skill Set **OR** Demonstrate equivalent competencies

What does 'supervision' mean?

Each registered training organisation remains responsible for defining who a supervisor is and how much face-to-face time constitutes 'supervision' to suit their local circumstances in accordance with the Determination.

What are 'equivalent competencies'?

On-the-job experience, completed training or professional development can provide evidence of equivalent competencies for trainers, assessors and supervised trainers. 'Equivalent competencies' allows for the recognition of the existing skills of experienced trainers in place of, or in addition to, formal qualification training.

Volunteer trainers, assessors or supervised trainers with equivalent competencies will be acknowledged as having the skills and learning required to satisfy requirements of the new qualifications.

Emergency management volunteer trainers, assessors and supervised trainers uncertain of their qualification standing can use self-assessment tools developed by the Innovation and Business Skills Australia (www.ibsa.org.au) to check whether their skills and previous qualifications satisfy the changed requirements.

This Communication has been drafted for the National Emergency Management Committee in consultation with the Office of the NSSC.

National Strategy for Disaster Resilience: Land use planning

Natural disasters are a regular occurrence across the Australian continent, causing more than $1 billion damage each year to homes, businesses and the nation's infrastructure, along with serious disruption to communities. In response, there has been significant investment by all spheres of government to recover and reconstruct communities devastated by natural disaster events. The *National Strategy for Disaster Resilience* acknowledges the importance of land use planning and building codes that take into account local risks.

The *Enhancing Disaster Resilience in the Built Environment Project* was undertaken by the Land Use Planning and Building Codes Taskforce, a group formed by the National Emergency Management Committee that includes land use planning and building expertise from across Australia. The *Project's* objective is to enhance disaster resilience in the built environment by establishing a common understanding of land use planning and building polices, regulations and codes across Australia, undertaking a *Gap Analysis* on the current instruments and preparing an issues paper that provides a Roadmap for key improvements to be implemented.

Moving forward, the *Roadmap* is required to be implemented across all Australian jurisdictions which will result in the agreed built environment vision being achieved. The *Project* outline is featured below.

Importantly, all jurisdictions agreed that there needs to be a change in the current approach within Australia where investment is focused on land use planning and building in response to natural disaster events. The outputs of the Project propose a fundamental shift in this strategy, with funding and effort to be proactively applied to enhancing land use planning and building regulation, processes, access to information, governance, education and collaboration (see figure below).

Vision

By 2025...I am contributing to a stronger, more resilient Australia by being informed and prepared for the natural hazards that may affect where I live, work and play

Current State

A stocktake of the current legislative environment using a consistent assessment framework to determine each jurisdiction's progress towards the built environment vision

Gap Analysis

- Hazard Mapping and Technology
- Legislation and Policy
- Hazard assessment Process
- Government Arrangements
- Hazard and Mitigation Awareness

Roadmap

Immediate

Integrated Legislation
Process Enhancements
Comprehensive Data and Mapping
Collaborative Vendor Disclosure

Medium Term

Governance Partnerships
Lifelong Education and Training
Inter-Jurisdictional Collaboration

Performance measures

Left to right: Dyan Currie, PIA National President;
Angela Forrest, Young Planner of the Year;
Raelene Thompson, AEMI – Executive Director.

The Attorney-General's Department sponsors the Young Planner of the Year award at the Planning Institute Australia's National Congress. The relevance of the conference is that we need to get smarter in our planning approaches so we create safer and more sustainable communities. The 2012 winner for the Young Planner of the Year was Angela Forrest who has worked extensively with local government, state government and private developers in Tasmania, which has resulted in her development of high level and objective perspective of the role of planning in Tasmania.

One of the key actions required to facilitate this shift is to establish genuine collaboration between the functions of emergency management, land use planning and building. With this collaboration in place, learnings from natural disaster events would be swiftly acknowledged and reflected within dynamic land use planning and building regulations, governance and processes.

The seven Roadmap projects are: Integrated legislation, process enhancement, comprehensive data and mapping, collaborative vendor disclosure, governance partnerships, inter-jurisdictional collaboration and lifelong education and training.

The 'Lifelong education and training' project highlights that a key outcome is for primary, secondary and tertiary education and professional certification courses to include content on natural hazard management. Correct implementation will ensure that our children who grow into becoming our young industry professionals will have an enhanced understanding of the subject matter.

Angela was nominated for her work on the Craggy Ridge estate in Legana, Tasmania. The development vision for this project was centred on sustainability, with a focus on minimising environmental impact and maximising opportunities for community interaction. Community consultation formed a critical aspect of the project's components.

Land use planning will continue to be promoted as an important consideration in preparing our communities to become more disaster resilient against future natural hazards. Through the findings from the Project and the impending implementation of its findings, the path forward towards achieving a stronger, more disaster resilient Australia is now much clearer.

If you would like any further information on the *Project*, please contact Co-Chairs of the either Brendan Nelson, General Manager, Land Use Planning, Queensland Reconstruction Authority (Co-Chair of the NEMC LUPBC Taskforce) or Peter Allen: Executive Director, Statutory Planning Systems Reform, Department of Planning and Community Development, Victoria.
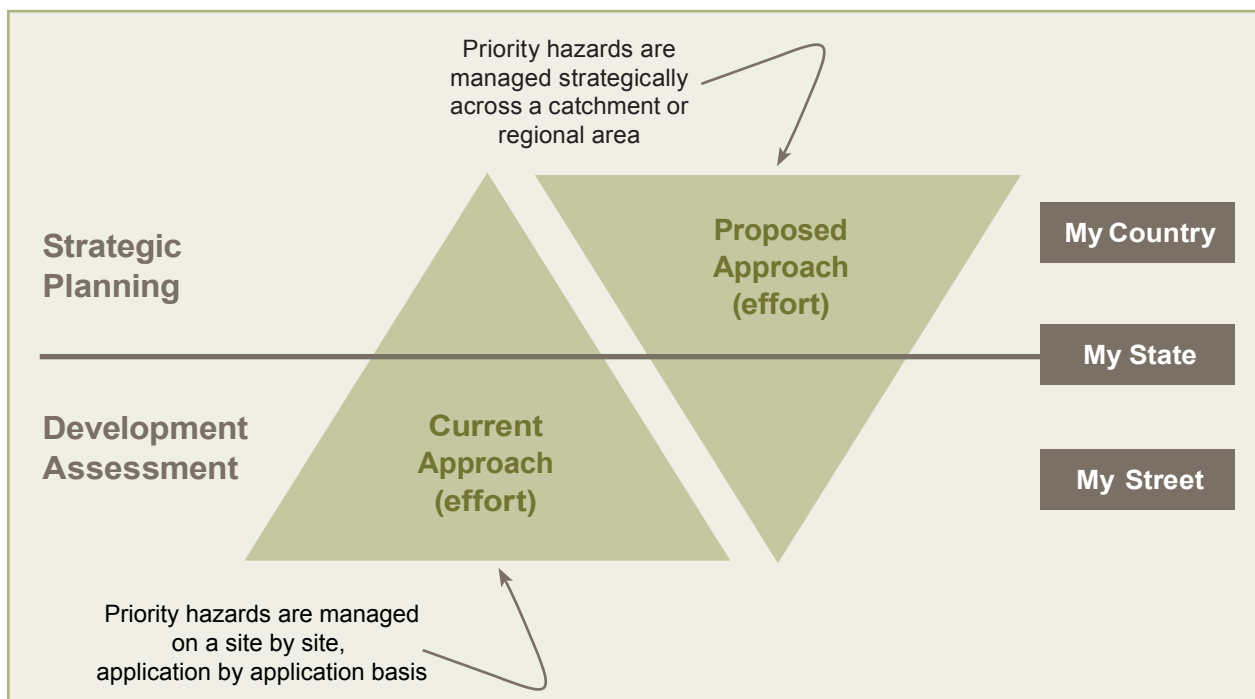
Queensland's State Disaster Management group: An all agency response to an unprecedented natural disaster

By Dr. Tracey M Arklay, Griffith University.

ABSTRACT

Queensland's management of unprecedented natural disasters in 2010-11 received worldwide acclaim. This article argues that the much publicised and largely effective response to extensive state-wide flooding and cyclone events was not an accident, but rather had foundations that were laid over many years of prior experience in preparing for a diverse range of natural disaster threats – including flood, cyclone, storm and fire. The organisational culture within the state's emergency agencies and the ongoing planning and training at the operational level was important, as was the learning and adaptation that had occurred previously. Queensland's largely 'bottom-up' approach to disaster management that gives responsibility to local government in the first instance, and prioritises collaboration is also an important part of the Queensland model. Effective collaboration requires good working relationships within and between government. In Queensland this was understood and modelled from senior management down, across the range of emergency agencies and the police. While many of these aspects exist in other jurisdictions, this paper argues that one key feature distinguishes Queensland's management of disasters, namely the presence of the State Disaster Management Group, a high level senior officials group, that provides for authoritative, decision making and confirms Queensland's claim to have an 'all hazard, all agency' approach to its disaster management arrangements. Ⓡ

Natural disasters are increasingly costly in human and economic terms.[1] In Australia, Queensland, due to geography and population density, has the greatest risk profile of any state (Risk Frontiers, 2011). While hardly an enviable position to be in, this also means that Queensland has extensive experience dealing with disasters. In the summer of 2010-11, the organisational learning[2] by emergency agencies was seriously tested when almost 80 per cent of Queensland's 1.8 million kilometre land mass was adversely affected by rain events that caused extensive flooding. This disaster was soon followed by Cyclone Yasi, one of the most severe cyclones in living memory. In the aftermath, 36 people were dead (to date, three bodies have still not been recovered), in excess of five billion dollars of public and private infrastructure damaged or destroyed, and 2.5 million people adversely affected, as natural disaster relief and recovery arrangements were activated in all 73 of Queensland's local government areas (Queensland Government, 2011, p. 3-4). Queensland's disaster response is based on the four internationally recognised tenets of 'Prevent, Prepare, Respond and Recover', and the actions of disaster management agencies and volunteers during the 2010-11 event has been called 'global best practice' by outside observers.[3] This article provides a descriptive account of the crisis unfolding in order to gain an understanding of the complexities confronting government and emergency agencies; analyses Queensland's emergency model and suggests that in important ways Queensland is different from other jurisdictions. Finally the paper argues that these factors along with past experience contributed to an effective 'global best practice' effort in 2010/11.

Methodology in judging success

Before proceeding, it is necessary to gauge the effectiveness and success of Queensland's management of the 2010-11 'rain events'.[4] The literature speaks of the difficulty in rating the relative success or failure of public policies and government activities, particularly in relation to the 'paucity of policy oriented reflections' on the relative success of crisis management (McConnell, 2011, p. 65). This difficulty is compounded when the

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1 Organisational learning is often promoted in policy texts, but has not been broadly studied (Mahler 2010, p. 250).
2 'Queensland's disaster recovery recognised on world stage' 16 June 2011 at http://www.qldreconstruction.org.au/news-media/54
3 Queensland's disaster recovery recognised on world stage' 16 June 2011 at http://www.qldreconstruction.org.au/news-media/54
4 Throughout December 2010, SDMG minutes confirm 'rain event' was the term used to describe the climatic conditions.

Cyclone Yasi, one of Queensland's 'rain events' during 2010-11.

outcomes or results are subject to the appraisal of 'multiple constituencies'– as usually happens around crises, as there is frequently a lack of agreement between them as to what constitutes effectiveness, or success (Marsh & McConnell, 2010, p. 567).[5] Not everyone agrees that the Queensland crisis was managed well. As any observer of the Queensland Flood Commission of Inquiry hearings would testify, stakeholders (for example, those assisting during disasters either as volunteers or as paid officials and those affected, such as flood victims or their families) use different criteria to judge success.

Judging a crisis response as a success or failure presents the evaluator with a range of methodological dilemmas. For example how do we distinguish 'success as a fact from success as interpretation'? (McConnell 2011, p. 64). To assist, McConnell has devised a framework that plots success on a scale from outright success to complete failure. He suggests crisis management responses will usually fit somewhere along this spectrum – in categories labelled as 'durable success' where success outweighs failures, to 'conflicted success' where successes and failures are equally balanced, to 'precarious success' where failures outweigh success. Bovens (2010, p.584) asserts that judging success should be distinguished between what he calls 'process' assessment and 'outcome' assessment. McConnell (2011, p. 68) provides a working definition:

A crisis management initiative is successful if it follows pre-anticipated and/or relevant processes and involves the taking of decisions which have the effect of minimising loss of life/damage, restoring order and achieving political goals, while attracting universal or near universal support and/no or virtually no opposition.

Based on this definition, this paper argues that Queensland successfully managed the 2010/11 crises, a judgement supported too in the assessment of the QFCOI interim report, which was generally supportive of the 'fundamental structure of the disaster management system' and made no substantive recommendations for change before the next wet season (p. 115). This paper argues Queensland's performance during this event, fits somewhere between outright success and the 'durable success' category on McConnell's success spectrum, in that the success of the 2010-11 event outweighed any purported failures.[6]

Stakeholders interviewed for this study, attribute Queensland's success to its prior experience in dealing with disasters as well as from learning from other jurisdictional experiences: Cyclone Larry (2006), the Gap storms (2008), the Victorian bushfires (2009) and Hurricane Katrina in the US (2005). Other states also have significant natural disaster experience. As such, that variable alone cannot fully explain Queensland's 'global best effort' mark. It is timely to ask therefore

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5   As noted by Marsh and McConnell there are many claims about policy success, but few are supported by rigorous evidence.

6   While the QFCOI final report had 177 recommendations, it was generally satisfied with the work of emergency agencies. Its recommendations, particularly as they related to floodplain management, local planning instruments and future development taking flood considerations into account, is somewhat ambiguous, particularly as it relates to which jurisdiction – state or local – is responsible for final implementation (see McGowan, forthcoming).

what are the key points of difference between Queensland and other States, and are these differences sufficient to understand the effective response and demonstrated capacity of emergency agencies in 2010-11? Taking into account the subjective nature and inherent bias of judging success,[7] it is argued that the 2010-11 response was a success for reasons that include both process and outcome related factors.

Process factors included:

- Regular, often twice daily, meetings of the SDMG. Present were representatives from local

- government and NGOs, power, telecommunication organisations and charities which ensured informed decisions based on the most up-to-date information possible;

- demonstrable cooperation between the all those involved (government, NGOs, private companies, charities and the ADF);[8]

- successful communication of up-to-date information was provided by the Premier and public officials after each SDMG meeting and broadcast across the state;

- the Queensland Police Service worked cooperatively with other disaster agencies, and effectively

- used social media technology to communicate information and field queries.

Outcome related factors included:

- no person going without clean drinking water despite up to ten communities with no water supplies or operating sewerage systems;

- in the days immediately after the disasters, no person reported a public health issue;

- a good disaster response is highly reliant on trained volunteers and in these disasters 2600 additional SES volunteers were deployed;

- offers of help were quickly matched with those urgently needing assistance;

- power and telecommunication facilities were more quickly restored after cyclone Yasi than in

- previous disasters, notably the smaller, less intense, cyclone Larry (DCS senior personnel, pers. comm., May 2011).

The Queensland difference

Australia's 'sunshine state' is no stranger to natural disasters (defined in legislation to include cyclones, floods, storm, storm tide, tsunami and bushfires).[9] While other Australian states are also at risk from certain types of natural disasters, Queensland is unusually exposed to multiple threats. While it is the flooding and cyclones that are the most common threat in the summer months, these make up only one part of Queensland's 'complex disaster profile' (senior personnel, pers. comm., June 2011). While Western Australia has a similar threat exposure, the overall risk is lowered because of the relatively sparse population in many parts of the state, whereas Victoria and South Australia are more exposed to fire hazard.[10] Northern New South Wales shares the border with Queensland and is also exposed to similar weather conditions as southeast Queensland. Currently a memorandum of understanding is being developed between the two states to further develop cross-border SES arrangements.[11]

Queensland – Australia's most decentralised mainland state.

Since European settlement, successive Queensland governments have emphasised and promoted regional growth. This pattern of development has made Queensland the most decentralised state, with almost as many people living outside the South East region as in it (DEEDI, 2007). Currently there are 73 local government districts operating in Queensland (and a 74th district in Weipa, which is managed by the mining company Rio Tinto Aluminium). Melbourne is closer to Brisbane than Cairns and so perhaps unsurprisingly, some in the far north regard their capital city and the government that resides there with suspicion. This fact explains why past state governments initiated community based cabinet meetings that take the executive to regional areas of Queensland.

The dispersed, but relatively significant populations living in the regions, also has implications for the way the state's disaster management arrangements are organised, and explains the practical necessity for its 'bottom-up' approach to disaster management.

Queensland's disaster management arrangements

Within Australia, federal constitutional arrangements ensure that primary responsibility for disaster management falls to each state or territory. Disaster planning is premised upon the notion of shared

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7   According to McConnell (2011), benchmarks for judging success include matching what occurred with, the stated objectives of crisis managers, benefit for individuals/groups/localities under threat, level and speed of improvement, adherence to industry standards, adherence to laws and contingency plans, comparison with the crisis experience of another jurisdiction, level of expert/ political/ public support for the initiatives.

8   Again, while not unusual in Australia this cooperation is in marked contrast to the events in New Orleans in 2005. As the Mayor of New Orleans at the time of Hurricane Katrina noted: 'I was still totally flabbergasted that by day three our federal and state governments had not pulled out all the stops to come and help us'. Later he attributed this lack of attention to one of three things – 'race, class or partisan politics – Pick one as there was some sort of discrimination happening'(Nagin, C 2011 pp. 168, 186).

9   The Disaster Management Act 2003 defines a disaster as 'a serious disruption in a community' which may be caused by natural or human acts or omissions (An Overview of the Queensland Disaster Management System, p. 2).

10 National risk profiles are currently being prepared under the National Strategy for Disaster Resilience.

11 Queensland Government response to the QFCOI Interim Report 2011, p. 11.

2600 SES volunteers were deployed during the response.

responsibilities, partnerships and collaboration between government and non-government sectors. When a disaster strikes, the principle of subsidiarity dictates that initial decisions on how best to respond are devolved down to the local level which is closest to the people and hence ideally located for deciding what needs to be done in the first instance (Wilkins 2009, p.4).

While the principle of subsidiarity applies to all Australian states, Queensland differs in its approach to disaster management because it operates an 'all agency position' as opposed to a combat agency model, whereby a particular, predetermined agency is responsible for managing a disaster in the first instance. Effectively this means that while in New South Wales, for example, NSW agriculture is the designated combat agency in any animal health emergency and the NSW Rural Fire Service is the agency of choice during a bushfire crisis (see NSW Emergency Management Arrangements, 2011), Queensland utilises a coordinated and focussed approach to disaster management, that not only includes government agencies but also involves non- government organisations like the RSPCA, Red Cross and telecommunication and power companies. All of these organisations and agencies are represented on the State Disaster Management Group (SDMG).

Queensland's disaster legislation

Recognising that disaster management requires a comprehensive approach, the Disaster Management Act 2003 updated 28-year Queensland legislation that was introduced after Brisbane's 1974 floods and Darwin's TC Tracy. The State Counter Disaster Organisation Act, passed in 1975, established the State Emergency Service (SES) and remained largely unchanged until the state government, responding to terrorist attacks in New York in 2001 and a Council of Australian Government (COAG) report in 2002 in the lead up to a scheduled CHOGM meeting in Coolum, introduced new legislation in 2003.[12] This legislation replaced two state level committees with a 'single peak disaster management, policy and decision making body', the SDMG.[13]

The SDMG was created to provide a quick response mechanism for both the development of disaster management policy and the planning, preparation and coordination of the resources needed in times of disaster.[14] Initially comprising the Director-General (DG) of the Department of Premier and Cabinet, who remains the designated chairperson of the group, other members included the DG of the Department of Emergency Services (deputy chair-person), and other CEOs of selected departments. Following the machinery of government (MOG) changes in 2009 that reduced the total number of government departments to 13, all the DGs became members of the SDMG, which in 'peace-time' meets four times a year. Perhaps one unforeseen benefit was that with the smaller total number of government departments, all DGs became members – and as such were required to attend the quarterly meetings. The SDMG is therefore truly representative of every government department, empowered to make quick, authoritative decisions when necessary and enabled to take a whole-of- government approach to disaster management (DCS senior personnel, pers. comm., June 2011).

The SDMG is responsible for the development of the strategic policy framework around disaster

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12 COAG has driven a great variety of changes in natural disaster management since 2002/03 – including a much greater emphasis on coordination (see Natural Disasters in Australia: Reforming mitigation, relief and recovery arrangements (August 2002). URL: http://www.ag.gov.au/www/emaweb/rwpattach.nsf/VAP/(99292794923AE8E7CBABC6FB71541EE1)~Natural+Disasters+in+Australia+-+Review.pdf/$file/Natural+Disasters+in+Australia+-+Review.pdf

13 See Queensland Parliamentary Debates (QPD), Reynolds, M., Disaster Management Bill, 2nd reading speech, 29 October 2003.

14 State Disaster Management Group - Annual Report 2003-04 p.7

management and for maintaining relationships with the Commonwealth government and non-government agencies. It is advised on available resources both within and outside the state that could be deployed during a disaster. It provides reports and recommendations to the responsible minister and based on this knowledge, prepares the State's Disaster Management Plan. Until December 2010, the state plan was unchanged since 2008. It was modified on December 22 to emphasise the tacit understanding of the centrality of local government in any disaster response.[15] In October-November 2010, the SDMG was extended to include the Local Government Association of Queensland (LGAQ). Following the disaster and subsequent recommendations by the QFCOI interim report, its membership again increased to include the Australian Defence Force (ADF) and Surf Life Saving Queensland.[16]

Importance of leadership

Effective management of any crisis depends upon capable political and administrative leadership, whose duties include 'recognizing emerging threats, initiating efforts to mitigate them and deal with their consequences', and in the recovery phase provide direction to 're-establish a sense of normalcy' (Boin *et al* 2010, p. 706). As the discussion under highlights, both political and administrative leadership across jurisdictions and including the private sectors and NGOs fulfilled these criteria. Throughout the crisis local, state and federal government agencies acted collaboratively to restore normalcy and assist those affected. In this they were aided by Australia's intergovernmental arrangements that clearly set out funding and assistance criteria.

In 2009 despite previous disasters (i.e. Cyclone Larry) being managed reasonably well, the then director general of Premier and Cabinet foresaw that Queensland may not cope with a more extensive disaster. As a result the government commissioned a report into Queensland's disaster arrangements that while generally favourable, questioned some aspects of Queensland's disaster management system. It concluded that Queensland's lack of a designated coordinator potentially limited Queensland's capacity to respond to a more widespread disaster situation and argued that 'policing organisations have the capacity and competence to perform this role on a State-wide basis in a scalable way to deal with one or multiple disasters' (O'Sullivan & the Consultancy Bureau, 2009). It recommended an Assistant Commissioner

of Police be appointed with overall responsibility for state coordination. The report, handed down in 2009 was enacted in November 2010, one month before the flooding commenced.[17]

During the 2010-11 events, the police worked alongside emergency services personnel and local councils in a display of cooperation and teamwork. According to senior disaster personnel,[18] while the importance of relationships in crisis management was already understood, in the wake of Cyclone Larry (2006) they together with a senior police officer set about in purposeful consultation with the state's mayors to sure up understandings and to gain trust. Both organisations recognised some recommendations of the review would not be universally welcomed. As one senior official recalled, prior to amendments of the State Disaster Act 2003, 'a lot of shoe leather was worn out' traversing Queensland, in order to reassure mayors about the enhanced police role, and to stress that police would consult and assist rather than adopt the old style command and control approach, in the first instance. The feedback from many local councils in the aftermath of the crisis, suggest police throughout Queensland worked cooperatively and sensitively with other emergency personnel and local communities (pers. comm., July 2011). In doing so, police on the ground in affected communities, mirrored the behaviour modelled by deputy police commissioner, Ian Stewart, appointed as the state's Disaster Coordinator on the 24 December 2010.

The timing proved prescient. As those interviewed for this study noted, it is unlikely that the old disaster model, reliant upon comparatively limited numbers of dedicated disaster management personnel from EMQ and scores of volunteers being dispatched to where ever a local disaster had occurred, could have dealt with the unprecedented breadth of the 2010-11 disaster that included:

- all 314 residents evacuated from Theodore by helicopter;

- Condamine and Cardwell evacuated (in the case of Condamine, twice);

- Toowoomba flooding and then the Lockyer

- Valley devastation resulting in the loss of 22 lives, with more missing;

- 310 swift water rescues around the state (AFAC 2011);

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15 This added to the four earlier tenets of the disaster plan: the prevent, prepare, respond and recover model, the all hazard response, the importance and responsibilities of all levels of the disaster management hierarchy, and ensuring communities were alert to natural disasters in their areas (see QFCOI Interim report 2011, p. 113).

16 Queensland Government response to the QFCOI Interim Report, August 2011, p. 10.

17 The commissioning of this report is one factor contributing to changes in the state's disaster management approach. As such it provides evidence of programmatic success, as the changes introduced because of it contributed to the effective response of an unprecedented disaster in 2010-11. This report also positively impacted on the final outcome of the 2010-11 crisis which enabled a better response across larger tracts of land than would have been possible, if (for example) police had not been given a lead agency role (for more on evaluating success see Marsh and McConnell (2010) and Bovens (2010) p. 584-85).

18 Fourteen structured and semi-structured interviews were conducted with senior staff from Director-General down, across a range of Queensland's disaster management agencies: The Department of Community Safety, Emergency Management Queensland, Fire and Rescue Service, Queensland Ambulance Service, as well as informal conversations with local government mayors, councillors, and senior police at the local government conference attended by the author in 2011 and/or by follow-up phone calls.

- 250 people evacuated from Cairns public and private hospitals to Brisbane – making it the largest aero-medical evacuation ever undertaken in Australia;[19]

- Everywhere from Rockhampton north isolated by road and rail;

- large areas of Brisbane and Ipswich, including parts of their CBDs, underwater;

- One of the most ferocious cyclones (Yasi) ever on record building in the Coral Sea;

- 10,500 people evacuated during TC Yasi,

- 136 000 residences affected, and

- a damage bill estimated at $5.8 billion dollars.

This was the first time that police worked alongside non-uniformed disaster management staff, out of the same complex at Kedron. By all accounts, the level of cooperation that existed between uniformed police, Fire and Rescue service, and the Queensland Ambulance – organisations that all have their own distinctive cultures and hierarchies– and non- uniformed personnel was noteworthy and indicative of the emphasis placed on collaboration and the importance placed on fostering relationships by senior management. 'We may not all like each other, but we certainly respect each other' was a common refrain.

From drought to flooding plains – background to the crises

Following years of drought and restrictions on water usage, December 2010 was the wettest month in Queensland's recorded history.[20] The presence of a strong La Nina alongside the normal monsoon season ensured Queensland received a record rainfall. It was relentless. As dam levels rose, and the ground became completely saturated, Queensland braced itself for flooding. In the fog of the disaster, with events unfolding at a rapid rate in multiple locations, and with much of the data imperfect or incomplete, Queensland's disaster management agencies met regularly, under the intense scrutiny of the media and political spotlight, and implemented a response.

The SDMG 'war room'

By early December, some towns in North Queensland were already feeling the effects of the heavy rain, while in the lead-up to Christmas, Cyclone Tasha dumped more rain on Rockhampton and the South-East region. The first extraordinary meeting of the SDMG occurred on 24th December. The meetings of the SDMG took place at the State Disaster Coordination Centre in Kedron. The SDMG minutes convey little of the frenetic pace of those involved – many more than the eight members required to make up a quorum were present at every meeting. By the 24th December, members of the SDMG as well as the Premier, Deputy Premier, Minister for

Police, Corrective Services and Emergency Services and other relevant ministers were getting regular 5am situational reports. Special units and the police air wing were on constant stand-by and the state was at the highest level of preparedness, with road tek (sic) crews ready to be activated and road and rail networks being constantly monitored. Despite all these preparations, there was still an air of uncertainty about whether the state's resources could cope. It was at a meeting on the day before Christmas that the chairperson, Ken Smith raised the issue of appointing a State Disaster Coordinator (SDC) for the December rain event. It was agreed that Deputy Commissioner Ian Stewart, from the Queensland Police Service, would be the SDC effective immediately. The news was quickly relayed to district and local level coordinators.

As the rain continued, the number of extraordinary meetings increased. Beginning in December there were four extraordinary meetings on the 24th, 28th, 30th and 31st. In January, meetings took place on the 2nd, 4th, 5th and then following the 'inland tsunami' that devastated Toowoomba and the communities down the range in the Lockyer Valley, the number of meetings increased to twice daily. As the immediate crisis abated, the SDMG meetings returned to one per day for the 15th, 16th, 17th, 21st, 29th, 30th and 31st. When Cyclone Yasi started bearing down towards North Queensland in early February, the numbers of meetings again increased to twice daily.[21]

Four days after his appointment, on the 28th December, Ian Stewart informed the SDMG that many local disaster management groups were operational. He spoke of 'hot debriefs', of disaster declarations having been made and the SDMG were told that a request for ADF assistance was under way.

By the 31st December the SDMG were given a summary of 'hot spots around Queensland' and were told that in Emerald, Condamine and Theodore, evacuations – in some instances of the entire town – had occurred. The ADF was on the ground and assisting with evacuations, the Red Cross was offering counselling to residents in Condamine and manning evacuation centres, meanwhile in Rockhampton 200 houses had been inundated and plans were underway to relocate the Royal Flying Doctors to Gladstone. In Yeppoon there was a problem with what to do with a ripe and ready for market pineapple crop, while in Bundaberg the SDMG dealt with rumours (later proved false) that the Paradise Dam had breached its wall. Returning from a tour of affected regions the SDC reported that the state recovery committee had met, meanwhile, as Queensland's coalmines filled with water, and the loss in export revenue was predicted to be significant, the Premier wrote to the Prime Minister requesting level six assistance.[22]

While these events were widespread and difficult enough, by the 5th January Major General Mick Slater

19 (see too URL: http://www.defence.gov.au/news/raafnews/editions/5302/5302.pdf)

20 Australian Bureau of Meteorology, Special climate statement 24: an extremely wet end to 2010 leads to widespread flooding across eastern Australia, 2011, p.2, cited in the Interim Report 2011, p. 24.

21 The information contained in this paragraph and much of the information about what was discussed at the meetings that follow were sourced from the SDMG extraordinary minutes, provided to the QFCOI and a copy provided by the DCS to the author.

had been appointed to the position of chairperson of the Queensland Flood Recovery taskforce and the director-general and chair of the SDMG announced that with this and the Commonwealth Recovery Cabinet sub-committee now in place, meetings of the SDMG would be scaled back in order to allow these bodies to take a lead in the recovery. The director general of DCS, Jim McGowan raised the issue of leave management for volunteers and of the need to have a fatigue management policy. No further extraordinary meetings of the SDMG were planned. Then the unthinkable happened.

Managing the unmanageable

Just like much of Queensland, rain in December and January had left the Toowoomba catchment area saturated. In late December, the three dams servicing Toowoomba's population of 162 057 had reached 53.2 per cent. By the 10th January this level had risen to more than double that (127.2 per cent). That day, two intense thunderstorms crossed Queensland. By 11.00am they had joined and were headed in a south-westerly direction, towards the Toowoomba range. The heavy rain that resulted caused 'severe flash flooding' that drowned a mother and her son as they drove through a city intersection. As the QFCOI interim flood report noted 'this was not a situation in which any agency could have effectively warned residents of what was to come' (p. 230). The rainfall had already triggered the Toowoomba regional council to call a meeting to consider activating the local disaster management group. Present at that meeting were representatives of the Queensland Ambulance Service, the Queensland Police Service, Queensland Fire and Rescue, and Emergency Management Queensland, Telstra and the ABC. As they deliberated, calls started coming in about cars and people being swept away.[23]

The SDMG met twice daily throughout this time. At the meeting on Wednesday 12th, along with the Premier, Deputy Premier and state ministers sat the Prime Minister, Julia Gillard, Senator Joe Ludwig, Defence Minister Stephen Smith and the Chief of the Defence Force Angus Houston. Also present either in person or via telephone were the mayors of Brisbane, Ipswich and Somerset, along with representatives from BoM and District Disaster Coordinators from Brisbane, Ipswich and Toowoomba.

While a working party made up representatives from ENERGEX, Police, Department of Public Works, Brisbane City Council and the deputy premier dealt with the imminent loss of power to the Brisbane CBD, the SDMG was informed by BoM representatives that the dams above Brisbane had peaked at 191 per cent the night before, and that controlled water releases would need to continue for the next two days until their flood compartments were empty.

The State Disaster Coordinator then reported on the conditions across Queensland. In Central Queensland the road to the south of Rockhampton was still closed, meanwhile the river at Chinchilla was flooded. Condamine had once again been evacuated, while St George, Surat, Warwick and Stanthorpe were being closely observed. In Toowoomba, police were still attempting to access areas of Murphy's Creek and Grantham to carry out search and rescue activities. This had been delayed due to poor weather conditions. In the township of Lowood, eight roof top rescues had been conducted (scores more were conducted throughout this event). The police were preparing for the rivers in Brisbane and Ipswich to peak. In Ipswich, ten areas had been evacuated and there were currently 12000 people registered at evacuation centres.

As flooding of the capital city began, two evacuation centres were established as the central business district was shut down. Over the next few days the SDMG would deal, among other things, with:

- Many public transport pontoons, a floating restaurant, and barges that had either broken free or were at risk of breaking free from their moorings. All threatened critical infrastructure. Further up on the Moggill stretch of the river, the Moggill ferry had broken free of one of the chains that secured it and was at risk too of being swept down the river;

- There was concern that a major private hospital near the Toowong reach of the river may need to be evacuated;

- All trains in the Mayne Rail yard had been moved and the yard was ready for evacuation if required;

- City cats and ferries had been removed from the river;

- Bus ways around the city centre were closed;

- A major piece of urban infrastructure, a floating, concrete walkway, had broken free of its moorings and along with numerous privately owned boats and pontoons was headed toward the river mouth and risking major bridges;

- Many suburbs across the city were flooding, with vehicle access and electricity supplies cut.

As these events continued to escalate, the SDMG ensured that towns and regions across the state were supplied with essential goods, access to clean drinking water, food and other supplies.

When the flood waters subsided, over 7000 volunteers armed with brooms, mops, gloves, buckets and shovels, joined 600 soldiers in the clean up around the capital. The Brisbane City Council organised buses to ferry volunteers to the worst affected areas, as strangers and passers-by pitched in to clean up the mud and muck. While this process was not perfect and later some people complained that there were so many volunteers

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22 Level Six refers to Defence Assistance to the Civil Community (DACC). DACC Category 6 is support to civil authorities in the performance of nonemergency law enforcement related tasks where there is no likelihood that Defence personnel will be required to use force. The procedures for processing Category 6 requests is in annex H see: (http://www.floodcommission.qld.gov.au/__data/assets/file/0005/7673/Paule_Kevin_attachment.pdf, p. 5)

23 The QFCOI interim report (2011, p. 228-33) details these events.

Photo by Michael Marston

Queensland Emergency Operations Centre, Ambulance Communications. Courtesy of Department of Community Safety.

'we felt like sea-gulls fighting over a chip', others remarked on the 'amazing sense of duty' that had been displayed (Papadikis, 2011).

In the following weeks the SDMG would be confronted with another natural disaster as Cyclone Yasi formed off the North Queensland coast. In the days leading up to the 3rd February, voluntary evacuations commenced as the ADF prepared to evacuate 234 patients from the Cairns base hospital. The day before Yasi made landfall, BoM notified the SDMG that it had been 'upgraded to a Category 5' cyclone and that 'severe weather conditions' were expected. Yasi's wind speed was measured at 285 km/h when it hit landfall at Mission Beach. Before the SDMG meeting on the Wednesday before the cyclone hit, a teleconference occurred between all police areas in the north of the state. The message was conveyed that 'emergency services may not be able to respond to calls for assistance and that people may have to be self-sufficient for some time after the cyclone hit'. Police were warned to 'prepare for significant trauma in the community'. Individual agencies including the ADF, DCS, Ergon Energy, Optus, LGAQ, Department of Transport and Main Roads, Queensland Health briefed the SDMG and the Premier about their preparations.

The literature on crisis management often refers to crisis in relation to national security (defence) issues rather than natural disasters per se. Furthermore, most of the literature uses overseas examples.[24] Connery's observations about crisis management, particularly as it relates to the East Timor intervention, indicates there are some common themes that are applicable to both security crises and natural disaster emergencies.

In particular Connery notes that Australian crisis policymaking 'tends toward the collegial approach' and that this is in part due to the time pressures involved in crisis decision-making (Connery, 2010, pp. 142, 143). McGowan (2012) supports that noting that 'relationships need to be developed during "peace time" so that roles and responsibilities of all agencies and response personnel are clear'.

Through interviews conducted for this study, from the evidence provided in various governmental reports, as well as accounts provided by the SDMG extraordinary minutes, it is apparent that relationships and networks developed over a long period of time were a vital part in successfully managing these disasters. The contrasting evidence of Hurricane Katrina highlights this point, where a lack of trust, partisan politics and an uncoordinated response extended the suffering of thousands of New Orleans' citizens. This study argues that Queensland's regional pattern of development, its emphasis on a bottom up, local government in the first instance response and the importance placed on fostering relationships that is well-recognised and seemingly practiced by the senior staff of Queensland's emergency management agencies, was a vital contributor to Queensland's successful response.

The 2010-11 disaster – a retrospective review of the evidence

As large tracts of the state vanished under flood-water, the management of the response and recovery effort, led by the state's peak coordinating group, the SDMG

24 Scholars such as Allan McConnell (University of Sydney) and Paul t'Hart (ANU) have both published extensively on crisis management, but most often use overseas cases as examples.

Queensland's 'all hazard, all agency' approach to its disaster management arrangements.
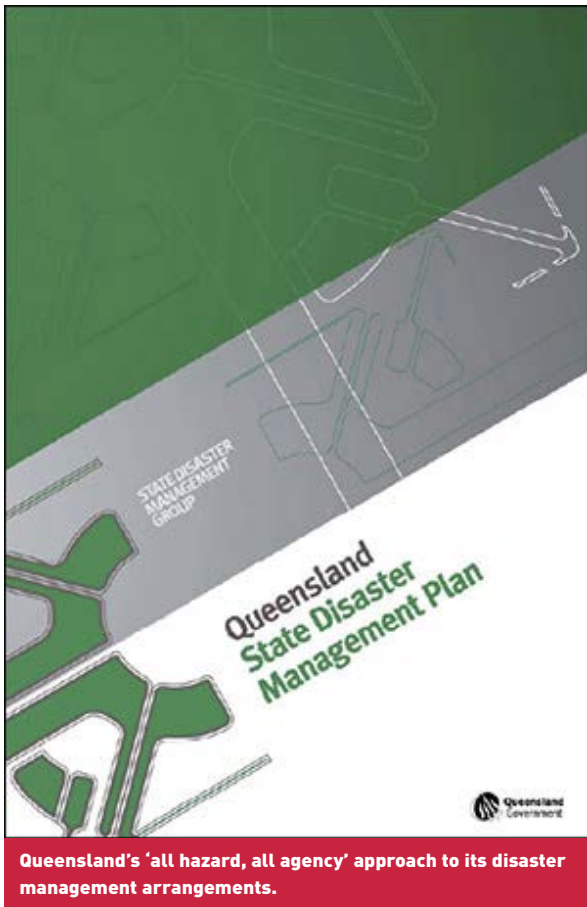
along with the actions of ordinary Queenslanders, later dubbed the 'mud army', gained world-wide attention. The Queensland Police Service's innovative use of social media to communicate with the state's residents would later be hailed as 'a world leading effort' in 'public engagement and emergency disaster responsiveness' (Queensland Police Service, 2011). As the disasters were unfolding, frequent media briefings by the Premier, flanked by experts in hydrology, or in uniform, provided information and calming reassurance. Her heartfelt appeal to Queenslanders succeeded in rallying the troops and waking a spirit of community that was palpable, a fact that delegations from overseas later commented on (Lutton, 2012).[25] In the initial weeks of recovery, the Premier's poll ratings received a substantial, if temporary, boost (Walker, 2011).

Across Australia, partisan politics diminish during times of natural disasters, as parties, politicians, and community groups from across the state and beyond, respond. Yet as Boin *et al* 2008 argue, disasters always have a political element to them, and it is the political dimension that often inhibit necessary reforms, including the development of more resilient, less dependent communities, despite this being a purported and agreed to aim of state and federal governments (see COAG 2010; Kapucu & Ozerdem, 2013 p.217). Former Attorney-General, Robert McClelland (2012) gave voice to this most recently:

The trouble is that politicians at all levels tend to focus and want to be seen after a disaster occurs because that's when it has most media attention. To get that, to be part of that scene, there is a lot of money that goes into post disaster compensation payments.

In responding to the need to better target government resources he continued:

Now these are $1000 payments that go to individuals. They're in addition to hardship payments that are jointly funded by the states and territories. So what I have consistently said, we need to evaluate how efficient these payments are, these $1000 compensation payments. Firstly to streamline them so that we target them to those who are most in need, but secondly to look at shifting a substantial amount of that money into preventative measures and one good example is last year, following the Queensland floods and cyclone Yasi, was about $840 million in these $1000 payments that went out to individuals. Now there was certainly a spike in consumer spending, plasma TVs and so forth, but there was no spike in insurance policies or buying generators for the next event.

McClelland's comments draw attention to the political context surrounding disaster management. In the case of the Bligh government, polls indicated an immediate 15-point boost in the polls, which quickly dissipated after the event. The short-term gain in popularity was probably helped by the $1000 largely untargeted payments handed out to residents, in some instances for seemingly inconsequential hardship (no power for a relatively short period of time). However, as some policy analysts have noted, the longer-term consequences of these untargeted payments include raising expectations of what government's should do, reduce individual resilience as a result and limit the resources that could be spent on mitigation programs that would be cheaper and of more benefit in the longer term (see McGowan, 2012).

Conclusion – what does this tell us?

There are many lessons that can be learnt from Queensland's disaster of 2010-11. Most importantly, this paper argues that there is a clear advantage to having all the state's director-generals serving as members of the peak decision making body – in Queensland's case – the SDMG. Effectively, its whole-of-government perspective confirms Queensland does have an 'all-agency' approach to its disaster management model. While effectively operating as a 'war-cabinet' during times of disasters, (meeting twice daily during the December/ January events), in 'peace-time' the SDMG meets quarterly to plan, strategise and prepare for future disasters (DCS senior personnel, pers. comm., June 2011). One important by-product of the all-agency approach is that any decision taken at those meetings are then enacted, providing a level of surety to those further

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25 Visiting overseas delegations from overseas countries have reportedly been amazed at the level of volunteerism on display during Australian disasters, noting such things don't occur in their countries (pers. correspondence with senior emergency personnel 2012).

Queensland's practical multiple agency approach to disaster management.

down the chain of command, as well as those outside of government (i.e. insurance companies and NGOs).

Queensland's particular pattern of development and the decentralised nature of the state have perhaps necessitated a greater emphasis on the bottom-up approach than elsewhere. The state's disaster management alliance places an emphasis on the centrality of local government. This helps ensure a useful and timely information flow to the SDMG from the regions, and ultimately a more coordinated approach to planning between local and state jurisdictions.

While these arrangements are articulated in state and federal legislation, and seem to be understood, what is not so immediately apparent is how these arrangements contribute to building trust between the disaster agencies – many of whom have different perspectives on what should be prioritised. Interviews with key personnel at the state level, as well as more informal conversations with local councillors, confirm that the relationships developed during 'peace-time', enabled a level of understanding and communication during the fog and urgency of a disaster. Leadership commitment at the state and local level is crucial to building the networks that are a fundamental partof any successful disaster management approach. These networks are not just between government agencies and the different tiers but also between private companies and NGOs, who all have input into the SDMG. Finally, the Queensland response to the 2010-11 natural disasters highlighted the importance of coordination, in clearly understanding what needed to be done and who was responsible for doing it; in having the most up to date information available and in having a flexible and scalable set of arrangements.

Acknowledgements

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Learning and adaptation of disaster management and housing provision: The Malaysian experience

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ABSTRACT

This article reviews the literature on aspects of the 'Policy and Mechanism on National Disaster and Relief Management' in Malaysia. The review focuses on the evolution and transformation of disaster planning, particularly regarding land management according to the 'level and complexity' of a disaster. As a social regime, the Malaysian Government not only formulates a complete framework of disaster planning, it also has a mandate to ensure the plan works throughout the whole cycle of disaster management. To ensure efficiency in disaster management, it is essential to develop close liaisons between the bodies responsible for recovery and those concerned with disaster management. Disaster managers can develop strategies, including awareness- raising and capacity-building, by using the lessons learnt from previous disasters. These strategies can in turn enhance Malaysia's current legislation and ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation. ®

Introduction

Providing emergency shelter is one of the most important emergency activities because of safety, land use and ownership issues (Quarantelli, 1995). In Malaysia, the Malaysian government gives extra attention to housing provision (Roosli, 2011a). Learning from theme issues in disaster management such as the dangerous location of buildings, improper construction, cultural attitudes about development and political preference, Malaysia is learning from shortfalls in provision, training and awareness to suit contemporary practice.

The MNSC Directive 20 is one part of the 'Policy and Mechanism on National Disaster and Relief Management' which is in fact characterised as a framework and outlines on the actions of land management according to the level and complexity of the disaster. It establishes management mechanisms for determining the roles and responsibilities of agencies at three levels namely the national, state and district levels (Moin, 2007a). Quite simply, the MNSC Directive 20 is the standard operational procedure (SOP) for all departments involved in disaster management. This policy framework was developed from international and national requirements such as Hyogo Framework of Action (HFA); Yokohama Strategy (guidelines for natural disaster prevention, preparedness and mitigation); Habitat Agenda (a practical roadmap for an urbanising world, setting out approaches and strategies towards the achievement of sustainable development of the world's urban areas); other ISDR strategies (a system of partnerships for disaster risk reduction strategies which consist of international, regional and national agencies); and national rules and regulations (Roosli, 2011b). Executive order in the MNSC Directive 20 by the Prime Minister is the standard operational procedure (SOP) to comply with for all departments involved in disaster management. Even if the complete version of the MNSC Directive 20 is restricted, the contents circulated are clear to all departments in the Mechanism of Disaster Management in Malaysia. The MNSC Directive 20 specifies in writing what should be done when disaster strikes, when to use certain clauses of it, and where responsibility lies. This directive includes objectives, scope of areas, stages of the process, responsibility and review of implication at the end to make sure that the procedure continues to be useful, relevant and up to date (Aini et al., 2007). The Malaysia National Security Council (MNSC) Directive 20 clearly stated guidelines on the management of disasters including the responsibilities and functions of various agencies within the scope of national and international

legislation (Shaluf et al., 2003a). The MNSC Directive 20 also provides:

- An opportunity to demonstrate professionalism, professional accountability and responsibility to government;

- A platform to tackle any issue in the right way parallel with other government departmental SOP's such as Health, Safety and Environmental Policy; department desk file; department work procedure manual; and the National Urbanisation Policy (Sarji, 1996). Most importantly, SOP will guide the agencies responsible to comply with rules and regulations in it.

Evolution of disaster management in Malaysia

Historically, the May 13 Incident (13 May 1969 racial riots) in Kuala Lumpur involving mainly Muslim Malays and non-Muslim Chinese, resulted in the establishment of the National Operation Council (Majlis Gerakan Negara-MAGERAN/NOC) on 16 May 1969 to restore and implement law and order by establishing an unarmed 'Vigilante Corps', a protective army and police force. The Government also declared a national emergency state and suspended Parliament until 1971. When peace was restored, NOC (MAGERAN) was suspended. On 23 February 1971, the Government decided to establish National Security Council (Majlis Keselamatan Negara-MKN) to strengthen the public security and national defence and to maintain public order in the country (Aini, 2005).

The major transformation in the Malaysia Disaster Management Mechanism came only after the tragedy of the luxury condominium of Highland Towers collapsed on 11 December 1993. The chaos occurred when the explanation given by various parties on the causes of the disaster differed greatly. At first, no agency admitted responsibility for carelessness and negligence. The noticeable lack of local expertise in specialised rescue operations, improper planning of disaster management and lack of standardised rules and regulation prompted the government to review the existing provisions for disaster management and institute a new mechanism for disaster relief and management (Aini, 2005).

Even international communities were disappointed in the absence of a pre-agreed emergency response plan when response teams from Japan, France and Singapore came to offer their assistance (Soh, 1998). The Highland Towers' tragedy set an exemplar and reference for future disasters management. Subsequently, the 'Policy and Mechanism on National Disaster and Relief Management' was formulated by National Security Council in May 1994 to coordinate all emergency agencies and handle relief activities during any major on-land disaster incident (Fakhru'l-Razi, 2001). In 1995, the MKN office was reorganised and renamed as the National Security Division (NSD) (Bahagian Keselamatan Negara-BKN). Nevertheless, on 24 July 1997, BKN was again renamed as the National Security Council (NSC) (Majlis Keselamatan Negara-MKN) (Loo, 1999).

Back in 1968, The Royal Commission of Enquiry found the existing Kuala Lumpur Municipal Building By-Law to be outdated and recommended the formulation of a uniform building By-law throughout the country to meet the changing needs of the construction industry. Among other matters the commission recommended changes

AFP photo by Jimin Lai.

Shelter is an emergency management priority for Malaysian authorities.

Figure 1. Disaster Management in Malaysia. Source: NSC (1997).
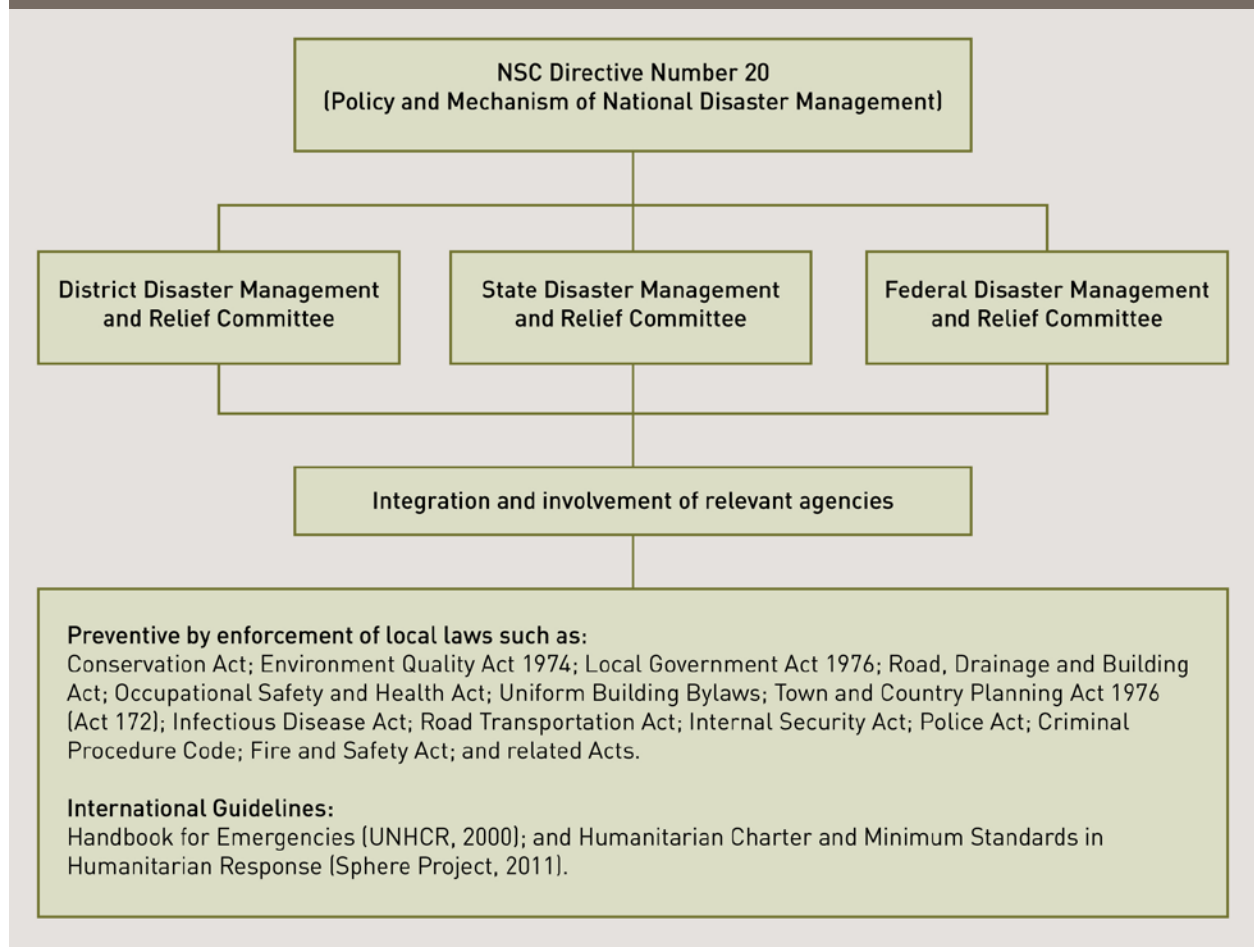
in the present laws and by-laws affecting the building industry that covered proposals for the introduction of new legislation for the control, tendering procedures and regulation of building operations on site. It also proposed the introduction of legislation regarding the workers safety and health (Barakbah, 1971). On January 1986, The Uniform Building By Law (UBBL) was finally implemented. Standard enhancement in UBBL is on-going and keeps updating from time to time to meet latest developments in building and construction technology (Aini, 2005).

To keep up the standard of construction development in Malaysia, the Malaysian Construction Industry Development Board (CIDB) was formed under the federal statutory body in 1993 to co-ordinate all construction industry activities in Malaysia. The official name of CIDB is 'Lembaga Pembangunan Industri Pembinaan Malaysia'. The Act was subsequently gazetted on 7 July 1994 and appointed on the 1 December 1994 (Abdul-Aziz et al., 2007). In the middle of 1996, the Building Control Unit was established under the Ministry of Housing and Local Government. The Unit was required to coordinate and draw up guidelines, plans and procedures as well as provide expert advice to local authorities on the safety and stability of buildings (Jaapar, 2006).

Malaysia never set an annual risk reduction budget. The Malaysian government reserves a sum of USD 20 million per year for an emergency fund (ADRC, 2006). A 'National Disaster Relief Fund' under the NSD has been set up to fund efforts in disaster relief. There are continued efforts by respective agencies (such

as the Armed Forces, Police Department and Health Department) in risk reduction as shown in Figure 1 guided by the MNSC Directive 20.

The establishment of National Disaster Data and Information Management System (NADDI) by the Malaysian Centre of Remote Sensing (MACRES); National Tsunami Early Warning System was commissioned by the Malaysian Meteorological Department, the Storm water Management and Road Tunnel (SMART) that was developed by the Malaysian Drainage and Irrigation Department (DID) are just some of examples of risk reduction and mitigation efforts made by government agencies. Several local universities initiated research centers related to landslide hazards in Malaysia such as the National Soil Erosion Research Centre (NASEC) by the University of Technology Mara (UiTM) and the Mountainous Terrain Development Research Centre (MTD-RC) by the PutraUniversity of Malaysia (UPM) funded by the MTD Capital Berhad (Jaapar, 2006).

Compliance to the MNSC Directive 20

Malaysia has a policy of disaster management called the 'Policy and Mechanism on National Disaster and Relief Management' (Aini et al., 2001). This framework contains directives that relate to disasters and relief management such as Directive 18 for the relief and management of disasters resulting from terrorist action; Directive 19 for establishing a special unit called Special Malaysia Disaster Assistance and Rescue Team (SMART) and Directive 20 for relief and management of natural and technological disasters.

The policy statement for disaster relief operations in Directive 20 was purposely put in place to:

- Mitigate the effects of various hazards;

- Prepare for measures that will preserve life and minimise damage to the environment;

- Respond during emergencies and provide assistance;

- Establish a recovery system to ensure the affected community's return to normalcy.

The MNSC Directive 20 is actually an executive order by the Prime Minister as the Standard Operating Procedures (SOP) that stipulates the procedures to implement in times of disaster (NSC, 1997). In the MNSC Directive 20, a disaster is defined as "an incident that occurs suddenly, is difficult in nature, destructive of property or environment and may cause loss of life and disrupt the daily activity of the local community" (Aini et al., 2001: 46). This definition includes natural disasters

like flood and landslide and technological disasters like factory explosion and fire. Through this directive in the NSC (1997), disaster management is controlled in accordance with the scale of disasters as follows:

A. Level 1 disaster

Local incidents which are in control and do not have the potential to spread. Disasters at this level are not complex and could cause only small damage to life and property. This form of disaster would not jeopardise local daily activity on a large scale. The District Level Authority is capable of controlling such incidents through district level agencies without or with limited assistance from outside.

B. Level 2 disaster

More serious incidents, covering a wide area or exceeding two districts with a potential to spread. Disasters at this level possibly would cause death and damage to a large number of properties. These kinds of incidents also affect public daily activities. Being more complex than Level I, these disasters are difficult in terms of search and rescue. The State Level Authority is capable of controlling such incidents with or without limited help from outside.

C. Level 3 disaster

Any incident caused by a Level III Disaster is more complex in nature and affects a wide area of more than two states. Such incidents could be handled by the Central Authority with or without foreign help. The classification on assessment relies on the district level authority or

AP photo by Vincent Thian.

Members of a special response team from Malaysia move into an abandoned construction site during a drill in Kuala Lumpur, Malaysia. In a scene simulating a devastating earthquake, rescue workers and officials of Malaysia, Brunei and Singapore spring into action to carry out a regional disaster response exercise.

state level authority or central authority depending on the scale of the disaster and also determines if help from higher authorities is needed.

The Malaysia National Security Council (MNSC) Directive 20 details the mechanism on the management of natural and technological disasters including the responsibilities and functions of the various agencies under an integrated emergency management system (Moin, 2007a). The directive states that when a disaster occurs, the Disaster Management and Relief Committee (DMRC) must be established at three different levels depending on the severity of the disaster, i.e. at the federal, state and district (NSC, 1997). Representatives from various private and government agencies fill up the place in this committee such as local authorities, Army, Police, the Civil Defense Department and many other relevant organizations.

The committee at the federal level is chaired by the Deputy Prime Minister. The state level is chaired by State Secretary, while the District level is chaired by District Officer. The National Security Council (NSC) is the secretariat at each level. Being the Secretariat,

NSC will establish Disaster Operation Control Centre (DOCC) to coordinate all forms of disaster relief efforts as well as monitoring the progress and development of these efforts (NSC, 1997). The DOCC is responsible for forming:

A. District Disaster Management and Relief Committee (JPBBD) for Level I Disaster

JPBBD is headed by the District Officer and should be mobilised to ensure all preparation activities for search and rescue operations, preparation of facilities and machinery, and other emergency aid (i.e. food and treatment) are executed and managed in good order and fully coordinated. On receiving a disaster report, the District Chief Police Officer and District Fire Brigade Chief should take appropriate steps assisted by main rescue agencies and supporting agencies and other organisation and voluntary bodies responsible in giving aid and rehabilitation to disaster victims. District Chief Police Officer and District Fire Brigade Chief would be commander and deputy commander of disaster operations respectively.

B. State Disaster Management and Relief Committee (JPBBN) for Level II Disaster

JPBBN headed by State Secretary should be mobilised to ascertain that disaster management is carried out smoothly and is well coordinated. The State Police Chief and Director of State Fire Brigade will be a commander and deputy commander of disaster operations respectively at this stage.

C. Central Disaster Management and Relief Committee (JPBBP) for Level III Disaster

JPBBP headed by a minister appointed by the Prime Minister should be mobilised to ensure that all aspects concerning policy and decision making in search and rescue operation is carried out in a professional and

effective manner. All related agencies and sources including search and rescue teams and emergency aid at district and state level shall be combined to face disaster that occurred under JPBBP. The Director of Internal Security and Public Order, Royal Malaysia Police (PDRM) and Deputy Chief Director of operation, JBPM respectively will be the commander and deputy commander of disaster operations.

'Control Post on Scene' (PKTK) and 'Disaster Operation Controlling Centre' (PKOB) should be established at the scene of a disaster. Assistance required may be delivered to the district or state level in terms of expertise and equipment if it is found to be necessary.

Moin (2007b) notes that officials must comply with the MNSC Directive 20 alongside other national legal frameworks in development process as follows:

- Land conservation Act;
- Environmental Quality Act 1974;
- Local Government Act 1976;
- Road, Drainage and Building Act ;
- Occupational Safety and Health Act;
- Uniform Building By-Laws;
- Town and Country Planning Act 1976 (Act 172);
- Infectious Disease Act;
- Road Transportation Act;
- Internal Security Act;
- Police Act;
- Criminal Procedure Code;
- Fire and Safety Act;
- Related Acts etc.

Simultaneously, any related international guidelines are considered as the same reference in emergency management and relief work because the Malaysian Government agreed to implement the contents in Hyogo Framework (Moin, 2007a). Two main basic texts provide the foundation for the response of the international community and aid organisations in humanitarian emergencies as mentioned by Corsellis et al. (2005) as follows:

- 'Handbook for Emergencies' (UNHCR, 2000);
- 'Humanitarian Charter and Minimum Standards in Humanitarian Response' (Sphere Project, 2011).

Newer versions of the shelter guidelines, the *2008 Preliminary Draft Shelter Standards* and the *2010 Edition 'Humanitarian Charter and Minimum Standards in Disaster Response* were released by the Shelter Centre. These standards however are still waiting for comment by the stakeholders in the disaster community.

Whenever non-compliance was identified, it is a useful means of reviewing procedures and identifying any that may need modifying because non-compliance will affect

the performance and vulnerable to potential risk, to regulatees and even to agencies involved.

Non-compliance refers to any failure to comply with the federal regulations or the requirements or determinations of the MNSC Directive 20 (Fakhru'l-Razi, 2001). Non-compliance can be relatively minor, such as trouble with bureaucracy and scopes of work within agencies involved, or it can be serious, such as non-compliance that adversely effects the rights and welfare of regulates and participants, such as inhabitable rooms; incompatible materials (e.g. non- combustible and toxic materials); no open spaces or buffer zone for gathering point in case of fire; improper insulation and painting; unacceptable ventilation; no running water supply; unmaintained toilet and unsafe workplace for the agencies as service provider (Shaluf et al., 2003b). All of the hazards (e.g. health, fire and chemical reactivity) will expose occupants and also the agencies working around them.

Conclusion

In the past, Malaysian public policy on disaster management, has been heavily centered around responses based on the assumption that natural disasters were almost inevitable and not preventable by any human agency. However, over the years, this perspective has been put to rest by disaster researchers such as Quarantelli (1980) and Dynes (1978), who now define disasters as a social phenomenon, in which the emphasis comes to be on internal rather than external factors. From this perspective, disaster is not an outside force that impacts upon a social system, but a manifestation in the society. This manifestation is the result of interactions between hazard-triggering elements distributed by nature, as well as from human activity and vulnerabilities where vulnerability is commonly evolved to a physical, social, economic and cultural loss. Variables that widely contribute to mitigation efforts include structural measures to control a hazard, land use management, building regulation enforcement to minimum standard and warning systems. In the international community, emergency management is the subject of defense strategy. In most cases, emergency management is an instrument of international cooperation, where liberty remains a political agenda. Inspired from international liaison and experienced from local situations, Malaysia provides guidelines in handling land disaster management called the MNSC Directive 20 that synthesises all hazards mitigation, preparedness/planning, response, recovery and reconstruction services; continuity of operations, continuity of government and emergency operations planning; risk management and mitigation, and training and exercise design services to local, state and federal government agencies nationwide.

Learning from the classic examples in disaster management, scholars such as Moin (2007a) and Corsellis et al. (2005) suggest that a process for planning must be included in the strategic; programme; and project levels perspective. It gives guidance not only to develop profiles of community and plans but also

describes the phases (i.e. before, while disaster happens and after) of operation for planning that presents the sequence of events (planning and operations) occur. Phases of operation are the most important due to crucial participation from all disaster communities. Disaster communities will give input in order to maintain cultural identity (e.g. income generation, social networking and historical conservation), reviving and conserving the often protective but vulnerable ecosystem.

The Malaysian Government hopes that with the creation of a Disaster Management Mechanism as reflected in MNSC Directive 20, the handling and resolving of disaster could be carried out in a more coordinated manner with the integrated involvement and mobilisation of related agencies. All these will in turn ensure that Malaysia has credible disaster management machinery that is able to perform in unpredictable disasters.

Acknowledgement

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Public-private partnership in disaster management: A case study of the Gold Coast

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ABSTRACT

Public-private partnership has important roles to play in disaster management, including building business and community resilience, developing community risk awareness and providing essential services. This paper reports on two recent initiatives in public-private partnerships on Queensland's Gold Coast. The first is an initiative by a local community group 'Varsity Lakes Community Limited' to prepare a disaster management guide for the masterplanned community of Varsity Lakes with support from NRMA insurance company and the local council. The second is the 'Community Watch' program initiated by the Gold Coast City Council to involve local community groups in various parts of the City for building disaster resilience. These two examples provide insights on evolving disaster management public-private partnerships that are more community- based and bottom-up by nature. The study indicates that there is potential for including an additional layer of 'community' when conceptualising the existing four- tiered (commonwealth, state, district and local government) disaster management framework of Queensland. Ⓡ

Introduction

Building partnerships between the government (public) and non-government (private) sectors is widely accepted as crucial to achieving sustainable, disaster-resilient communities (National Research Council of the National Academies, 2011). These so-termed "public-private partnerships" are advocated internationally by the Hyogo Framework for Action 2005-2015 as a means to organise and share expertise, resources and services in order to maximise their continuity and efficacy in disaster management and response (UNISDR, n.d.). This is particularly important where critical resources, services and infrastructure are operated by private enterprises and other non-government organisations. In these cases, supporting business resilience and continuity is a priority. Furthermore, public-private partnerships may not only facilitate post-disaster response and recovery – as is generally acknowledged – but potentially enhance pre-disaster prevention and preparedness through: developing risk-sharing arrangements; planning for community-wide response; awareness-raising and advocacy; social investment and philanthropy; and core business partnerships for mutual economic advantage and hence resilience-building (UNISDR, 2008; 2009).

The key objective of this paper is to examine the nature of public-private partnerships in disaster management (DM) in Queensland using the Gold Coast as a case study. The paper will focus on two recent

initiatives in the Gold Coast region. The first is by private enterprise to develop a disaster management plan for the housing estate of Varsity Lakes with guidance and support from Gold Coast City Council. The second is the Gold Coast City Council's recent 'Community Watch' program, designed to engage the local community groups in disaster management in various parts of the city. To provide the context for the local case study, a short account of public-private partnerships in disaster management is presented first.

Public-private partnerships in disaster management

In general, the development of public-private partnerships originally emerged in the 1980s as an administrative reform with the aims of debureaucratising the public services and promoting privatisation (Dunn-Cavelty and Suter, 2009). Such partnerships were seen as a solution to improving public administration efficiency, having the goal to 'exploit synergies in the joint innovative use of resources and in the application of management knowledge…' (Dunn-Cavelty and Suter, 2009, p. 180). In the context of disaster management, private sector involvement was increasingly discussed during the 1990s' United Nations International Decade for Natural Disaster Reduction, when the mobilisation of support from both the public and private sectors was encouraged to achieve the aims of disaster reduction (UNISDR, 2009). Cues were taken

from a growing propensity for support agency programs, including those of the United Nations, to involve the private sector in partnerships to provide basic infrastructure and services to disadvantaged regions. Later, the UN Global Compact of 2000 defined the United Nations' engagement with the private sector and 'requests businesses to integrate disaster prevention into their decision-making throughout the value chain' (UNISDR 2008, p.v). In the United States, the concept of public- private partnerships in its critical infrastructure protection had been adopted in policy by the end of the 1990s, and they are now seen as a key mechanism for building community capacity (Dunn-Cavelty and Suter, 2009; National Research Council of the National Academies, 2011).

Although public-partnerships for disaster management are being adopted, as will be illustrated, discussion is ongoing in regard to their efficacy in specific contexts. For example, The National Research Council of the National Academies (2011) note 'challenges' to successful collaboration that involve sensitivities to: capabilities of sectors and stakeholders for capacity building; public perceptions of risk; diverging interests of stakeholders; the need to span organisational boundaries and scales; levels of coordination, trust and information sharing; and difficulties in measuring outcomes, among others. Dunn-Cavelty and Suter (2009) suggest that problems (they observe) arising from public-private partnerships for critical infrastructure protection reflect tensions between the new 'security' aspirations sought versus the more traditional 'efficiency' goals of such partnerships. Egan (2010) points to the increased complexities introduced by public-private partnerships into disaster management, for example, suggesting that the private sector may not honour their obligations in disasters.

While critical discussions have continued, public- private partnerships in disaster management have become a reality. Several international and national organisations, including the United Nations International Strategy for Disaster Reduction (UNISDR), World Economic Forum, Asia-Pacific Economic Cooperation (APEC) and the Federal Emergency Management Agency of the United States (FEMA) are collating, publicising and analysing contemporary global case studies of disaster management public- private partnerships in a range of scales and socio- economic contexts (APEC Emergency Preparedness Working Group, 2011; UNISDR, 2008, 2009; World Economic Forum, 2008; FEMA, n.d.). In doing so, some attempt has been made to identify good practice and, hence, suggest frameworks to develop and maintain partnerships (notably UNISDR, 2008 and APEC Emergency Preparedness Working Group, 2011).

To date, the more common public-private partnerships publicised across these sources include those which:

- support business resilience and continuity

- support essential services/ infrastructure continuity

- develop community risk awareness programs

- establish integrating communication forums, platforms and networks;

- effect risk assessment and mapping,

- support access to finance and insurance.

UNISDR (2008) and FEMA (n.d.) have collated numerous case studies of local-scale public-private partnerships and outlined their organisational and operational frameworks. County and city-based public- private partnerships inthe United States, described on a dedicated public FEMA website, are commonly aimed at pre-disaster planning to enhance business and service continuity in disaster response and recovery. Furthermore, they generally aim to facilitate systematic interaction and strategic information exchange between public and private stakeholders. Although often initiated by government-related bodies (e.g. local authority offices of emergency management), specific multi-sectoral administrative bodies and dedicated personnel are usually appointed to manage such partnerships and facilitate liaison.

In Australia, developing partnerships between government, business, volunteer and not-for-profit sectors is explicitly promoted by the National Strategy for Disaster Resilience to promote community resilience (COAG, 2009). "Community resilience" here (and consequently in this paper) is conceptualised in terms of recognising common attributes of resilient communities including: functioning well while under stress; successful adaptation; self-reliance; and social capacity. At the national level, the Trusted Information Sharing Network (TISN) for Critical Infrastructure Resilience is a key public-private partnership that provides a framework of information exchange concerning the security and continuity of critical infrastructure (commonly privately owned and operated commercially) against "all hazards" (COAG, 2009; Commonwealth of Australia, 2010). Telstra has also partnered with governments to provide emergency service support in the development of mobile phone alert systems (APEC Emergency Preparedness Working Group, 2011).

The Australian disaster management system affords significant responsibilities for disaster management to the state and local levels. Queensland's Disaster Management Strategic Policy Framework and State Disaster Management Plan (Queensland Government, 2010; 2011) promote the coordination and integration of the private and volunteer sectors into local-level disaster management and resilience-building but do not specifically define roles for the private sector as they do for government agencies. The policy emphasis is on enabling the continuity of business and services during and after a disaster. Supporting legislation currently under development will require mandatory partnerships, particularly in regard to some critical services. At the local government level, which bears primary responsibility for disaster management planning, King (2008) noted only limited involvement of the community and businesses with local councils in such planning. Nevertheless, anecdotal evidence collected when conducting later research (Childs *et al*., 2010) suggests

that public-private partnerships are being negotiated by some local authorities. For example, these include agreements with local hardware suppliers and logistics companies. The capacities for some local governments to effect comprehensive disaster management, however, including the development of partnerships, may be limited by resource, skill and political constraints (Childs et al., 2010; King 2008).

A growing body of Australian research analysing and evaluating processes of community engagement in disaster management, though broader in community scope, does provide a further, complimentary framework within which to locate the activity of developing local public-private partnerships (Elsworth et al., 2010; Campbell et al., 2010a, 2010b; Blair et al., 2010a, 2010b; Frandsen et al., 2011; Rhodes, 2011). Outcomes from this research, including identifying good practices in community engagement, appear broadly compatible with those described above in relation to the establishment of public-private partnerships and particularly those proposed by National Research Council of the National Academies (2011). That is, communities, including private enterprises and other non-government organisations engaged in disaster management through the development of effective learning networks that feature regular strategic conversations and information exchange between multiple stakeholders. These are typically administered by robust arrangements and open to adequate assessment.

Gold Coast case studies

This paper focusses on explaining public-private collaboration in disaster management between the Gold Coast City Council and the Varsity Lakes masterplanned community, and the 'Community Watch' program initiated by the Gold Coast City Council to involve local community groups in various parts of the City for building disaster resilience. An empirical, case study approach was chosen in order to capture and contextualise the detail and complexities of the developing relationships. This approach is consistent with the method employed internationally to articulate examples of public-private partnerships in disaster management (e.g. UNISDR, 2008) Qualitative data were gathered from semi-structured, personal interviews conducted by the researchers with a key representative from each of the Varsity Lakes management and the Gold Coast City Council. The latter further agreed to directly contribute to the development of this paper by detailing these public–private initiatives.

Varsity Lakes disaster management initiative

Located close to Robina and Bond University on the Gold Coast, Varsity Lakes is a master planned community of about 8700 people with a range of amenities including offices, shopping villages, schools and local parks (see Figure 1 for location of Varsity Lakes). Varsity Lakes Community Limited (VLCL) was established as a not-for-profit organisation, represented by a volunteer board of

directors, that seeks to provide leadership, support and coordination to the Varsity Lakes community (Bajracharya and Khan, 2010). It continues and advances a range of community engagement initiatives of the original developers, Delfin Lend Lease. As part of its activities, VLCL has adopted a leadership role in developing local disaster management for the community, including the production of a local disaster management guide and checklist for collating a household emergency kit. In 2010, Varsity Lakes was certified by the World Health Organisation as an International Safe Community.

Two important catalysts promoted VLCL interest and action on local disaster management. First, VLCL members and directors engaged directly with the Gold Coast City Council disaster managers, who presented their framework for whole-of-city disaster risk management. This is further detailed in the following section. Secondly, financial support by way of a one-off grant was secured from insurer NRMA's Emergency and Readiness Program to enable VLCL to develop local disaster management materials.

The Varsity Lakes Disaster Management Guide was produced by VLCL with the aims of: identifying significant risks; assisting the community to be better prepared for an emergency or disaster; to be more self-sufficient in the wake of an actual event; and to provide pointers to further information. A guiding vision was to vertically integrate a localised, community disaster management "plan" with Gold Coast City Council's disaster management plan. VLCL's intention was to not make their guide overly detailed or prescriptive as the organisation did not want to take on the risk of "telling people what to do". A limited print run of the guide, together with an emergency kit checklist, was made available to the community upon request and via download from the community online network. The emergency kit checklist is designed to enable self-sufficiency for several days and complements Council's disaster management welfare framework. To date, the current guide and kit have been promoted at local community events and via communications including community newsletters in both online and printed formats. Engagement through public meetings or other direct forums has not been attempted.

Figure 1. Location of Varsity Lakes on the Gold Coast.

Southport
Carrara
Surfers Paradise
Nerang
Broadbeach
Robina
Burleigh Heads
Varsity Lakes
Mudgeeraba
Currumbin
Tweed Heads

Townsville
Cairns
Queensland
Rockhampton
Brisbane
Gold Coast

The location of Varsity Lakes on the Gold Coast
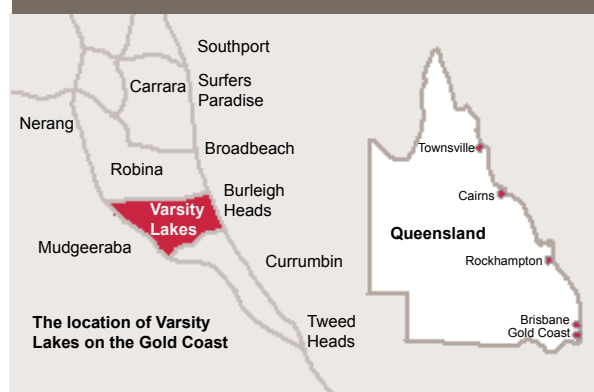
Key to localising content in the current guide is the nomination of six community "champions" (contacts) comprising the local college and university, police station, post office, bank and VLCL itself. The envisaged process is that during a hazard event, these contacts can act as a hub of information exchange between the Varsity Lakes community and the Gold Coast City Council Disaster Coordination Centre, which ultimately liaises with emergency managers of all agencies and coordinates operations during an event. The local contacts would access, and make available to the community, information from the centre. In addition, local situation reports can be collated and more effectively communicated by the local hubs to the Gold Coast centre for taking appropriate action. The community contacts, therefore, provide a focus for community enquiries and importantly, an opportunity for face-to-face engagement for those who desire it. VLCL and Gold Coast City Council disaster managers view such a network as complementary to the range of established communication options and definitely not a replacement. It does, however, appear to reflect the establishment of a new community-scale "sub-layer" located under the local government arrangements within the current Queensland disaster management system.

VLCL is presently collating a local flood guide that will more specifically illustrate local flood risks, including those related to inundation of land and infrastructure and loss of access to the community. It is hoped that guidance can be given to the community in translating external information such as precipitation and flood forecasts to potential local impacts and, hence, prompt timely, appropriate responses.

VLCL view their initiatives to be ongoing. Although resource and funding constraints were frequently cited as a barrier to program maintenance and further advancement, the organisation does recognise needs and opportunities in relation to more effective community engagement in disaster management. These include:

- the identification and recruitment of community "champions" to facilitate community engagement;

- maintenance of ongoing engagement with nominated community contacts and external disaster/ emergency managers to ensure currency and relevance of information;

- enablement of community feedback and contribution to the development of VLCL's local disaster management initiatives/ guides – encouraging community ownership of these;

- search for greater, strategic community engagement through personal contact, meetings and forums;

- formalisation of evaluation of local disaster management initiatives;

- continuance of efforts to locally contextualise disaster management information, including greater understanding of local vulnerability and resilience; and

- documentation and formalisation of community-level disaster management planning, processes and coordination within existing disaster management arrangements.

Gold Coast City Council's Engagement with Varsity Lakes

Gold Coast City Council's Corporate Plan 2009-2014 specifies "a safe city where everyone belongs" as a key focus. Within this focus, an outcome of achieving a safe and secure community where people live and visit without fear is nominated. Disaster management planning and response capability is seen as one means to achieve this. As such, the Council, through its Gold Coast City Local Disaster Management Group, maintains a Local Disaster Management Plan, which, among many key objectives, seeks to encourage an all-agencies, all hazards approach to disaster management. The Local Disaster Management Group has developed a framework for increasing community safety through a coordinated approach to community awareness and education. The framework underpins wide community engagement, through multiple channels, aimed at increasing awareness of risk, accessibility of information and effecting behavioural change for enhanced community preparedness and resilience.

Against this background, Gold Coast City Council's disaster managers do not see that they, or any other agency or group, are exclusively responsible for progressing community preparedness and resilience, and support the concept of community groups, such as Varsity Lakes Community Limited (VLCL), taking active roles in the local disaster management system. Their inclusive approach views such private sector groups as providing "another voice" by which to engage the public and promote the ideal that disaster management is the responsibility of all.

As mentioned in the previous section, Gold Coast City Council's disaster managers were invited to meet with VLCL directors to discuss how the Varsity Lakes community could be developed to enhance disaster preparedness. The content presented by Council included their principles of disaster management and understanding risk. A second meeting was then held with the VLCL executive to workshop the application of city-wide risk assessments to the local area. In anticipation of VLCL initiating their own local disaster management activities, materials including disaster guides were provided by the Council for both distribution to the community and to provide guidance to VLCL in designing locally contextualised extension materials and plans. Ensuring that local messages aligned with those of the Council and the Queensland state government

was a key motivation for this approach. Localising disaster management was then passed to VLCL, which produced the materials previously described.

The above engagement was considered by the Gold Coast City Council's disaster managers as a relationship based on conversation and cooperation rather than Council imposing its systems on the private development of disaster management for the community. The Council assessed materials produced by VLCL to be sound, particularly with regard to message coherence with other sources and localisation of content, but did not seek to formally endorse the content – nor were they asked to do so by VLCL. A bottom-up, community-based process within the general disaster management framework was therefore clearly advocated.

Gold Coast City Council's "Community Watch" program

The Gold Coast City Council is currently formalising and advancing a broad engagement approach via its "Community Watch" program. This initiative was jointly funded under the Natural Disaster Resilience Program by the Australian Government, Queensland Government and Council. The program seeks primarily to improve the resilience of the Gold Coast community by raising awareness of disaster risks and what should be done during times of crisis, and to provide leadership skill-sets into local community "sub-layers" of the type demonstrated during the January 2011 Queensland Floods crisis. As secondary objectives, these groups will seek to recruit and empower existing community groups

such as Rural Fire Brigades, State Emergency Service, Australian Red Cross and others (eg, VLCL emergency functions), to provide a conduit for the exchange of disaster-management-related information and warnings with the community. In essence, through Community Watch community groups are able to adopt disaster management functions in addition to their existing roles and are valued as part of the local disaster management arrangements in the Gold Coast.

During an incident, local community groups are potentially a hub of information exchange between the local disaster coordination centre and local communities. Messages and warnings can be accessed by the group from the coordination centre, locally interpreted and disseminated through community networks. Conversely, the coordination centre can secure information regarding local community needs and well-being via local groups who are in close contact with their communities. Even in the absence of an event, greater access to detailed community profiles via local groups may enhance disaster management planning and engagement by the Council.

Through Community Watch, it is envisaged that information and messages can be locally contextualised, disseminated and supported by the groups through penetrative local community engagement with the overall aim of increasing local community resilience. Ultimately, it is hoped that the groups may be able to establish local "sub-plans" that apply the Gold Coast City Local Disaster Management Plan to local conditions and communities. The council is creating templates and training materials to support local groups in these

Figure 2. Potential for community groups as additional layer in State disaster management framework.
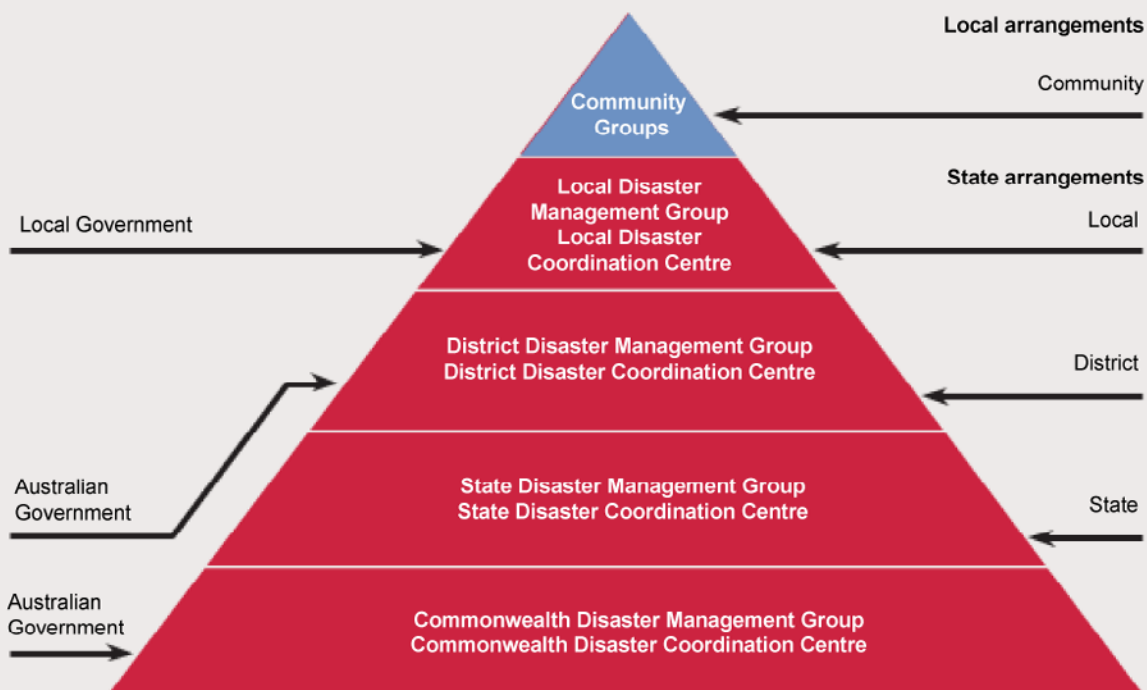
Adapted from Queensland Disaster Management Arrangements (Queensland Government 2011)

endeavours, but again, does not see itself in a strongly prescriptive role other than promoting consistency within the wider local, district and state disaster management systems and providing the tools to support this "ground up" approach to building community resilience.

Currently the program seeks to engage thirty local groups throughout the Gold Coast region with their identification being currently based on geographical communities that have higher exposures to natural hazards. Council, however, recognises the potential to extend the program to support, for example, communities of functional interest that share risks beyond geographical boundaries, interest groups, networks of vulnerable people (e.g. the elderly, lower socio-economic groups, disabled, etc.), and business groups. If implemented, under such an approach, individuals could belong to geographical and/or several functional communities, thereby enhancing penetration of preparedness programs, but again underpinning the importance of coordination of approaches.

It is important to note that Gold Coast City Council views the Community Watch program as a complementary addition, and not a replacement, to current local, state and national information dissemination and engagement systems. It is one program within a coordinated framework, and as stressed above, preserving message consistency and coordination amongst the potentially several sources in times of crisis is vital. Nevertheless, the program effectively adds a new local layer to the existing, four-tiered Queensland disaster management arrangements (Figure 2).

Discussion/Conclusion

Building community resilience is a complex and important task that requires effective partnerships. This includes the development of public-private partnerships. This paper has provided two different but related case studies of how such partnerships have formed within the Gold Coast: the partnership between Gold Coast City Council and Varsity Lakes Community Limited; and the partnership between Gold Coast City Council and local community-based organisations. Unlike traditional emergency management approaches to "partnerships" in which government applies a top down approach to determining partners and program, both case studies reviewed by this research illustrate a different approach – one in which the non- government partners have "emerged". The Varsity Lakes community did not need to be "authorised" by government to have an interest in emergency management – as explained above, this grew naturally out of the development process. Likewise the Gold Coast Community Watch program seeks to identify community-based groups which have an interest

To adopt this more 'organic' or "ground-up" approach to building resilience through partnerships, requires a shift in traditional thinking by government on community engagement. For Gold Coast City Council, this has meant going beyond the crafting of careful resilience messages and the construction of appropriate delivery

media, to assisting local people to take ownership of messages and information. It has also meant recognising that to build resilience requires a local community to internalise resilience-building into daily life practice. For Council, this approach has meant adopting a greater focus on coordination of messages, as opposed to simply managing the distribution of a single message into multiple communities.

While early indications to date are that both programs outlined in this paper appear to have been successfully received within the Gold Coast region, it should be noted that their longevity will be dependent on the willingness and the commitment of the groups to continue. At some point in the future, however, these groups may cease to perform these roles, or multiple groups may form to complement the community resilience role played by existing groups. What this means is a departure from traditional "hierarchical" notions of how community emergency management groups are formed and maintained, to a more "naturalistic" approach reflective of the lifecycle of community-based activity.

Acknowledgements

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Future scenarios for Australian bushfires: Report on a Bushfire CRC workshop

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ABSTRACT

A Bushfire CRC workshop on future bushfire scenarios was conducted at the Australian National University, Canberra, in November 2011. The workshop explored effects of global change on fire regimes, implications for socio-economic and environmental assets, potential mitigation strategies, and law and planning responses. These findings will be used to construct bushfire projections, and to assess implications for assets, including terrestrial carbon stocks and built assets in peri-urban environments, and their management. These analyses will provide critical input into economic evaluation of bushfires in Australian society, both currently and in the future.

Background

Climate change, and other aspects of global change, have considerable potential to directly and indirectly modify bushfire regimes (Gill 1975) (eg. Williams *et al*. 2009, Bradstock 2010, Cary *et al*. 2012). The 'Future Scenarios and Economics' project of the Bushfire Cooperative Research Centre (CRC) convened a workshop on 'Future Scenarios of Bushfires in Australia', at the Australian National University, Canberra, in November 2011. Seventeen researchers with expertise in bushfire dynamics and effects, bushfire management, land planning and bushfire law, explored: (i) the effect of global change on fire regimes; (ii) implications for a range of socio-economic and environmental assets; (iii) potential mitigation strategies; and (iv) society's response in relation to law and planning. The workshop agenda extended discussion on future bushfire scenarios significantly beyond recent syntheses (eg. Cary *et al*. 2012) (Figure 1).

The Bushfire CRC 'Future Scenarios' workshop was organised by Eddy Collett, Geoff Cary, Malcolm Gill and Josh Mulvaney. Workshop presentations were given by: Colleen Bryant, Geoff Cary, Helena Clayton, Steve Dovers, Michael Eburn, Malcolm Gill, Richard Groves, Craig James, Karen King, Darryl Low Choy, Andrew MacKenzie, Steve Roxburgh, Andrew Stark, Richard Thornton and Lyndsey Wright.

Global change effects on fire regimes

The direct effects of climate change on fire weather and fire regimes have been extensively studied in Australia (eg. Cary 2002) and elsewhere (Flannigan *et al*. 2009). Climate change effects on fire danger will vary by region (Williams *et al*. 2001, Lucas *et al*. 2007) (Table 1). In southern Australia, where increased fire danger is expected for most areas, warmer, drier climates are projected to shorten intervals between fires when the direct effects of climate are considered alone.

Understanding the effects of a changing climate and atmospheric CO_2 concentration on fuel dynamics is more complex. In many areas, drier conditions will reduce vegetation productivity, thus slowing rates of fuel accumulation (Table 1), although fuel decomposition will also be affected (see Williams *et al*. 2009). However, higher levels of atmospheric CO_2 concentration can increase plant photosynthetic efficiency, and hence productivity, although this enhancement will likely be limited by water and nutrient limitations (see Cary *et al*., 2012).

Future land-use changes, in response to global change, will be complex and difficult to predict, yet may have considerable effects on fire regimes. For example, a drier climate may cause Australia's major cropping zones to contract south and toward the coasts (Nidumolu *et al*. 2012), with the original cropping landscapes being either replaced by rangeland grazing or carbon sequestration, or being abandoned. These land use changes will likely result in greater connectivity of bushfire fuel (Moreira *et al*. 2009). Overall, considerable changes in plant communities are expected, particularly in arid, semi-arid and tropical savannah landscapes, with the emergence of 'novel' plant communities (see Seastedt *et al*. 2008) being highly likely (pers. comm. Craig James).

The spread of invasive, introduced plant species, especially grasses, has already changed fire regimes in large areas of Australia, and will continue to do so

Figure 1. Conceptual framework for exploring future bushfire scenarios. Global change will affect fire regimes that will influence assets directly, as well as indirectly via fire management efforts. More broadly, adaptation may involve changes to management, planning and legislation.
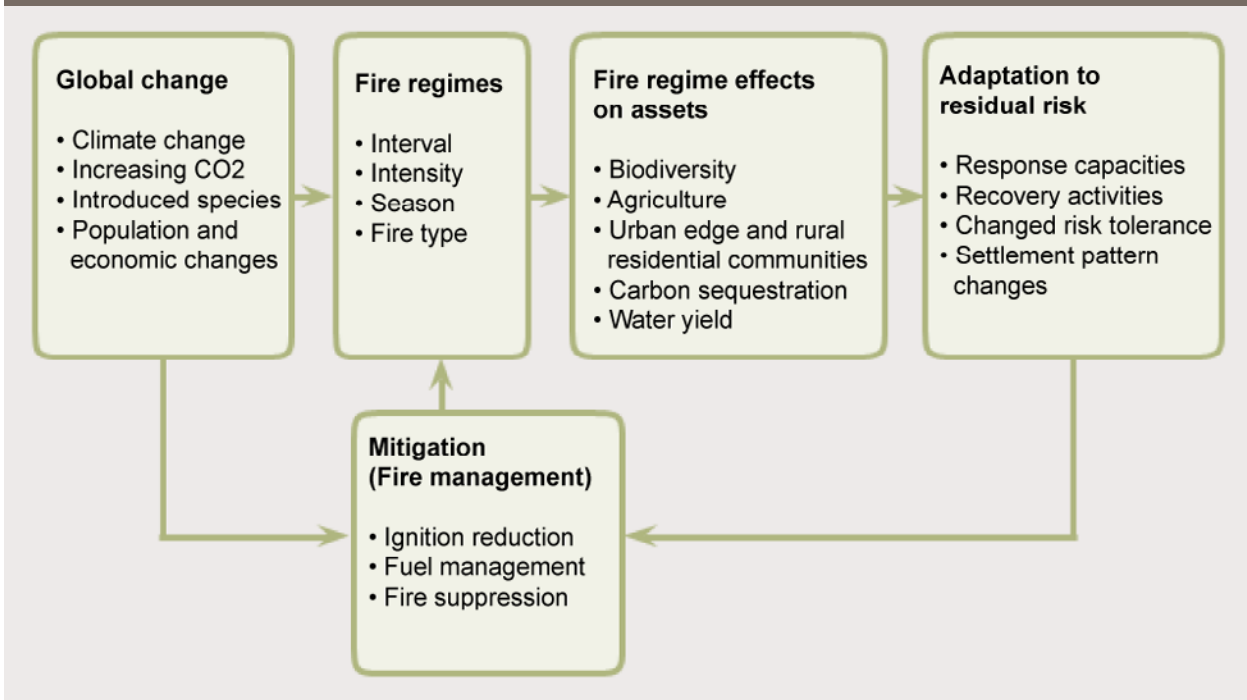
as invasive species increase their range. For example, Gamba grass (*Andropogon gayanus*) in northern Australia and Buffel grass (*Cenchrus ciliaris*) in central Australia, have increased fuel loads and continuity considerably, causing more frequent, and intense fires (Setterfield *et al.* 2010, Marshall et al. 2012). Similar circumstances surround the spread of leguminous shrubs in some temperate regions (pers. comm. Richard Groves).

Bushfire ignitions result from lightning or human activity. Climate projections indicate that lightning activity will increase in warmer climates (Williams 2005) and, combined with a shift toward increasing fire danger in some areas, will likely result in greater lightning ignitions. However, the majority of vegetation fires are human-caused (Bryant 2008). Fire ignitions are correlated with population size (Keeley & Fotheringham 2001), indicating areas that experience high levels of future population growth will likely experience more bushfires, although socio-economic status will likely remain a strong controlling influence (pers. comm. Colleen Bryant).

The combined effect of these factors on fire regimes remains uncertain because it is unclear whether controlling processes will have opposite or reinforcing effects on fire regime components (Bradstock 2010). For example, higher fire danger in south eastern Australia may be offset by lower overall fuel loads (Table 1), resulting small changes in fire intensity (eg. King *et al.* In press).

Effects on assets

Fire management objectives should involve protection and enhancement of natural and constructed assets, depending on location and legislated mandates, although noting assets can be valued differently by individuals, states and organisations. Bushfire- prone assets discussed at the 'Future Scenarios' workshop included human lives and houses in the urban-bushland interface and peri-urban landscapes, biodiversity, carbon stocks and water yield.

Residential areas contain high-value, constructed assets that face significant threat from bushfires. Peri- urban and rural-residential areas in particular are at significant threat given close proximity to remnant native vegetation and farmland (see Gibbons *et al.* 2012) (Figure 2), a characteristic that also increases their attractiveness as places to live (Eriksen *et al.* 2011). Low Choy *et al.* (2007) argue that peri- urban areas are now largely managed by a wave of recent settlers that can be categorised as 'Seekers', 'Survivors', 'Speculators', and 'Strugglers'. These groups bring, develop and foster vastly different types of assets in peri-urban areas, and this presents complex new challenges for management of natural resources and development in general (pers. comm. Darryl Low Choy), and for future bushfire management in particular. Further, future scenarios for peri-urban areas might range from continued development with little restriction in fire prone areas, to highly regulated development that effectively prohibits any further development. Communities subject to post-fire rebuilding in peri-urban and urban-interface areas may have additional financial resources to absorb losses and recover quickly (Cutter *et al.* 2000). As a result, the

Table 1. Global change scenarios in case studies in differing Australian ecosystems. Climatic predictions are 2070 (50th percentile) scenarios from CSIRO (2007) for Darwin (TF), Alice Springs (AW), Dubbo/Adelaide (TGW), Sydney/Perth (DSF) and Hobart (WSF). Bioregional zones from Hutchinson et al. (2005). (Modified from Bradstock 2010).

Global change attribute		Tropical open forest (TF)	Arid woodlands (AW)	Temperate grassy woodlands (TGW)		Temperate dry sclerophyll forests (DSF)	Cool temperate wet sclerophyll forests (WSF)
Fire Danger (based on fire weather)		Increase	Increase	Significant increase		Increase likely	Increase unlikely
Main fuel types		Annual grasses	Perennial grasses and annual herbs/ grasses	Perennial grasses and annual herbs/ grasses	Woody plant litter	Woody plant litter and shrub crowns	Woody plant litter
Sensitivity (direction of change in mass) of main fuel type to	Climate change	decrease	decrease	decrease	decrease	decrease	decrease
	Elevated CO2	decrease	decrease	decrease	increase	increase	increase
Introduced plant types		Gamba grass	Buffel grass	Tree plantations		Exotic grasses – Mediterranean areas	
Trend in ignitions			+ human	– human		+ human	+ human

post fire reconstruction tends to follow national trends in house design while only incorporating minimal increases in fire-related building standards (pers. comm Andrew MacKenzie).

Fire regimes and biodiversity dynamics are intricately interlinked (Gill 1975, Bradstock et al. 2012a). However, climate-induced changes in fire regimes occur simultaneously with direct effect of climate change on species (Hughes 2000, Williams et al. 2009). Critical to understanding overall effects of future fire regimes on biodiversity will be the nature of formal and informal systems of biodiversity reserves, with the importance of informal and/or private reserves (see Dunlop & Brown 2008) likely to increase in future times (pers. Comm. Malcolm Gill, Wyborn 2011).

Fire regimes are integral for understanding carbon dynamics (Williams et al. 2012). Greenhouse gas emissions from bushfires are largely re-sequestered during post-fire recovery (Figure 3). However, future changes to fire frequency or intensity will likely result in significant changes in long-term carbon stocks (King et al. 2011). Similarly, water yield will respond directly to climate change and indirectly to changed fire regimes through effects on vegetation (Chiew et al. 2008). Typically, fire causes vegetation regrowth, from varying mechanisms, increasing overall water use (Kuczera 1985), leading to decreased water yield in some cases.

Nevertheless, as with effects on other assets, and the interactions among effects, a linked fire-water-vegetation-carbon ecosystem model would be required to fully understand dynamics and make reasonable projections for the future (pers. comm. Steve Roxburgh).

The complex and changing nature of bushfire impacts on assets, pose significant challenges to fire managers (per. comm. Shane Wiseman). There is increasing interest in economic evaluations of fire impacts to guide future fire management responses. In such evaluations there are multiple values and trade-offs to be considered along with the high levels of uncertainty and dynamic processes where the cause and effect is separated across time and space. Simply exploring the cost of fire events may not prove as valuable in bushfire decision making as integrated economic decision-support frameworks.

Management solutions

Fire management can mitigate, to some extent, future changes in fire regimes. Increased rates of prescribed burning, coupled with highly strategic location of treatment application, could conceivably mitigate future increases in area burned (King *et al.* 2006, Boer *et al.* 2009), although the increase in prescribed burning required will be large in many areas (Bradstock *et al.*

Figure 2. Houses destroyed in 2009 'Black Saturday' fires (Photo: Geoff Cary, March 2009).

Figure 3. Post-fire regeneration following the February 2003 bushfires near Canberra (Photo: Geoff Cary, February 2004).

2012b), with resultant total area burned increasing significantly (King *et al.* 2006). The cost-effectiveness of prescribed burning for meeting objectives into the future is likely to be a significant consideration for future fuel management responses (pers. comm. Helena Clayton, Bradstock *et al.* 2012b). Intensive management closer to houses will continue to be a key management solution for mitigating against future loss of houses (Gibbons *et al.* 2012), and intensive programs aimed at reducing rates of bushfire ignition, both in general (Cary *et al.* 2009) and from arson (pers. comm. Colleen Bryant), along with rapid initial attack of fires (Figure 4), will remain critical.

Fire managers are likely to face increasingly difficult conflicts in allocation of resources to address the complex and interacting facets of fire management required of them. It is important, therefore, to understand how all these issues relate in order to make effective decisions now that will determine how well fire management organisations can address bushfires in a future world (pers. comm. Andrew Stark), although understanding key drivers of land management in 2050 will also be important (pers. comm. Lyndsey Wright). Given the increasing global inter-connectedness of fire management, the extent that national and international sharing of bushfire suppression resources will be limited by altered global patterns of fire in a future world may need to be considered (pers. comm. Richard Thornton).

Law and planning

Notwithstanding that land owners in Australia have been subject to post-fire litigation since 1868, bushfires are not necessarily a significant focus for the law. Nevertheless, bushfire policy is significantly influenced by lawyers and inquiries, and is significantly influenced by the particular circumstances of the most recent events, rather than necessarily forecasting future requirements on time-scale relevant to the effects of global change. Therefore, endeavours by society tend toward becoming readied to respond to the last disaster, not the next one (pers. comm. Michael Eburn) and this discourages agencies to prepare well for the future (pers. comm Andrew Stark). Overall, there does not appear to be a trend in frequency of bushfire litigation. There is, however, an increasing tendency for land management agencies to be defendants in this kind of legal process, and this may be a trend that continues in the future. The role of land use planning as a tool to minimise vulnerability to fire in new settlements is difficult to predict, and will vary across jurisdictions.

Workshop outcomes and next key steps

The 'Future Scenarios' explored diverse aspects of future bushfires. Resultant discussion is informing subsequent analysis of future scenarios of bushfires in Australia. In developing new projections, it was noted that the A1FI IPCC greenhouse gas emission scenario (IPCC 2000) most closely matches observed emissions (Raupach et al. 2007), and fire regime projections

Figure 4. Effect of annual summed Forest Fire Danger Index, and rate of initial fire attack, on simulated area burned in the south-east Australian mainland high country. Climate scenarios are: present (● and ○); 2070 B1 (▲ and △); and 2070 A1FI (■ and □). Solid symbols represent historical rates of initial fire attack. Open symbols represent enhanced initial fire attack. Standard error bars are shown. Note the x axis does not commence at zero. (Source King et al., 2011).
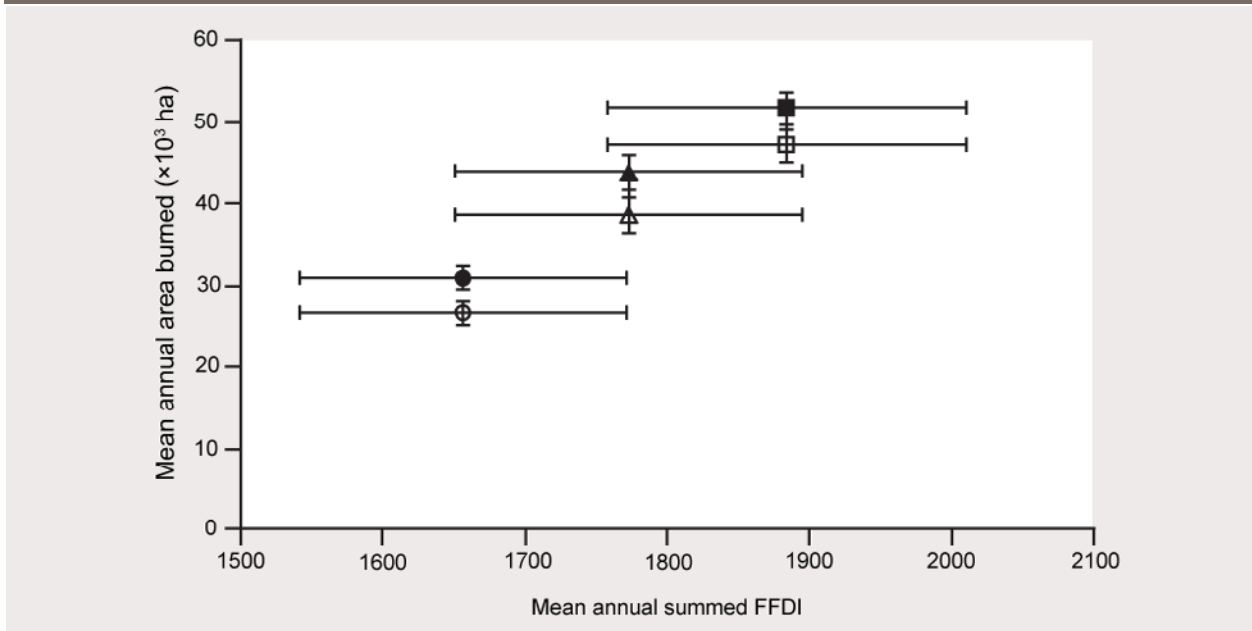
produced in this project will be derived from the A1FI scenario. A most-likely bushfire projection for 2050–2070, that incorporates the effects of global and climate change outlined above, will be constructed for key regions broadly represented by some of the vegetation types in Table 1.

It is not envisaged that multiple fire projections would be written for each study region. Doing so would compromise the project's capacity to explore implications of fire projections on assets, effectiveness of management, and implications for legal systems and social planning processes. Discussion of key examples of assets that can be explored focussed on terrestrial carbon stocks and built assets in peri-urban environments, which are key considerations for future bushfire management, but also reflect the focus represented by workshop attendees.

This group envisages that ongoing analysis will draw on some aspects of scenario planning but will not take the form of a traditional scenario planning exercise. The various insights about future bushfires in Australia will provide critical input into economic evaluation of bushfires in Australian society, both currently and in the future. For example, significant scope exists for market-based and regulatory policy mechanisms to reduce the burden of changing fire regimes on public fire management agencies. Further, economics could help guide future policy responses by evaluating and comparing effectiveness of private and public investment in fire risk management in meeting social objectives (pers. comm. Helena Clayton). An important caveat though, is that predicting future policy choices and settings is difficult, and becomes more so the further the time horizon is stretched (pers. comm. Steve Dovers).

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Innovation in policing emergency events: PERT TEAMS (Police Emergency response teams)

By Chief Superintendent Silvio Amoroso APM, LEM, South Australia Police.

There were successive years of devastating bushfires in South Australia in the mid 2000s, resulting in the loss of life and significant property destruction. As a result, South Australia Police's Deputy Commissioner Gary Burns decided that a group of Officers of Police at the level of Chief Inspector and Superintendent should be trained in more innovative ways for higher level forward command.

His thinking was to provide South Australia Police (SAPOL) with the capacity to deploy those specially trained officers to any location within the State to take command of major and or protracted incidents. This would be something new.

It would enhance police response in recognition that police leadership and working practical knowledge of command structures and requirements is essential to meet the obligations of the Emergency Management Act. In South Australia, under the Act, police are agency coordinators in addition to managing their own resources as a support or control agency.

So, in March 2008, a new higher-level Police Command Course with 10 participants was developed and conducted. This course focused on leadership and decision making skills transferable into any major incident, including terrorism incidents.

All of the command course participants were already highly trained. They had completed the tertiary level Superintendent Qualification Program, which includes a week long strategic incident management module covering public order, emergency management and counter-terrorism elements of operations command.

As an experienced operational commander I was given the responsibility of the ongoing professional development of the command course participants. My aim was to ensure that the knowledge and skills attained during that course remained sustainable and provided a foundation for present and future improvements in service delivery to the community.

While terrorism was the initial focus of the course, I recognised that the ongoing training should focus on

the ability to understand and respond to all categories of major incidents. This included critical environmental events such as bushfires, floods, earthquakes or chemical explosions, which have devastating consequences on public safety.

In this state, bushfires are a very real and significant threat to the safety of numerous communities every summer. As a consequence, the ongoing command course training sessions have had a critical environmental and in particular a bushfire focus. The very same knowledge and skills required by a commander in response to bushfires equally applies to other critical events, such as floods or earthquakes.

When considering the best way to develop the command group and enhance our policing response in an innovative way, I imagined deploying a commander in the field accompanied by a team specifically trained in setting up a Police Forward Command Post (PFCP).

While a Police Commander is well supported in that role in the centrally located Police Operations Centre (POC) through the SAPOL Emergency management Contact List, there is no formalised support for the Police Forward Commander. They often have to rely on local staff to provide the PFCP structure in the field. More often than not, those members have never

The Tank Cave environment and surrounding terrain was unforgiving and the specialised operational knowledge and technical IT support from the PERT team was invaluable in ensuring no further harm was caused to any rescuer or investigator.

Tank Cave is world renowned for its 7 kilometres of complex channels and chambers with many restriction points located within the cave system. Diving in this location is an extremely dangerous and technically demanding experience.
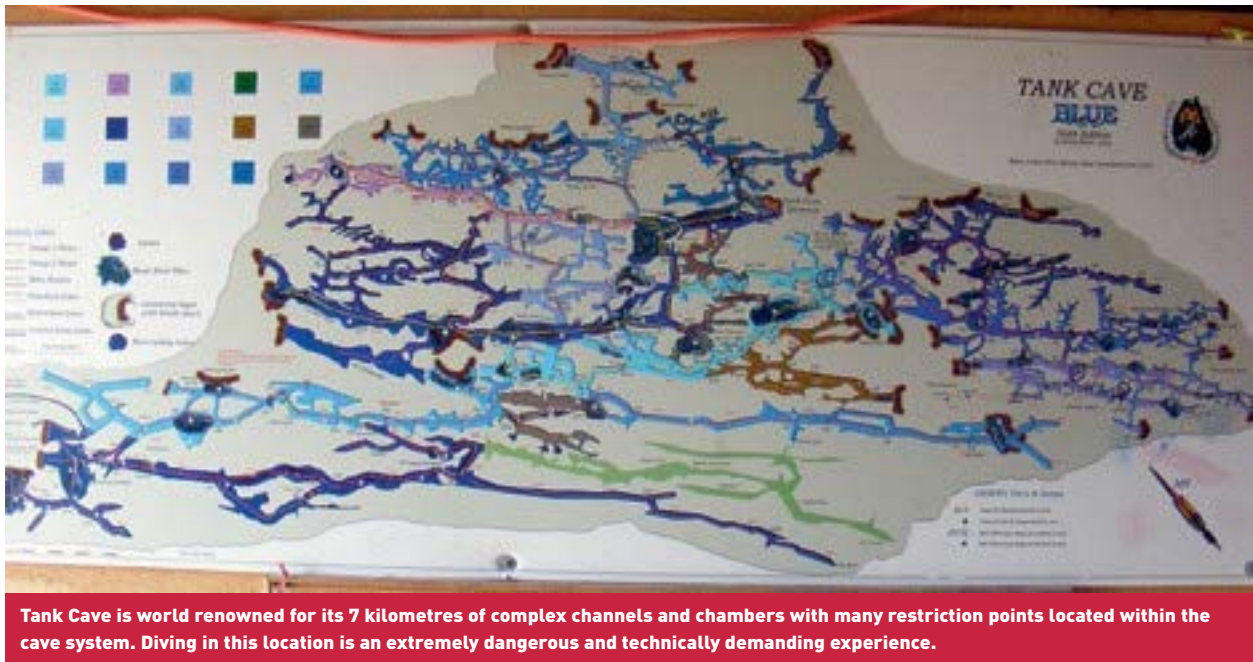
worked within that environment and are highly likely to have never received any training in their roles and responsibilities as the primary function for responding patrols is for the on-scene management of incidents.

A trained specialised team to operate a PFCP under SAPOL's Incident Command and Control System (ICCS, essentially a functional approach to the command of any incident), would be the ideal support scenario for any Police Commander.

Ideally, that team would have a high level of operational police experience to allow decision- making at that practical functional level to be knowledgeable and highly motivated, with the flexibility and scope to respond at short notice through the deployment of one of the command group members.

At this point, that ideal team existed only in my head.

Across the state police operations are divided into two large northern and southern regions (Services), each one having a tactical team of 17 members operating under the Command of the Chief Superintendent of that region (Service). The primary objective for these two tactical teams is to enable the flexible deployment of a dedicated group of members to work in collaboration with local police on targeted crime reduction and prevention strategies.

The focus is on high visibility of officers in hot spot areas, to target specific crime issues and criminal activity such as anti-social behaviour, public order offending, property offending, street level drug possession and hoon driving. They adopt a fair but low tolerance attitude and have the flexibility and mobility to deploy anywhere within the State at short notice.

A rigorous selection process ensures that only highly motivated, experienced and above average performers become members of the tactical teams.

It was clear to me that both these groups already possessed the qualities and structure to provide support to a police forward commander establishing a PFCP and hence the concept of PERT or Police Emergency Response Teams was born.

Detailed discussions were then held between both tactical teams and Police Commanders on operational details such as method of deployment and the roles and functions within the PFCP, particularly decision making processes and levels of responsibility.

Agreement for the concept was unanimous and things began to move quickly to establish PERT Teams as a priority.

A business model was developed and as deployment could potentially be metropolitan, regional, rural or remote, there was a need to engage technology that had the ability to 'plug' into the various SAPOL systems from anywhere in South Australia. In particular, the ability to use the Critical Incident Management System (CIMS) in real time to allow detailed recording and any police officer with the appropriate authority to access details of the incident from their office, using their desk top computer. This was important as it avoided the need to provide time consuming ongoing verbal updates.

PERT and the Command Group was a new idea, outside of the established SAPOL Emergency management Contact List and the formally established training framework. However, the value of the concept in the effective management of emergency incidents was immediately recognised and supported by police executive and the necessary IT and resourcing requirements for PERT were provided.

Most emergency personnel reading this article will be aware that there has been a tendency in the past in pursuit of IT remedies for operational requirements to specify the IT needs to the experts. This often results

Entry to the caves is through a small hole in the ground, leading down a vertical chamber.

in protracted dialogue and frustration with the delivery of IT solutions not doing what was anticipated. To avoid that situation on this occasion, I met with IT management, provided them an understanding of the role and the expected outcomes of PERT, and left them to determine what technology could best be deployed to meet those requirements.

The results were quick, simple, cost effective and stunningly operationally efficient when deployed in the field. It enabled links into SAPOL systems literally from the middle of a paddock in country South Australia.

The technology consists of a small portable router with NextG application for connections into SAPOL mainframe. This enables use of the technology from nearly every part of the State and at the very minimum; coverage is assured at all locations in this State with a population base regardless of its size.

PERT has now been very successfully deployed in metropolitan and regional locations earning high praise from the Police Forward Commanders for providing them with professional, effective and highly efficient support. The concept is flexible, being used for both emergency and major crime incidents with its IT linkages and real time documentation and recording of all activities, including the decision making processes by the PFC.

As a result additional equipment has been purchased including a smart board and interactive mapping system to enhance the capabilities and functions for the Police Forward Commander. Importantly, care was required in not overburdening PERT with equipment, as the essential criteria are flexibility and mobility to respond quickly to any location within the State either by road or plane.

The PERT model provides a simple, rapid, cost effective and operationally efficient response to managing any major community safety incident across a wide range of locations.

A case study example that attracted national and international media coverage was the recovery of a missing diver who died whilst exploring the famous Tank Cave near Mount Gambier in the south east region of South Australia.

On Sunday 27 February 2011, members of the Cave Divers Association of Australia (CDAA) reported that one of their well-known and experienced female members was missing within the well-known 'Tank Cave', after failing to surface from a dive.

Tank Cave is world renowned for its 7 kilometres of complex channels and chambers with many restriction points located within the cave system. Diving in this location is an extremely dangerous and technically demanding experience.

Entry to the caves is through a small hole in the ground, leading down a vertical chamber.

The recovery of the missing diver's body was extremely dangerous and expected to take some 5 days to accomplish in what was literally a paddock in the middle of farmland and pine forests in regional South Australia.

Members of the CDAA were given the task of recovering the body under the supervision and coordination of SAPOL. This required the establishment of a Police Forward Command Post to ensure the safety and coordination of civilians and other emergency services. The risk associated with the recovery required a professional approach with a high level of accuracy and recording of all operational details including briefings and directions.

The southern region (Service) PERT Team was immediately deployed along with an Officer from the Command Group to the scene, providing a high level of support and reassurance to all those involved. This included local police, also responsible for other daily response requirements and those close to the missing diver such as the Cave Divers Association of Australia members attempting the recovery operation, and the parents of the victim who remained at the scene for a number of days. There was also a high level of media interest.

Police management of this incident required both sensitivity and tact and a high level of awareness and coordination of appropriate safety procedures. The cave environment and surrounding terrain was unforgiving and the specialised operational knowledge and technical IT support from the PERT team was invaluable in ensuring no further harm was caused to any rescuer or investigator. The PERT structure was also able to easily provide coronial investigators with all appropriate recording and documentation requirements.

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Using modular simulation and agent based modelling to explore emergency management scenarios

By David Scerri, Sarah Hickmott, Karyn Bosomworth, Lin Padgham, RMIT University, Melbourne.

ABSTRACT

Computer simulation is a powerful technology which could be used by the emergency management sector to improve an understanding of complex scenarios. We present two emerging simulation technologies, Agent Based Modelling and Modular simulation development, and describe how they could aid with communication, collaboration and understanding of complex emergency management scenarios. ⓡ

Introduction

Viewed across the planning, preparedness, response and recovery (PPRR) spectrum, emergency management has multiple factors including land use planning, building regulations, community development, tourism, health, the education sector, and major infrastructure management including electricity, water, roads and rail. Consequently, emergency management involves a vast range of stakeholders, each with often independent responsibilities. It is the need to consider and address this multitude and often dynamic range of responsibilities and issues that makes emergency management increasingly complex and complicated.

This paper will discuss the potential of combining two emerging computer simulation technologies for emergency management planning and preparedness. The project was funded by the National Climate Change Adaptation Research Facility (NCCARF), and our project partners were Victoria's Country Fire Authority (CFA) and Department of Sustainability and Environment (DSE). We worked with these agencies to identify that bushfire evacuation was an area of concern for the state's fire agencies and then to build a prototype simulation for exploring bushfire evacuation scenarios.

The technologies the project brought together to explore complex emergency management scenarios were modular simulation and Agent Based Modelling and Simulation. Modular simulation allows the building of

complex simulations by integrating multiple models, where each model can capture a different aspect of the scenario, and be based on different stakeholder expertise and perspectives. This can involve combining existing tools and data (that were not necessarily originally designed to interact), as well as creating new models, to build a complex scenario whilst maintaining the integrity of each model or program. Agent based modelling and Simulation is a computer-based technology that allows individual 'agents' to be programmed with unique behaviours in a way that is intuitive and natural. It allows for complex group behaviour to emerge from relatively simple behaviours of individual agents. Bringing these technologies together can capture many different aspects of an emergency management scenario in one common computer simulation, while allowing for a focus on human behaviour and the modelling of individuals. Importantly, this allows users to explore an array of interactions between the multiple aspects of an emergency scenario, under non-emergency conditions.

In this paper we first outline a prototype simulation that was developed for this project, which explored bushfire evacuation scenarios. Using this example prototype we then describe the potential relevance of modular simulation and agent based modelling to EM planning and preparedness, as well as training and community engagement. We consider how visualisation and manipulation of complex emergency management scenarios, and the ability to define, examine and control individual agents, can aid collaboration and communication between different stakeholders.

Bushfire response evacuation prototype

The prototype simulation developed in this project aimed to capture the movement of people during a bushfire evacuation. It incorporates key aspects of the scenario, including fire spread, traffic flow, and the decision making of citizens surrounding when they choose to leave and which roads they might take. The simulation can be configured for different scenarios using different road maps, fire profiles, evacuation point(s), and information about the characteristics and behaviours

of people such as their starting address, how long they take to respond to 'evacuation stimuli'[1], and whether they go directly to an evacuation point or take more circuitous routes.

The prototype incorporates a number of existing and purpose-designed models. As it is widely accepted in the industry and trusted by the project's partners, the fire spread model uses outputs from the Phoenix Fire Simulator.[2] The traffic model utilises an existing agent-based model developed by traffic researchers in Germany known as the Multi-Agent Transport Simulation (MATSIM) (Balmer, Rieser et al. 2009). Each vehicle on the road is modelled individually, and the driver plans their own route for reaching the evacuation area. Driving behaviour such as acceleration and deceleration speeds can also be unique to each vehicle. When the vehicles move on the road, they interact with other vehicles by attempting to maintain safe distances from those around them. This allows realistic traffic movement to be modelled, with bottlenecks able to appear at high traffic areas and traffic jams emerging from the dynamics of cars stopping and starting. The behaviour of people in response to the bushfire threat is an agent-based model developed specifically for this prototype. It is based on a fairly simple analysis of the academic and grey literature (Perry 1979; Sorensen 1991; Alsnih and Stopher 2004), and has fairly basic behavioural characteristics.

Modular simulation

Modular simulation supports modelling a complex scenario as a set of largely independent parts, and their interactions (Scerri, Drogoul et al.). This is particularly suited to various emergency management scenarios that typically involve a multitude of stakeholders, infrastructure, and environmental impacts, each of which are complex in themselves. For example, a simulation scenario may comprise a weather model, a communication network model, a transport network model, an EM sector response model, a disease spread model, etc, and the interactions between these models. Modular simulation allows for each of these parts to be defined and developed independently, subject to its own modeling requirements, data needs, and stakeholder responsibilities and expertise. It allows organisations with specialised expertise to develop, validate and understand their part of the scenario, and the way it interacts with the bigger picture, without having to delve into the details of other parts of that picture. For example, the traffic model allows drivers to be affected by aspects of the fire model, such as the current location of the fire, but the intricacies of how the fire spreads are able to be confined to the fire model. This approach readily supports the incorporation of existing models and data that have established credibility within different stakeholder groups.

The modular simulation approach also supports exploration of a multitude of scenarios by expanding on the current scenario, re-orienting the scenario, or interchanging models in the scenario. For example the fire evacuation simulation could be expanded to include a model capturing police control of traffic; it could be re-oriented to look at spread of information by including a communication network model; or it could be converted to a flood evacuation simulation by swapping the fire spread for a flood model and including the interactions between vehicles and water levels.

Agent-based modelling

Agent-based modelling is a particular modelling paradigm that is increasingly popular for examining scenarios where individual behaviours and interactions between individuals are considered important (Bonabeau 2002). While the agents in an ABM may represent any real world entity, such as animals, plants or biological cells, we focus on humans or groups of humans as the 'agents'. An agent-based model is based on particular descriptions of individual agent behaviours, including decision processes that might be considered to influence actions. This is distinct from modelling a presumed average behaviour of a group or from simplifying behaviours down to mathematical formulae. Attributing each individual agent unique behavioural characteristics allows for modelling of a heterogeneous population, which is closer to a real-world scenario than one which assumes homogeneous behaviour.

An agent-based model is then used in a computer-based simulation. A simulation uses the model along with some other input parameters and produces some form of output. Because a simulation can be configured in a multitude of ways, it allows users to explore a range of different scenarios. The outputs from any one simulation can also take a range of forms. Sometimes, system level values such as total survivors or total infrastructure damage are considered sufficient information. Other times, it is more interesting to look at agent-level values such as the time it took an agent to evacuate from a danger area or the path which the agent took. It is possible to record a history of the actions and interactions of each agent, so that later these can be analysed to identify why and how an agent reached a particular state. ABM simulations also usually have some form of visualisation, which can allow the user to understand the scenario from a unique perspective, and to observe parts of the simulation which cannot be captured as individual components because the outcomes (the simulated 'behaviour') depend upon the interactions of a number of factors.

The appeal of ABM over other modelling paradigms for exploring some of the aspects of an emergency management scenario depends on many factors that are discussed below.

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1 'Evacuation stimuli' might include official and unofficial warnings and information, including comments from neighbours, responses to weather, conditions etc.

2 Developed as part of the Bushfire CRC by Tolhurst, Chong and Strangard

Spatially explicit

Emergency management scenarios typically have a significant geographical element to them, with the physical location of people, hazards and infrastructure playing a vital role in how a scenario unfolds. This is well supported by the agent-based modelling technique, where agents, and other objects can be made spatially explicit, and relationships or interactions between them can be dependent on their geographic location. For example, it is possible to have agents that are close to

a hazard be aware of its existence directly, while other agents are dependent on warnings, or may be totally oblivious to any indication of threat.

Availability of individual data

Agent-based modelling requires information at the individual agent level and thus is not based on necessarily simplified aggregated information. This type of information might be obtained via various research methods, particularly those from the social sciences. Information from some of Australia's worst disasters can provide an initial starting point (CRC 2010). This also allows for a mapping of certain social science data into an agent-based model. The strength of using individual level data was discussed above.

Emergence

There are some phenomena present in emergency management scenarios which are simply not well understood at a high level, and it is therefore difficult to model them from that level. The phenomena of 'a traffic jam from nowhere', where a small, temporary disruption to traffic flow is magnified and eventually results in cars being brought to a standstill, is best explained through the behaviour of individual cars, with each car slightly overreacting to the braking of the car in front. Agent based modelling allows for this type of phenomena, which would otherwise be missed, to emerge from the interactions of the agents. (Cariani 1992).

Heterogeneity

The ability of Agent Based models to include heterogeneous populations has a number of benefits for emergency management planning. The assumption of homogeneous populations in other forms of modelling often fails to capture variances that are inevitably present in any scenario. Therefore, while it may be possible to identify a theoretically best or worst result, it isn't possible to capture more complex subtleties that might be expected from a model based on heterogeneous characteristics. Using agent-based modelling allows a closer representation of a population to be modelled. For example, a combination approach to a warning system which uses SMS messages, community phone trees, and visual warnings, could be modelled on a heterogeneous population, and the specific parts of the community which have characteristics which mean they are missed by the warnings could be identified and more robust policies identified.

Capturing behaviours and decision processes

There is also a clear difference in the way the behaviour of an agent can be defined in ABM, compared to other modelling paradigms, which is better suited to attempts to capture human behaviour. Agents may be described using simple rules: how they will react to another agent's actions, which actions they will perform regularly independently of others, and simple decision making about what actions to perform under which conditions. There are also more complex ways of describing agents which attempt to map some psychological understandings of human decision making, and allow the modeller to work at a higher level of abstraction using the concepts of the agents beliefs, desires and intentions (Bratman 1999). This intuitive way of modelling behaviour both makes modelling easier and the resulting model easier to understand. While still limited in its actual ability to represent the actual complexities of human behaviour, the ability of ABM to allow for programming of individual agents allows for model outputs that may be somewhat more indicative of complex human behaviour and social scenarios than potentially oversimplified mathematical models based on homogeneous model inputs.
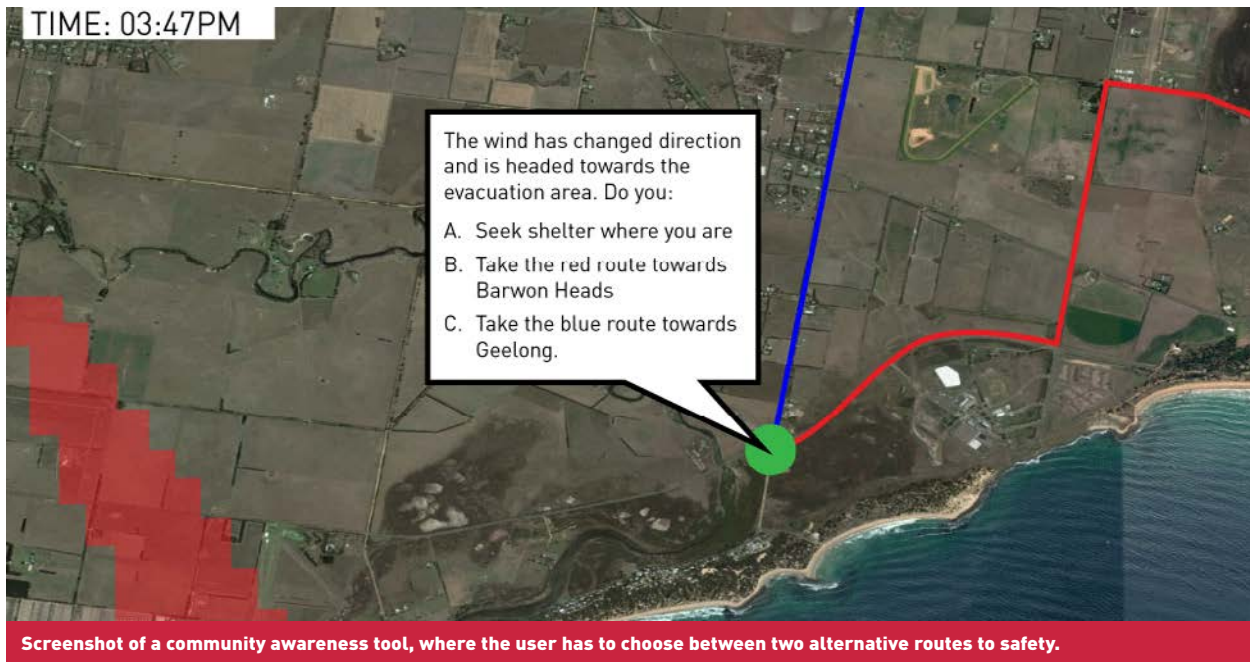
How might modular, agent-based simulation be used in emergency management planning?

We have identified three key areas where we believe modular, agent-based simulation might be useful for the emergency management community, each with a different level of control over the simulations progression. However, the flexible nature of these types of simulation mean they can be used for many other purposes beyond the examples presented here.

Community awareness

The simulation platform can be a powerful tool for sharing information with the community and raising community awareness of specific issues. A key advantage of having an agent based model that includes some basic human behavioural factors, is that people can relate better to individual behaviour in the simulation, particularly when it is localised to their community or even them specifically. For example, in the current prototype it is possible to visually follow the movement of a single agent, giving the participant sense of being immersed in the scenario. This visual engagement can be a very powerful way of communicating information, particularly across language or cultural borders. By developing scenarios for specific communities people can understand the specific issues in their area, and explore the advantages and disadvantages of their planned response to a threat.

In these types of simulations, it is possible to strictly control the progression of the simulation so that specific messages can be portrayed. For example, users who select risky responses to a threat can be shown how these can result in negative outcomes, rather than

TIME: 03:47PM

The wind has changed direction and is headed towards the evacuation area. Do you:

A. Seek shelter where you are

B. Take the red route towards Barwon Heads

C. Take the blue route towards Geelong.

Screenshot of a community awareness tool, where the user has to choose between two alternative routes to safety.

occasionally being successful which could result in a false understanding of the associated risks.

Training

Interactive simulations, or 'serious games', can be used for the training of emergency management staff. An interactive simulation could also allow the user to perform the same actions as they would be expected to perform during an actual emergency event. For example the evacuation prototype could be used by incident controllers to explore the possible timing of evacuations. Simulations can be developed to allow users access only to the information they would likely have access to in a real scenario, or alternatively can allow the user access to different perspectives to allow them to better understand the effects of their actions.

It is possible in these interactive simulations to maintain a balance between directing the simulation towards a goal, so that the purpose of the training is achieved, and allowing the user to feel in control and that they are having an actual affect on the simulation's progression. The exact progression of the simulation will vary based on the actions of the users, but specific desired effects may always be present. This allows simulations to be set up to train users about specific hazards or common mistakes while allowing them to practice as realistically as possible in non-emergency conditions.

Research

Using the simulation platform, with the input of stakeholders from different emergency management agencies, communities and organisations can support the generation of new insights or understandings for research. Some examples include exploring different

warning delivery methods and their effectiveness; exploring different evacuation plans in under different circumstances; exploring potential congestion locations even under best-case scenarios.

Different simulations could explore scenarios in the same town using differing weather conditions, householder and tourist reaction times and movements, emergency service vehicle movements and a range of evacuation points. In this way, an exploration of the sensitivity of an outcome to the variables examined can be made, including some consideration of the influence of various planning and response activities on those outcomes and can support policy makers in identifying robust[3] management options.

In simulations for the purpose of research, there is less control needed over the progression of the simulation, and instead outcomes are allowed to emerge. This allows new phenomena and insights to be generated without the modellers having to explicitly model them, and often results in more exploratory, thought-provoking type simulations rather than strictly predictive ones.

Conclusion

Agent-based modelling and modular simulation development are two technologies that could be used by the emergency management sector to improve an understanding of complex scenarios. It allows groups with separate expertise to model specific parts of a scenario using tools and data that they consider suitable and that are available. Complex simulations can be built from these parts which are still easy to understand and change. Utilising an agent-based approach to model parts of the simulation that involve people can allow for a more natural and intuitive inclusion of

3   Here robust is taken to mean a management or policy option that has positive outcomes under a broad range of conditions.
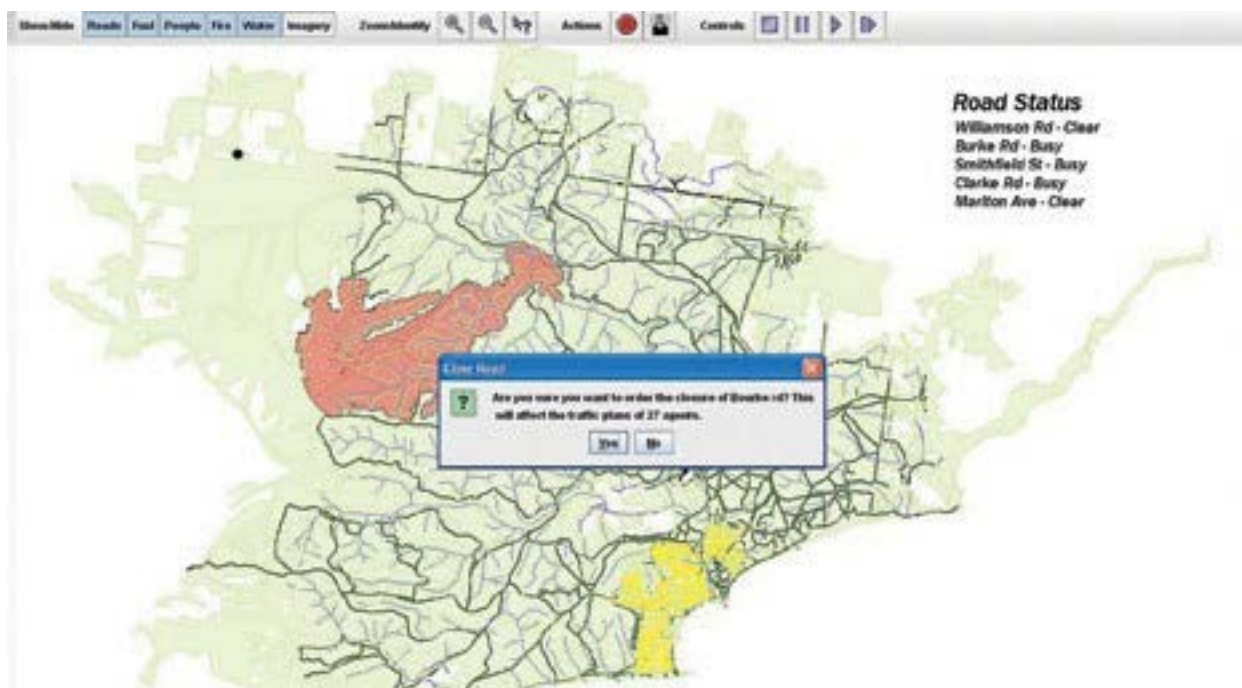
Screenshot of a possible training simulator, with the user able to make decisions about which roads to close, but also have access to extra information such as how many people a closure will affect.

human behaviour, albeit simplified in the simulation, and can allow for outputs to emerge from interactions between agents.

We believe that computer simulation can play a vital role in Emergency Management planning and preparedness, and that these two technologies can allow more complex simulations to be developed, understood and used.

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Older people and disaster preparedness: a literature review

By Cornell, V.J., Cusack, L., and Arbon, P., Flinders University.

ABSTRACT

Anecdotally, older people are considered to be vulnerable to emergency events, from the preparation phase, through the response, and into the recovery phase. This article provides an overview of disaster research literature concerning older people, in the context of vulnerability. In light of the current focus on building resilience and the Council of Australian Governments (COAG) endorsed National Strategy for Disaster Resilience, it is timely to consider how the emergency management sector understands and engages with potentially vulnerable groups to build their resilience.

Introduction

In Australia, and around the world, both natural and man-made disasters continue to challenge the emergency management sector, from preparedness through to recovery. The experience of recent events, such as the Victorian Bushfires in 2009 and the Queensland and Victorian Floods in 2011 and 2012, have highlighted issues regarding the engagement of vulnerable groups in preparedness and response planning. One group that is often considered to be vulnerable is older people. Further, those older people in receipt of an in-home aged care service might be considered particularly vulnerable. This could be either because they receive the service due to their own reduced ability; or because they rely on a service which might itself be interrupted during an emergency event.

In addition to actual emergency events, discussions that have taken place during disaster management planning and exercising, for example pandemic planning, have triggered consideration to the way older people are engaged in disaster management processes. Have the views of older people been specifically canvassed, in developing disaster preparedness plans? While peak bodies may be engaged in disaster planning, the only time older people themselves have been invited to contribute to disaster management has been through post emergency event research. This literature review therefore forms part of a larger research project considering whether the lived experience of older people influences their preparedness for disasters.

Method

There is a large, and growing, body of literature available about disasters and disaster management, predominantly from overseas, but also from Australia. To meet the particular requirements of the author's research, and to ensure that both domestic and international vocabularies and research were captured, search terms included: emergency, disaster, preparedness, older people, elderly and aged. The literature review was not confined to specifically the emergency management field, and also explored the disciplines of psychology, sociology, health care, climate change and demography.

Older people and disaster research

Anecdotally, older people are considered to be vulnerable to emergency events, from the preparation phase, through the response, and into the recovery phase. They are often grouped in a collective of vulnerability that 'identifies the aged, the very young, the poor, the socially and physically isolated, the disabled and ethnic groups as being particularly vulnerable' (Buckle, 1998-99, p. 23).

However, little research has been undertaken in this area. As Ngo (2001, p. 80) highlighted: 'Despite an increased awareness of disasters and a growing interest in the study of how disasters affect human populations, research specifically addressing the elderly population has remained a relatively small and undeveloped field'.

In addition, much of the research that has been undertaken provides conflicting information. Fernandez *et al* (2002, p. 68) found that 'The data are contradictory as to whether the elderly groups are more vulnerable than are other age-defined population groups' suggesting there are several variables in older population groups which must be considered, for example age (what constitutes 'older'); mental and physical ability; living arrangements; and financial situation.

Most disaster management research concerning older people focuses on the response and recovery phases. As Perry and Lindell (1997, p. 258) noted 'Over the years, the bulk of empirical research on older citizens in disasters has focused on the period after the impact; normally known as the reconstruction and recovery phase'. Little research has been carried out with regard to older people and preparedness.

Of the preparedness research carried out to date, most is centred on authorities preparing for responding to an event rather than the individual. For example, there has been much research on developing social vulnerability indices within communities, to assist emergency response workers when dealing with an event. If a social vulnerability study undertaken in a community highlights that a large number of older people live in a particular suburb, the emergency responders can factor that in their actions (Morrow, 1999; Yeletaysi et al, 2009; Center on Aging, 2005; and Flanagan et al, 2011).

Similarly, there is literature that considers aged care facilities, such as nursing homes. In particular, there is research and guidance on preparing the facility for emergency events, whether and when to evacuate, and the best way to evacuate the facility (Hyer et al, 2006; Hyer et al, 2007; and Castle, 2008). Given its focus, this type of research has considered agencies and authorities with responsibility to manage such facilities or activities, not community residents.

However, there is a lack of research that relates to preparedness of older people who are living in their own homes, or even to agencies that provide care to older people in their homes – 'Little research has addressed disaster preparedness in agencies providing services to older and/or disabled clients in their homes. Almost all of this research has been limited to narrative reports about the impact of disaster on clients of home care services, narrative accounts of community based initiatives, responses of a single agency after a disaster, or ways home healthcare nursing can better prepare to care for clients.' (Laditka et al, 2008, p. 134).

The discussion that has taken place largely considers the development of tools that will help older people prepare, rather than what might influence their decision to prepare. Following their study to identify the vulnerabilities of older people to disasters and to develop strategies to deal with those vulnerabilities, Fernandez et al (2002, p. 71) stated that 'Disaster checklists and other educational materials can be developed for distribution to the frail elderly, their family, and friends through social networks, community-based service organizations, and healthcare providers'. However, this study was based on a literature review alone; it did not interview one older person.

Similarly, Aldrich (2007, p. 3) noted 'Disaster preparedness planners are beginning to understand the need to communicate with advocates from the older adult and disability communities.' But what about speaking with the older people themselves?

It would appear that the opinions and thoughts of older people – either in developing the tools, or even assessing if the tools are what the older people want – have rarely been canvassed. It has been more the case of doing things to and for older people (i.e. disseminating personal safety plans) rather than asking older people what they want (i.e. engaging with the older people).

There is precedent for fully engaging with older people in other sectors. A World Health Organization project considering age friendly cities, undertaken in late 2006 – early 2007, interviewed older people (aged 60 years and over) in focus groups across 33 cities worldwide – 'Because older people are the ultimate experts on their own lives, WHO and its partners in each city have involved older people as full participants in the project' (WHO, 2007, p. 7).

This 'bottom up' approach of directly canvassing the views of older people could readily be transferred to emergency preparedness. Authorities would do well to ask older people what they have learned from their experiences through life, what served them well in previous emergency events, and what would be useful in terms of preparedness advice and tools, rather than assume. This could have a positive effect on the whole community, not just the older people.

Are older people more vulnerable?

Disaster researchers often classify older people as a 'vulnerable' group. However, as has been highlighted by many (for example, Fernandez et al, 2002 and Smith et al, 2009) it is not advancing age alone that makes older people vulnerable. The vulnerabilities of older people are generally due to factors associated with the advancing age, such as 'impaired physical mobility, diminished sensory awareness, pre-existing health conditions, and social and economic constraints' (Fernandez et al, p. 69).

Buckle (1998-99, p. 15) when writing about community vulnerability with specific regard to the 1998 Longford Gas Crisis in Victoria, stated 'There is anecdotal evidence – though not corroborated by any systematic study – that the elderly who had weathered the landmark disruptions of war and economic depression or the more personal difficulties of daily domestic life dealt with the stress of living without gas better than the less robust young. As well as being personally more resilient they were more imaginative in the solutions they developed to cope without gas'.

Whose responsibility is it to 'protect' older people?

Another issue of interest is the question of responsibility. Whose responsibility is it to 'protect' older people in their own homes, or ensure their preparedness for emergency events? Is it the older person's? Is it the responsibility of the state authorities? Is it a mixture of both? Does this differ from responsibility to other citizens? 'Debate concerning the obligations of the state, or government institutions, to promote and

maintain welfare has an ancient history. The balance between private and public responsibility for welfare has shifted over time and across nations, reflecting widely philosophical views concerning the state's proper role.' (Reamer, 1993, p. 10).

Given that older people spend more time in their homes than anywhere else, and that research has shown that the home is the most important place for older people, where they feel both independent and safe (Fange and Ivanoff, 2008) ensuring they are not vulnerable in this setting would seem to be critical:

"The very old people were very aware that due to aging they belonged to a group that is vulnerable...The home was a safe and familiar environment, and a place that the older people could return to when life outside home was too demanding. A familiar, safe and functional home compensated for declining capacity, supported routines developed over the years, and enhanced daily activities and participation. Thus, the home was an important source of support for the health of the very old people" (Fange and Ivanoff, 2008, p. 341).

The ageing population: a burden or a benefit?

In one respect, the literature on the ageing population is generally in agreement – that the international population, with very few exceptions, is ageing. Certainly in Australia this is the case. The Australian Bureau of Statistics (ABS) data shows that the median age of Australia's population is projected to rise to between

41.9 years and 45.2 years in 2056, from a 2007 figure of 36.8 years. In addition, by 2056 there will be a greater proportion of people aged 65 years and over than at 30 June 2007, and a lower proportion of people aged under 15 years. (3222.0 - Population Projections, Australia, 2006 to 2101, 2008).

What is interesting in the literature is the difference of opinion of the 'burden or benefit' of this ageing population. 'Population ageing has brought with it... negative stereotypes of dependency and burden...' (Tinker, 2002, p. 731).

The literature from some sectors, for example the health and economic sectors focuses on the ageing population as a burden. Those sectors express concern that, as the older population increases, there will be a greater strain on healthcare provision (for example, Stewart, 2002; and O'Connell, 2000) and superannuation.

In its report of 2001, the Commonwealth Government Department of Health and Ageing considers the implications of an ageing population. While not discussing the subject in a negative light, the report does point out that 'There are a number of population ageing challenges for Australia. Promoting a sound economy is the best insurance a nation can take to counter and adjust to the impact of population ageing.' (p. ix).

On the other hand, there are those who speak very positively about the ageing population, and what older people can give to society. In their report on older persons in emergencies, for example, the World Health Organization (WHO) (2008, p. 4) states:

Newspix photo by Patrick Hamilton.

Older people are considered to be vulnerable to emergency events, from the preparation phase, through the response and into the recovery phase.

"Older people are resources for their families and communities particularly during times of crisis. Their years of experience can make them models of personal resilience and sources of inspiration and practical knowledge. They give voluntary aid, care for grandchildren or neighbours, and participate in support or recovery initiatives. Including older persons in planning for and responding in emergencies thus benefits the whole community."

This report compiled case studies of older people, around the world, who had experienced an emergency event – either as a person affected by the event, or as someone involved in the emergency operations. The events ranged from natural disasters such as the tsunami that followed the Indian Ocean earthquake of December 2004, and the heatwave that affected large parts of Europe (particularly France) in 2003; to man-made events such as the Chernobyl nuclear power plant accident of 1986 and the Lebanon armed conflict in 2006.

Refreshingly, in most case studies undertaken for the study, it was the older people themselves who were interviewed – not peak bodies or other advocates for older people. Similarly, some of the measures proposed in the report's policy response are very inclusive and engaging of older people. For example, the promotion of the sharing of older people's experiences of previous crises and involvement of older people in personal planning and decision- making relating to emergency events (p. 38). After all, '…the survival know-how in emergencies that older people have acquired helps them cope and provides inspiration and guidance to others' (p. 32).

Prior exposure to disaster events

There is a large body of literature considering prior exposure to, or previous experience of, events and subsequent behaviours as a result of that exposure or experience. This research covers both disaster exposure (particularly in relation to psychological effects) and other more general life experiences.

Prior exposure, developed over a long life, could be seen to be a positive in terms of disaster preparedness. For example, Morrow (1999, p. 6) found 'In a study on the effect of prior experience on the psychological impact of a disaster on older adults, the findings support an inoculation hypotheses in which previous exposure to stressors that were the same or similar in nature to the disaster resulted in a level of psychological tolerance'.

Similarly, in his review of literature on how elderly people respond to disasters, Ngo (2001, p. 80) found that 'The lower psychological vulnerability of older adults observed among the elderly disaster victims may be attributed to greater life experience, previous disaster exposure, or having fewer obligations and responsibilities.'

In terms of the disaster sector, the research – while interesting and informative – is not age specific, i.e. much of the research considers prior exposure to an event across a community of all ages. Also, the focus is primarily on prior exposure and subsequent behaviours in known hazard areas, for example hurricanes (Sattler, Kaiser and Hittner, 2000).

While it may seem intuitive to assume that prior exposure to an event makes survivors more vigilant and encourages preparedness for future events, this is not always the case. For example, experiencing a small event 'such as having easily survived a mild hurricane or near-miss, can breed complacency' (Morrow, 1999, p. 6), and subsequently lower inclination to go to the effort of preparing.

No research has been found that asked a broad section of people (of any age) that lived in a general community where potentially any event could occur, but was not known for specific hazard event types.

The lessons so far

In light of the current focus on building resilience and the National Strategy for Disaster Resilience it is timely to consider how we understand and engage potentially vulnerable groups to build their resilience. More needs to be understood about what constitutes vulnerability, and engagement with those identified as vulnerable must be genuine. Emergency management planning needs to be less paternalistic and more inclusive if true resilience is to be achieved. In the case of older people, it must be recognised that many older people live in the community, in their own homes and can contribute enormously to community resilience.

Acknowledgements

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Mr Donald Joseph KELLY

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Mr Trevor Michael ROCHE

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Mr William Murray (Bill) WATSON

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Mr Ian McDonald MITCHELL

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Mr John VAYRO

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Mr Michael Gregory (Mike) CANTELO

Mr Wayne John JONES

Mr Colin Walter MALCOLM

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AUSTRALASIAN LIBRARIES IN THE EMERGENCY SECTOR

Forensic and Scientific Services, Information Research Services

The current Forensic and Scientific Services Library moved with the Government Chemical Laboratory from its premises in the City to Coopers Plains in 1989. As a business unit within Queensland Health, Information Research Services provides services to clients based at the Coopers Plains campus, as well as state wide services to Pathology Queensland staff; FSS staff based off-site and other clients within Queensland Health.

In 2009/2010 DEEDI and CSIRO library staff were accommodated within the existing FSS library area, as part of the Coopers Plains Health and Food Science Precinct. The libraries share a front line service where initial enquiries and services are provided jointly by all agency staff regardless of their affiliation.

Information Research services provides services that include literature searches, current awareness alerts, journal and database subscriptions, book purchasing, document supply from internal and international sources, help with bibliography management and citation and information skills training.

Staff in FSS Information Research Services serve:

- Forensic and Scientific Services
- Biomedical Technology Services (BTS)
- Brisbane Southside Population Health Unit (SPHS)
- Queensland Bone Bank
- Pathology Queensland and
- National Research Centre for Environmental Toxicology (Entox)

Information Research Services currently has 7.5 full time staff which includes the Library Manager, 4 x liaison/liaison support (including collection management and document delivery) and 2.5 staff in electronic and technical services.

Government Chemical Laboratory Library, research area (circa 1920).

Purpose, role, function (within organisation and wider community)

Information Research Services at Forensic and Scientific Services links people with information. It's a vital part of our commitment to promoting the delivery of information and sharing our expertise to help our clients achieve their research and business goals.

Staff in Information Research Services provide services that include literature searches, current awareness alerts, journal and database subscriptions, book purchasing, document supply from internal and international sources, help with bibliography management and citation, negotiating/communicating with vendors to achieve access to online licensed material at library prices and providing on-site and remote access to a range of online material including journals such as Forensic Science International and online books through CRC press.

Experienced staff scan local, national and international news and other media resources to provide scientists and researchers with up to date content alerts via email. The focus of the news alerts is on breaking stories, public health outbreaks, issues relating to Queensland Health in general and FSS specifically which are important to management, ongoing legal cases and new research from subject areas relating to the services provided by FSS.

Staff have expertise in literature searching and information evaluation. Information can be supplied from a wide range of national and international databases. Staff are extremely adept at sourcing information from a range of secondary and tertiary sources.

The Document Delivery service provides journal articles, reports and books from other Australian libraries and from a variety of overseas sources, as well as from our own collection. This service greatly reduces the cost of subscriptions as information not within our specific collection area can be sourced from a network of libraries.

The library today.

Staff maintain a digital repository of research published by FSS staff members. This repository (eprints) is available from the Queensland health network. The eprints database ensures that the intellectual output of the staff employed by FSS is maintained and accessible.

FSS in the news – Staff maintain a digital database of news items which directly reference Forensic and Scientific Services or John Tonge Centre. This database is available via the Queensland Health network and seeks to digitise and make available all news reports pertaining to the business unit.

Information Research Services provides access to AS/NZS and ISO documents to maintain accreditation and quality within the organisation.

Info about library

The library is open 5 days a week. 8.30am to 5pm Monday to Thursday and 8.30am to 4.30pm Fridays. Access is to Queensland Health staff only. Public wishing to access the collection may do so at the discretion of the Library Manager.

Manager, Information Research Services

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Electronic and Technical Services

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Liaison Librarians

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Document delivery

qhss-ills@health.qld.gov.au

Website links

Organisation home page
http://www.health.qld.gov.au/qhcss/qhss/default.asp

Information Research Services Subject alerts blog
http://fssalerts.wordpress.com/

Workshops, Forums and Master classes

In ensuring professionalism and a learning culture within emergency management, Australian Emergency Management Institute (AEMI) networks with communities of practice: sharing knowledge and empowering individuals and groups through the provision of workshops, forums and master classes.

Peter Power Master Class

'Preventing chaos in a crisis: lessons from the past, ideas for the future'

Peter Power is well known globally as an authoritative and entertaining presenter and writer with over 30 years of crisis management (CM) experience. His research on crisis decision making is quoted in the UK Government Guide on Integrated Emergency Management and he is the author of many advice guidebooks, including the original UK Govt. booklet on what is now Business Continuity (BC) Management.

He is a founder member of the UK judging panel for BC Awards and for several years sat on a UK Cabinet Office / British Standards Institute working party on CM, which recently produced the first ever pan UK guidance on dealing with all types of crises. He was also a member of the IPPR UK Security Review Commission chaired by Lord P Ashdown and General C Guthrie and has run exercises and/or completed CM projects for organisations ranging from the UK 2012 Olympic Delivery Authority, to the BBC and British Tourist Authority ('Visit Britain').

Peter regularly appears on BBC & Sky News and is a Fellow of the Chartered Management Institute, Fellow of the Emergency Planning Society, Fellow of the Business Continuity Institute and Fellow of the institute of Risk Management. He is also the primary architect of the UK crisis command system 'Gold, Silver & Bronze' (during his time as a senior Police Officer at New Scotland Yard).

Venue: Australian Emergency Management Institute
601 Mt Macedon Road, Mt Macedon Victoria, 3441
Date: 17-19 September 2012
Information and registration: www.em.gov.au/aemi
Email: aemicommunication@ag.gov.au
Phone: 03 5421 5100

Australian Emergency Management Institute

The Australian Emergency Management Institute (AEMI) is a Centre of Excellence for education, research and training in the emergency management sector.

In support of the COAG National Strategy for Disaster Resilience (2011) AEMI:

• Provides education and training
• Conducts strategic activities
• Undertakes applied research
• Promotes community awareness and resilience

Apply now for upcoming units of study or professional development programs

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28 – 30 August	**Develop and organise public safety awareness programs**
28 – 31 August	**Develop and manage activities that exercise elements of emergency management**
4 – 7 September	**Coordinate resources for a multi agency incident**
5 – 6 September	**Establish and manage a recovery centre**
10 – 14 September	**Facilitate emergency risk management**
25 – 27 September	**Develop and use political nous**
1 – 3 October	**Manage recovery functions and services**
16 – 19 October	**Develop and maintain business continuity plans**
30 October – 2 November	**Design and manage activities that exercise elements of emergency management**

For further information visit: www.em.gov.au/aemi
Email aemi@ag.gov.au or Phone (03) 5421 5100

Building resilience through education, collaboration and innovation

Never drive through floodwater.

You don't know what you're getting into.

Floods can hit fast and strong currents can be hard to see. Floodwater is also filled with large hidden debris that can sweep you and your vehicle away so never drive into it – even if you know the area. Stay out and stay safe.

State Government
Victoria

FloodSafe
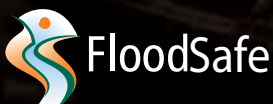
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www.ses.vic.gov.au
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