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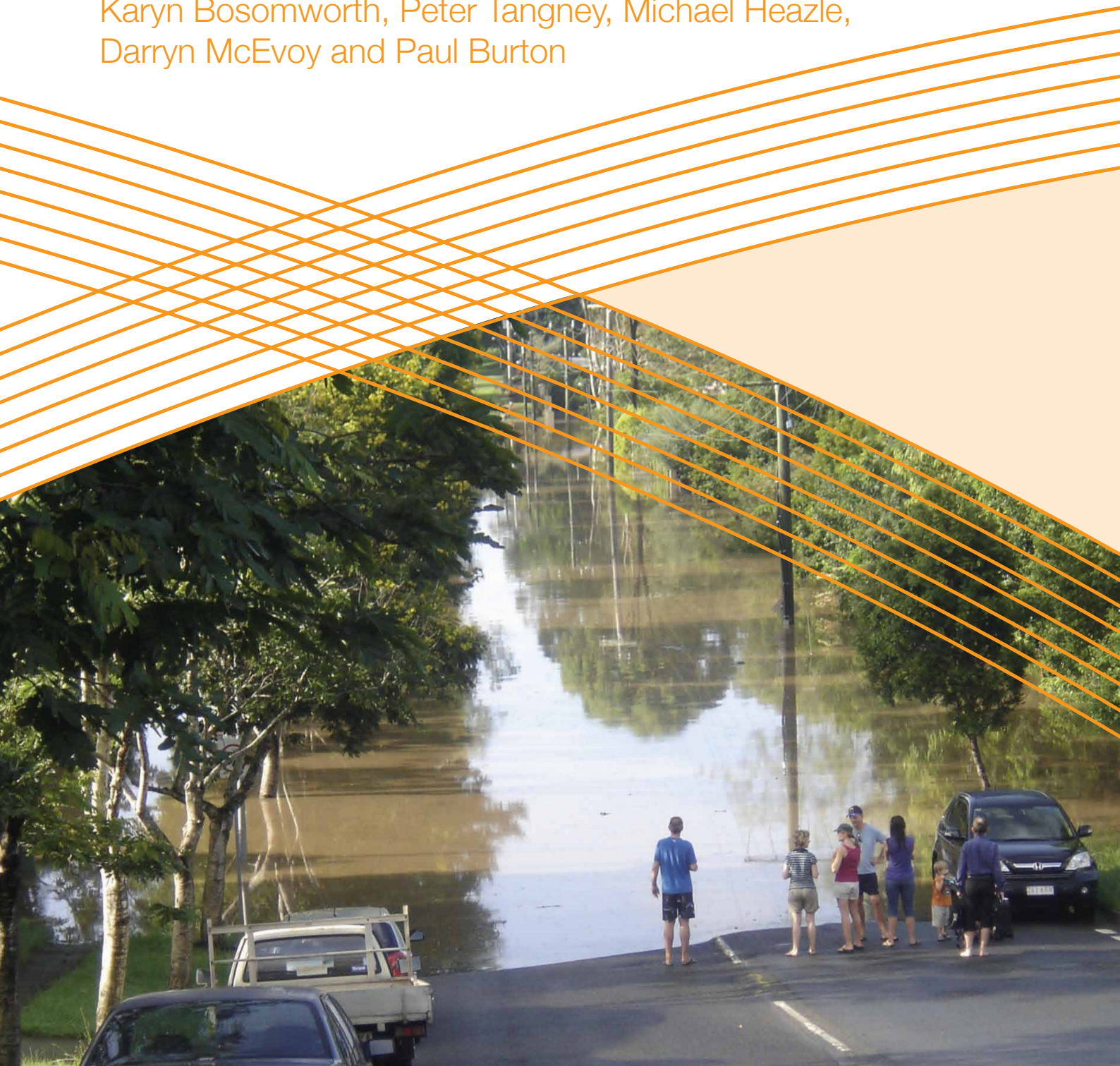
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# Rethinking disaster risk management and climate change adaptation

Final Report

Michael Howes, Deanna Grant-Smith, Kim Reis,  
Karyn Bosomworth, Peter Tangney, Michael Heazle,  
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## Final Report

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Please note, this report contains edited extracts from the project's interim publications:

- Grant-Smith, D., Reis, K., Howes, M., Bosomworth, K., Tangney, P., Heazle, M., McEvoy, D. & Burton, P. (2012). *Integrating climate change adaptation and emergency management to enhance community resilience: A report on the key findings of the workshops*, Urban Research Program, Brisbane, Australia: Griffith University.
- Howes, M., Grant-Smith, D., Bosomworth, K., Reis, K., Tangney, P., Heazle, M., McEvoy, D. & Burton, P. (2012). 'Rethinking emergency management and climate adaptation policies,' *Australian Political Studies Association* conference, 24-26 September, Hobart, Australia: University of Tasmania.
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**Cover image** Flood waters over Kingfisher Gem Road © 2011 Elspeth and Evan, Flickr Creative Commons

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## **LIST OF ACRONYMS**

<b>AAS</b>	Australian Academy of Science
<b>AEP</b>	Annual exceedance probability
<b>AFAC</b>	Australasian Fire and Emergency Service Authorities Council
<b>BCC</b>	Brisbane City Council
<b>BOM</b>	Bureau of Meteorology
<b>CCA</b>	Climate change adaptation
<b>CFA</b>	Country Fire Authority (Victoria)
<b>CMC</b>	Crime and Misconduct Commission (Queensland)
<b>COAG</b>	Council of Australian Governments
<b>CRC</b>	Bushfire Cooperative Research Centre
<b>CSIRO</b>	Commonwealth Scientific Industrial Research Organisation
<b>DEC</b>	Department of Environment and Conservation (Western Australia)
<b>DERM</b>	Department of Environment and Resource Management (Queensland)
<b>DRR</b>	Disaster risk reduction
<b>DSE</b>	Department of Sustainability and Environment (Victoria)
<b>EMA</b>	Emergency Management Australia
<b>ESO</b>	Emergency Services Organisations
<b>FESA</b>	Fire and Emergency Services Authority (Western Australia)
<b>FOC</b>	Flood Operations Centre
<b>FR</b>	Brisbane Floods Commission of Inquiry's Final Report
<b>FSL</b>	Full supply level
<b>GWA</b>	Government of Western Australia
<b>IAP</b>	Incident Action Plan
<b>IFMPP</b>	Integrated Fire Management Planning Project (Victoria)
<b>IMT</b>	Incident Management Team
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>IR</b>	Brisbane Floods Commission of Inquiry's Interim Report



<b>LUP</b>	Land use planning
<b>MAV</b>	Municipal Association of Victoria
<b>MCPEM-EM</b>	Ministerial Council for Police and Emergency Management – Emergency Management
<b>NCCARF</b>	National Climate Change Adaptation Research Facility
<b>NEMC</b>	National Emergency Management Committee
<b>NERAG</b>	National Emergency Risk Assessment Guidelines
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NSDR</b>	National Strategy for Disaster Resilience
<b>PHBR</b>	Perth Hills Bushfire Review
<b>PPRR</b>	Prevent-Prepare-Respond-Recover
<b>QFCI</b>	Queensland Floods Commission of Inquiry
<b>RAM</b>	Rational actor model
<b>SES</b>	State Emergency Services (Queensland)
<b>VBRC</b>	Victorian Bushfires Royal Commission
<b>VFBV</b>	Volunteer Fire Brigades Victoria
<b>VPP</b>	Victorian Planning Provisions

## **ABSTRACT**

Australian governments face the twin challenges of dealing with extreme weather-related disasters (such as floods and bushfires) and adapting to the impacts of climate change. These challenges are connected, so any response would benefit from a more integrated approach across and between the different levels of government. This report summarises the findings of an NCCARF-funded project that addresses this problem. The project undertook a three-way comparative case study of the 2009 Victorian bushfires, the 2011 Perth Hills bushfires, and the 2011 Brisbane floods. It collected data from the official inquiry reports into each of these events, and conducted new interviews and workshops with key stakeholders. The findings of this project included recommendations that range from the conceptual to the practical. First, it was argued that a reconceptualization of terms such as ‘community’ and ‘resilience’ was necessary to allow for more tailored responses to varying circumstances. Second, it was suggested that the high level of uncertainty inherent in disaster risk management and climate change adaptation requires a more iterative approach to policymaking and planning. Third, some specific institutional reforms were proposed that included: 1) a new funding mechanism that would encourage collaboration between and across different levels of government, as well as promoting partnerships with business and the community; 2) improving community engagement through new resilience grants run by local councils; 3) embedding climate change researchers within disaster risk management agencies to promote institutional learning; and, 4) creating an inter-agency network that encourages collaboration between organisations.

## EXECUTIVE SUMMARY

As the climate changes, the population grows, and urban coastal development continues there is likely to be an increase in the exposure of people to extreme weather-related events such as bushfires and floods. This will entail significant environmental, economic and social impacts for Australia. An appropriate, effective and efficient response will therefore require the integration of both disaster risk management and climate change adaptation but there are three main barriers to achieving this integration. First, the impacts of both disasters and climate change are difficult to predict at the local level and require well-coordinated whole-of-government responses, as well as the support of the private sector and the community. Second, the structure of the Australian federal system of government discourages cooperation between and within the different levels of government. Third, while a comprehensive response is urgently needed, policymaking processes tend to favour piecemeal change.

This report summarises the findings of a research project that addresses this problem. The project aimed to develop the foundations for a nationally consistent approach to disaster risk management and climate change adaptation that would be supported by a set of appropriate reforms to governing institutions and tools. The work was undertaken by a team of researchers from Griffith University and RMIT University over one year (2012) and was funded by the National Climate Change Adaptation Research Facility (NCCARF). The research centred on a three-way comparative case study of the 2009 Victorian bushfires, the 2011 Perth Hills bushfires, and the 2011 Brisbane floods. It involved an analysis of the reports generated by the official inquiries into these disasters, interviews with key stakeholders, and stakeholder workshops in Perth, Melbourne and Brisbane. The first half of the project identified four common themes that emerged from both the academic literature and the inquiry reports on each of the case studies:

- Improve interagency communication and collaboration;
- Develop institutional arrangements that support continual improvement and policy learning;
- Improve community engagement and communication; and,
- Refocus attention on building resilience.

These four themes provide points for the integration of disaster risk management and climate change adaptation.

A reconceptualization of the problem indicated that concepts such as ‘community’ and ‘resilience’ tend to be oversimplified by policymaking and planning processes. These concepts need to be recast to take account of socio-economic diversity and allow for more tailored, context-specific risk analyses and responses. This is particularly important with regards to community engagement. Further, the uncertainty inherent in both climate change adaptation and disaster risk management, along with the highly contested political context, suggests that an iterative approach to policymaking could be a more fruitful strategy than the rational comprehensive ideal. Some specific proposals for reforms/tools emerged from the stakeholder interviews and workshops during the second half of the project. First, was the idea to create a funding system that would encourage collaboration between agencies, businesses and communities. Second, was the proposal that local governments adjust their grant schemes to encourage the community to propose and vote on small-scale adaptation

projects that increase their resilience. Third was the idea of embedding climate change researchers within larger agencies, or getting them to form partnerships with smaller agencies, in order to encourage institutional learning and more integrated risk-context analyses. Finally, a number of organisational changes were proposed to increase inter-organisational networking and support these reforms. These findings offer an opportunity for improving responses as well as a starting point for better integration of disaster risk management and climate change adaptation.



# 1. INTRODUCTION

Climate change adaptation and disaster risk management have both been prominent on the public policy agenda over the last few years. It is predicted that as the climate changes further, as population grows, and as urban coastal development increases, the exposure of people to the impacts of weather-related disasters (such as floods and bushfires) will increase (IPCC 2012). While the policy responses to both issues have developed largely in isolation to date, they share the common goal of increasing community resilience. What is therefore needed is an integrated national response across all levels of government that makes the best use of scarce public resources and existing approaches (AFAC 2012).

This is the final report of a research project entitled: *The Right Tool for the Job: Achieving climate change adaptation outcomes through improved disaster management policies, planning and risk management strategies*. This project aimed to develop the foundations for a nationally consistent approach to disaster risk management and climate change adaptation that would be supported by a set of appropriate reforms to governing institutions and tools. The project was undertaken by a team of researchers from Griffith University and RMIT University over one year (2012) and was funded by the National Climate Change Adaptation Research Facility (NCCARF). The research centred on comparative case studies of the 2009 Victorian bushfires, the 2011 Perth Hills bushfires, and the 2011 Brisbane floods. The first stage of the project involved a literature review that provided an overview of current disaster risk management arrangements and climate change adaptation policies in Australia. Stage two centred on an analysis of official inquiry reports into each of the three case studies to identify common themes. A series of semi-structured interviews were then conducted with key stakeholders in Perth, Melbourne and Brisbane, to examine these themes in more detail and to develop proposals for change. Finally, three workshops were held (one in each city) with a broader range of practitioners and stakeholders to review the proposed changes and identify any gaps in the research.

This report is divided into twelve sections. Following this introduction, the second section outlines the nature of the research problem and the objectives of this project. Section three then gives a brief outline of the research activities undertaken and the methods used for data collection and analysis. The institutional and policy context is provided in section four with an overview of: the Australian system of government; the policymaking process; key climate adaptation policies; and, disaster risk management arrangements. Section five offers a background to the three cases studies. Sections six to ten cover the project's key findings on: interagency communication and collaboration; institutional improvement and learning; community engagement and communication; a renewed focus on resilience; and the integration of disaster risk management and climate change adaptation. Section eleven offers a reconceptualization of the problem and four proposals for change as the foundations of a new approach. This is followed by some concluding remarks in section twelve.

It should be noted that the purpose of this research project is not to criticise the actions of emergency service workers and volunteers who do an excellent job under extreme circumstances. It should also be noted that the emergency services were not originally set up to deal with the kind of extreme large-scale events that this project has used as case studies.



## 2. THE RESEARCH PROBLEM AND OBJECTIVES

The best available scientific risk analyses indicate that the climate is changing and there will be significant environmental, economic and social impacts as a consequence. The environmental impacts include rising temperatures, increases in sea levels, coastal erosion, changing precipitation patterns, reductions in ice and snow cover, loss of habitat, accelerated species extinction, and an increase in the frequency, duration and/or intensity of weather-related events such as cyclones, storms, floods, heatwaves, droughts and bushfires. The projected economic impacts include the loss of agricultural production, increased damage to built assets, higher insurance costs, greater defensive infrastructure costs, and more resources spent on emergency responses. The forecast social impacts include higher mortality and injury rates, damage to homes, the loss of livelihoods, an decrease in fresh water availability, an increase in food scarcity, a rise in the number of displaced people, and an increased risk of conflict (IPCC 2007, 2012; Royal Society 2010; AAS 2010; NOAA 2010; Stern 2005). The risk-context of each community will therefore vary according to its climate, geography, and socio-economic status.

Australia is particularly vulnerable to the impacts of climate change due to its geography, economy and settlement patterns. Although it is difficult to accurately predict local impacts, the long-term trend is for the majority of the temperate south to become drier and the tropical north to become wetter. For the southern areas this is likely to translate into a significant reduction in crop production, increased pressure on water supplies, and an increased risk of bushfires. For the tropics, it is likely to result in increased risks from storms and cyclones. Because most of the major Australian population centres are located on the coast they face a higher risk of inundation and coastal erosion. Further, the likelihood of more frequent, extreme and prolonged heatwaves will likely increase the rate of mortality, particularly amongst the elderly and the ill (IPCC 2007, 2012; CSIRO 2010; Garnaut 2011).

Some examples of what is to come might be drawn from recent history. The 2011 Queensland floods demonstrated what happens when there is a deluge in catchment areas that feed into major cities and towns, while the 2009 Victorian bushfires and 2011 Perth Hills bushfires revealed the increased fire risk from prolonged dry periods. It should be noted, however, that climate scientists are reluctant to attribute specific events such as these to climate change. Floods, droughts and bushfires have always been a part of the Australian environment, but these kinds of events are likely to increase because of climate change (IPCC 2012; QFCI 2011, 2012; GWA 2011; VBRC 2010c). The argument put forward here is simply that climate change is linked to disaster risk management through these weather-related events so an integrated and improved response to both is needed.

The complex and far reaching nature of climate change has led many to label it a 'wicked' policy problem (APSC 2007; Head 2008; Rittel & Webber 1973) and some have even gone so far as to call it 'diabolical' (Garnaut 2008). The concept of wicked problems was developed by Rittel and Webber (1973) who gave them ten defining attributes:

1. They are difficult to define;
2. There is no end or boundary to the problem;
3. There is no agreed criteria to judge the correctness of a response;
4. Responses have unforeseen consequences;
5. Responses that go wrong cannot be easily undone;



6. It is not possible to identify all options;
7. There is no suitable precedent to guide decision makers;
8. They are interconnected with other problems;
9. There is no agreed explanation of the problem; and,
10. Mistakes in either action or inaction are very costly.

While climate change clearly exhibits these attributes, it is interesting to ask whether the move to classify them as 'wicked' might also be an indictment of the limitations of existing systems of government.

Because climate change has significant implications for politics and public policy from the international through to the national, state and local levels of government it cannot be handled by a single agency or portfolio and need a nationally consistent approach (Howes & Dedekorkut-Howes 2012). In addition, the link between climate change and extreme weather-related events requires context specific risk analyses for communities as well as an integrated response in both adaptation policy/planning and disaster risk management. The prevailing institutional structures and policymaking processes, however, may create significant barriers in developing an effective, efficient and appropriate response.

The objective of this project was to address this research problem by:

1. reconceptualising the twin problems of disaster risk management and climate change adaptation;
2. developing the foundation for a new integrated approach; and,
3. proposing practical changes to existing policy/planning responses.

Specifically, this project addressed the *National Adaptation Research Plan for Emergency Management* across-theme priority 4.1, project 1, research question 1.2: What tools are needed to enable decision-making under future climate uncertainty?

### 3. RESEARCH ACTIVITIES AND METHODS

This research project ran from January to December 2012 and was funded by a grant from the National Climate Change Adaptation Research Facility (NCCARF). Due to the short timeframe, the broad scope of the research question, and the objective of producing practical outcomes, a tightly focussed comparative case study approach was adopted as the overall research strategy. Three case studies were chosen: the 2009 Victorian bushfires; the 2011 Perth Hills bushfires; and, the 2011 Brisbane floods. These cases were selected for several reasons. First, they offer examples of the kinds of disasters that are likely to become more frequent, intense and/or prolonged under the impacts of climate change on Australia. Second, they are examples of events that put extreme pressure on existing government institutions, policies and plans, hence offering the opportunity to identify what works well and what needs to change. Third, they are geographically dispersed across the continent (from north to south and east to west) and involved three different state governments, which makes the research findings more generalisable and gives them national implications.

The project proceeded in several stages. Stage one consisted of a literature review and document analysis conducted in the first few months of the project. The purpose of this stage was threefold. First, it elaborated the institutional structure of the Australian system of government in order to identify any features that would be pertinent to this project. Second, it reviewed the significance of long-running debates regarding policymaking processes. Third, it assembled a composite picture of the relevant disaster risk management and climate change adaptation risk analyses and responses. This review then provided the foundation for the rest of the research.

Stage two consisted of a comparative analysis of the reports generated by the Victorian Bushfires Royal Commission (VBRC 2010 a, b, c), the Perth Hills Bushfire Review (GWA 2011), and the Queensland Floods Commission of Inquiry (QFCI 2011, 2012). Each inquiry report was analysed to identify what was covered and what was not covered with regards to: how the emergency response was done well; what could be improved; the barriers to change; and, any links to climate change. These findings were then grouped into major themes and compared to the literature on disaster risk management and climate change adaptation. Four common themes for changes to in that spanned all three reports and the literature were then identified. First, there was a need to improve interagency communication and collaboration. Second, there was a need to develop institutional arrangements that support continual improvement and policy learning. Third, there was a need to improve community engagement and communication. Finally, there was a need to refocus attention on resilience. These four themes provided both opportunities to improve existing responses and points for integration between disaster risk management and climate change adaptation.

Stage three took the four themes identified and used them to create a set of semi-structured interview questions for key stakeholders. These stakeholders were drawn from a range of agencies across the public sector that may deal directly or indirectly with emergency management and climate change adaptation. The agencies worked across areas such as emergency services, environmental management, social services, and justice. Some had been involved in the official inquiries into the case studies. In total, there were twenty two respondents, ten in Melbourne, seven in Perth and five in Brisbane, drawn from the senior executive to on-the-ground officers. These interviews refined the analysis of what was working well, what needed to change, what improvements could be made, and what barriers

there were to change. There was some consideration of the current state of risk-context analyses and the options for improvement via various reforms to governing institutions and tools.

Stage four involved running workshops in Perth, Melbourne and Brisbane that utilised the outcomes of the interviews and the comparative analysis of the inquiry reports. The goal of these workshops was three-fold: (1) to provide an opportunity to identify anything that the previous research stages had missed; (2) to test proposals via the peer-review of practitioners; and, (3) to raise awareness and disseminate the findings of the project amongst key stakeholders. In total the workshops attracted twenty six participants: six in Perth, eleven in Melbourne, and nine in Brisbane. These participants included some individuals who had been interviewed in stage three, but most were new to the project. The range of stakeholders was broadened to include people from the community sector including volunteer and non-government organisations involved in assisting people who had been affected by disasters. Each participant was provided with a conference paper outlining the project and its preliminary findings (Howes, et al. 2012a) on their arrival at the venue. A summary report analysing all three workshops was sent to all participants following the workshops (Grant-Smith, et al. 2012).

The final stage of this project was to analyse and disseminate the full research findings. This report is one of the publications produced and a summary of its key findings was presented to the Public Policy Network conference in Brisbane in January 2013 (Howes, et al. 2013). A presentation was also made at the NCCARF *Flooding Forum* for key stakeholders held in Brisbane on March 21 of 2013. In addition, a further four articles were drafted (one centred on each theme) and submitted to national and international academic journals.

During the project a number of other opportunities were utilised for the peer-review of the research and the dissemination of preliminary findings. These included:

- Presenting the research design to a meeting of lead investigators from NCCARF funded projects in Canberra on 9 May 2012;
- Making a presentation on the project's progress to the NCCARF conference in Melbourne on 27 June 2012; and,
- Presenting a paper of the preliminary findings to the Australian Political Studies Association annual conference in Hobart on 26 September 2012 (Howes, et al. 2012a).

A brief article based on the first two stages of the project was submitted to the *Australian Journal of Emergency Management* in June 2012 (Howes, et al. 2012b) and a paper was submitted to the Urban Research Program in October 2012 for on-line publication as an issues paper (Howes, et al. 2012c). The team is also working on the development of an executive briefing note that might be used by senior decision makers within the public sector.

## 4. THE INSTITUTIONAL AND POLICY CONTEXT

Integrating disaster risk management and climate change adaptation policy taps into two key issues regarding the nature of government in Australia. First, is the institutional architecture of the system of government that gives rise to jurisdictional disputes and makes a whole-of-government response more difficult. Second, is the dispute over the nature of policymaking and whether it can realistically adopt a rational comprehensive response, or if it is limited to making incremental changes. Both these issues are evident in the current arrangements for disaster risk management and climate change adaptation.

### 4.1 *The Australian system of government*

Beck (1992) pointed out that the main institutions of modern government were created in the nineteenth century and were not designed to address current complex environmental issues. The oldest environmental agencies only date back to the early 1970s, and climate change organisations did not emerge until the late 1980s (Howes 2005). The Australian system of government is a case in point. It was shaped by a constitution drafted in the 1890s by a group of independent colonies that were reluctant to cede power to a new national government. The result was a compromise that blended institutions from the USA and UK into what is sometimes referred to as the 'Washminster mutation' (named after the governments of Washington and Westminster) (Jaensch 1997; Thompson 1980). Local governments were not mentioned in the constitution and exist entirely at the mercy of state governments that were formed from the pre-existing colonies (Howes & Dedekorkut-Howes 2012). Climate change and disaster risk management were simply not on the political agenda when these institutions were created, so there is no mention of them in the constitution.

The underlying dynamic of the Australian political system is an on-going vertical power struggle between the three tiers of government. This has been particularly fierce when it comes to complex issues related to the environment that cut across local, state and national boundaries (Howes 2005; Toyne 1994). There have, however, been some moves to improve collaboration between levels through the Council of Australian Governments (COAG) and a range of joint councils (Howes & Dedekorkut-Howes 2012).

In addition to the vertical power struggles, there have been corresponding horizontal rivalries between different organisations within each level. Governments have traditionally divided up their responsibilities into discrete areas, such as emergency services, the environment, public health, housing, infrastructure, business, and agriculture, etc. This strict demarcation has led to a 'silo mentality' within organisations that encourages a narrow view of issues within their purview and tends to overlook the broader or cross-agency implications. Furthermore, there is the risk of 'turf wars' as responsibilities and resources are jealously guarded because other organisations are seen as competitors (Liebrecht & Howes 2006). These kinds of rivalries are exacerbated by issues such as climate change and disaster risk management that cut across defined areas of responsibility (Productivity Commission 2012; APSC 2007). A flood or a bushfire, for example, will have implications not only for the emergency services that need to provide the immediate response, but will also require the intervention of other government organisations to provide health care, housing, financial assistance, and repairs to infrastructure. In recent years there have been moves to improve cooperation and coordination in Queensland, for example, at the regional level, with joint

bodies being established between various agencies and local government to coordinate the delivery of services (Rolfe, et al. 2009; Howes 2006). This was extended by the creation of the Queensland Reconstruction Authority after the 2011 Queensland floods.

## **4.2 Policymaking**

While the governing institutions at the heart of the Australian political system set the stage, the policymaking processes within them direct the behaviour of the actors. These processes have a strong formal component that is embodied in public sector rules and procedures but there is some debate as to how they might best be described. Perhaps the most popular view is that of the 'policy cycle' which characterises policymaking as a series of logical steps: issue identification; policy analysis; policy instruments; consultation; coordination; decision; implementation; and, evaluation. At the end of the evaluation step, any issues that are revealed or remain unresolved start the next turn of the cycle (Althaus, Bridgman & Davis 2007). Critics of this view argue that policymaking is not as logical or clear cut and point out that even the proponents of this model have admitted that it is more of an ideal than a definitive explanation of practice (Colebatch 2005). The idea of a logical step by step process remains influential in many policies, plans and decision-making routines. Notwithstanding the attraction of the policy cycle, one of the ongoing debates is whether the process should proceed via giant leaps (the rational comprehensive school) or small steps (incrementalism).

The rational comprehensive approach conceives policymaking as rational, balanced, objective and analytical process in which decisions are made in a series of stages starting with identification of the problem or issue and ending with the implementation of a solution. The approach advocated by this model implies that all possible options are considered in detail and that one alternative is chosen over others entirely on merit thus effectively discounting the influence of political and other external factors (Productivity Commission 2012). Critics of the rational comprehensive approach consider it to be based on an unrealistic ideal, noting that such comprehensiveness is rarely possible in practice. Adequate information is rarely available and 'problems are often just redefined or partially addressed, rather than solved, allowing them to re-emerge (Handmer & Dovers 2007; Sutton 1999). There have also been criticisms of the step-wise approach and of the assumption that policy formulation and implementation can be separated (Heazle 2010; Bell 2002; Neiman & Stambough 1998; Sutton 1999). What if a problem is not easy to define? What if there are clashing goals and objectives? What if policymakers are not aware of all the options available? What if the costs and benefits cannot easily or accurately be calculated? What if policymakers and planners are influenced by factors such as ideas, economic interests, political ideology, discourses or values and so fail to optimise the cost-benefit ratio?

Incrementalism, the main competitor to the rational comprehensive model, was proposed in the 1950s by researchers such as Charles Lindblom who acknowledged that policymakers have to deal with imperfect or incomplete information about issues and options (Lindblom 1979). He believed that democratic systems tend to resist radical change and that a strategy of incremental change through small steps could allow policy makers to address parts of larger problems using familiar tools and drawing on their past experience. While critics of this theory argue that such an approach makes substantial improvements to society impossible, Lindblom suggested that over time these steps could build into significant changes. While this view of policymaking is perhaps more realistic than the rational comprehensive model, it is less than optimal and does not provide a strategic way forward because it only considers a

small number of alternatives for dealing with a problem and tends to choose options that differ only marginally from existing policies (Handmer & Dovers 2007).

Attempts to avoid the pitfalls of both the rational comprehensive and incremental models have given rise to hybrid approaches that offer an iterative or sequential approach to policy development and implementation (Dror 1964). These have the capacity to adopt an institutional learning cycle that utilises the on-the-ground knowledge of key stakeholders to drive policy changes. Indeed it has been suggested that responding to problems like climate change require such a sequential or iterative decision-making approach because it allows “decisions to be made and revised repeatedly over time in response to new knowledge, accumulated experience, or changed conditions” (Parson & Karwat 2011:744). This might include new scientific knowledge about climate change and associated impacts, changes in technologies, or changes in goals and priorities.

Although complex interlinked issues like climate change and disaster risk management appear at face value to be well suited to a rational comprehensive policy, the uncertainty inherent in the knowledge of local risks and the clash of values between stakeholders renders this model unworkable in practice (Heazle 2010). On the other hand, the issues and challenges they present are so pressing their resolution requires more rapid and substantial changes than an incremental approach can deliver. Perhaps the best hope lies in the adoption of a sequential, iterative approach that develops a growing body of risk-context analyses and learns from experimentation with different policy/planning tools. Questions of how this might cope with uncertainty, the clash of values, and whether it can deliver the needed changes in time would still need to be resolved.

### **4.3 Climate change adaptation policies**

The preceding sections have elucidated three elements of the policy problem. First, climate change has profound policy implications for Australia, particularly with regards to adaptation, and has been characterised as a ‘wicked’ problem. Second, although an integrated response is needed, the Australian institutional context discourages collaboration across and within levels of government. Third, there remains considerable disagreement about whether the policymaking process can generate the scale and speed of change required. All three elements have manifest themselves in current responses to climate change adaptation.

The *National Climate Change Adaptation Framework* (COAG 2007) is the touchstone for coordinating climate adaptation policies across the three levels of government in Australia. It was developed by COAG in 2007 to improve understanding of the problem, build adaptive capacity and reduce vulnerability. It was accompanied by the creation of the *National Climate Change Adaptation Research Facility* and identified priority areas of action in: water resources; coastal regions; biodiversity; agriculture, fisheries and forestry; human health; tourism; settlements, infrastructure and planning; and, natural disaster management.

In 2009 the Australian Department of Climate Change released *Climate Change Risks to Australia’s Coasts: A first pass national assessment* (DCC 2009) that provided all levels of government with some indication of the key risks to coastal settlements. This was followed in 2010 by the Commonwealth’s *Adapting to Climate Change in Australia: An Australian Government Position Paper* (DCC 2010) acknowledging that responsibility for adaptation is shared by all levels of government, business and the community. While the Commonwealth

saw itself as playing a leading role in some areas, it was made clear that most of the heavy lifting would have to be done by the other levels of government.

In 2011 the Productivity Commission investigated the barriers to climate change adaptation at the request of the Commonwealth government. This resulted in the release of an *Issues Paper* (Productivity Commission 2011) followed by a *Draft Report* (Productivity Commission 2012), both of which saw climate change as a market failure and stressed the need for market solutions. In 2011 the Commonwealth created the Climate Commission to inform the public debate about climate change through a series of reports.

At the State level, climate change adaptation policies and plans are undergoing some significant revisions. In October 2012, for example, the West Australian government released a new policy statement entitled *Adapting to Our Changing Climate* (GWA 2012) that showed how rainfall in the south-west of the state had declined since 1950 and discussed bushfire prevention, early warning, control and defence. The Victorian government is required by its *Climate Change Act 2010* to develop a *Climate Change Adaptation Plan* every four years. The first plan was released in March 2013 and included a chapter on the increased risk of disasters with specific references to the 2009 bushfires (State Government of Victoria 2013). While Queensland developed some climate change policies that dealt with adaptation under the Bligh government, (including *ClimateQ: Toward a Greener Queensland* and the *Draft South East Queensland Climate Change Management Plan*) many of these policies were never fully implemented and the election of the Newman government in 2012 shifted the policy focus away from climate change (Norman 2012).

At the local government level, the Department of Climate Change ran a *Local Adaptation Pathways Program* that provided grants to local councils for developing their own adaptation plans (the list of participating councils included several from Western Australia, Victoria and Queensland). In addition, eighty seven local councils in Australia are members of the network of *International Councils for Local Environmental Initiatives* (ICLEI) *Local Governments for Sustainability* that has several voluntary programs on climate change adaptation. As with state governments, policies and plans at the local level are in a state of flux (Norman 2012). The Gold Coast City Council, for example, had developed a *Climate Change Strategy* that included adaptation in 2009 but by late 2012 it was making cuts to its climate change department (Killoran 2012).

#### **4.4 Disaster Risk Management**

Australia has an array of legislation, organisations, financial instruments, and coordination mechanisms designed to manage disasters that include multi-tiered institutional arrangements and formal coordination forums (World Bank & QRA 2011). In general these arrangements, along with a high coping capacity (primarily a function of income, savings and insurance), ensure that although disaster events may cause extensive damage, mortality rates are generally low and communities are able to recover relatively quickly (O'Brien, et al..2006). The challenge is how the system will cope in future as climate change increases the frequency, duration and/or intensity of disasters caused by extreme weather events (IPCC 2012; Productivity Commission 2012).

There have been considerable efforts to improve collaboration between agencies and develop a more consistent national response amongst the different levels of government. COAG has again played a key role supported by the joint ministerial *Standing Committee on*

*Police and Emergency Management* and the *National Emergency Management Committee* (that is made up of the Directors-General of the relevant departments) and its sub-committees (comprising officers from the key agencies).

The Commonwealth, through the Attorney-General's Department and *Emergency Management Australia*, has sought to facilitate a national approach to disaster risk management by maintaining a constructive dialogue between the states and territories on issues of national importance (EMA 2000; Pitman 2006). This has encouraged the adoption of an all hazards, all agencies, prepared community approach to disaster risk management as well as the standard policymaking model of Prevent-Prepare-Respond-Recover (PPRR). Two key policies used by all governments are the *Australian Emergency Management Handbook and Manuals* and the *National Emergency Risk Assessment Guidelines* (NERAG) (2010). Funding can be sourced from the *National Disaster Resilience Program* and the *National Disaster Response and Recovery Arrangements*.

In Queensland, there is the *Queensland State Disaster Management Plan* (2010), the *Disaster Management Act 2003* and *Public Safety Preservation Act 1986*. Coordination is handled by the State Disaster Management Group (2011) (made of the state departmental Directors-General) with three subgroups dealing with disaster coordination, recovery and mitigation respectively. In the aftermath of the severe flooding 2010-11 and cyclone Yasi, the Queensland Reconstruction Authority (QRA) (2011) was established to coordinate and implement recovery efforts. In Western Australia, the Fire and Emergency Services Authority (FESA) was the lead agency operating under the *West Australian Emergency Management Policy*. In the aftermath of the Perth Hills bushfires, FESA has been restructured into a department. Victoria **has its own** *Emergency Management Act 1986* and *Emergency Management Manual Victoria*. In the past **the lead agency was the** Office of the Emergency Services Commissioner but after a policy review it was announced that a new organisation, Emergency Management Victoria, will become the lead coordinating organisation (Government of Victoria 2012).

At the local level, councils have an important role to play in disaster planning and response but many have limited capacity to deal with major disasters without the support of state agencies. The Queensland government has *District Disaster Management Groups* and *Local Disaster Management Groups* to coordinate efforts at the local and sub-regional level. Similar arrangements operate in Western Australia. Relationships between state and local governments in Victoria are currently being reviewed (Government of Victoria 2012).

#### **4.5 Summary and the next steps**

Any attempt to integrate disaster risk management and climate change adaptation policy/planning into a whole-of-government approach will face several challenges. First, Australia has a three tiered federal system of government that tends to encourage rivalries between and within the federal, state and local levels. Second, while these policy issues may appear to need a rational comprehensive solution, the practical policymaking response is more likely to be incremental or iterative. Third, there is a patchwork of constantly shifting priorities, partially overlapping policies, and sometimes competing organisations. There are, however, some promising opportunities. COAG and its associated organisations, for example, has played an significant role in developing a consistent national approach to both climate change adaptation and disaster risk management, as well as encouraging



cooperation between and within different levels of government. Further, there has been a strong, effective and positive policy response to disaster risk management across the country in the light of recent extreme weather-related events that has enabled the rapid mobilisation of considerable resources. What is needed is to generate the same enthusiasm for action on climate change adaptation.

## 5. BACKGROUND ON THE CASE STUDIES

As stated previously, the case studies of the 2009 Victorian bushfires, the 2011 Perth Hills bushfires and the 2011 Brisbane floods were selected for this project for three key reasons. First, while climate scientists are reluctant to attribute individual events to climate change, these cases offer examples of the kinds of disasters that are likely to become more frequent, intense and/or prolonged. Second, these cases put extreme pressure on the organisations, policies and plans outlined in the previous section, hence offering the opportunity to identify what works well and what needs to change. Third, these cases involved three different state governments that are geographically dispersed across the continent (from north to south and east to west) which gives the research findings national implications.

Major bushfires are not unusual events in the Victorian landscape and, since 1939, post-fire inquiries have sought to improve understanding of their drivers and impacts and of reducing their likelihood and consequences. Investigations into the 1983 'Ash Wednesday' fires in particular generated the central tenet of the *Victorian Bushfire Policy*, colloquially known as 'prepare and stay or leave early'. Between 1983 and the fires of February 2009, research repeatedly reinforced the general conclusion that a well-prepared property can be readily defended by (physically and emotionally) well-prepared people. On 7 February 2009 ('Black Saturday') much of south-eastern Australia experienced extreme fire weather conditions. The fires were preceded by an eleven year drought and occurred during an extreme heatwave, with several localities across Victoria recording their highest temperatures since records began in 1859 (BOM 2009). On the day, the Country Fire Authority (CFA) and the Department of Sustainability and Environment (DSE) attended 316 fires, of which 15 caused (or had the potential to cause) the greatest damage, with five fires claiming the lives of 173 people, 2133 houses, and many other assets (VBRC 2010b). These fires tested every aspect of Victoria's fire management sector and governance with the subsequent Royal Commission inquiry report making sixty seven recommendations for change across the entire PPRR policy spectrum. The Terms of Reference for the Royal Commission included: the causes of the fires; preparation and planning; all aspects of the response; the provision of essential services; land use planning; fire-proofing buildings; emergency management; public communication; and, training, infrastructure and resources (VBRC 2010a:38-40).

In Western Australia, the Bureau of Meteorology (BOM) noted that "2010 was one of the driest and hottest years on record across the Perth Metropolitan area," with annual rainfall totals "generally 40 to 50% lower than normal" (GWA 2011:55). In November of that year, the Minister for Emergency Services told Parliament that "Western Australia was facing one of its worst bushfire seasons in history" and that "large parts of Western Australia faced an above normal fire risk due to increased fuel loads from dry bush and grasslands" which could result in "early season bushfires that are fast moving and extremely challenging for fire-fighters to control" (GWA 2011:55). On 6 February 2011 a fire was ignited in the front yard of a private property by an off-duty police officer who was allegedly operating an angle grinder while undertaking metalwork at his home. With a drought factor of 10 (meaning that all fuels are dry and ready to burn) the peak wind gusts at the fire site were estimated to have been between 70 and 80km/h. The resulting bushfire destroyed 71 homes and damaged a further 39 homes in the Roleystone-Kelmscott area of the Perth Hills in Western Australia (GWA 2011:3, 56, 82). On 23 February 2011 the Perth Hills Bushfire Inquiry, also called the 'Special Inquiry' was announced by the Western Australian Premier and lead by Mick Keelty (former

Commissioner of the Australian Federal Police). The Special Inquiry focused on the theme of a 'shared responsibility' between all stakeholders for the management of risk and vulnerability as it relates to fuel loads. On 17 August 2011 the report of the inquiry was publicly released with a total of 101 submissions and 55 recommendations. The report identified the Fire and Emergency Services Authority (FESA) as a key constraint for achieving an effective share of responsibilities between all parties (GWA 2011:3-9). The Terms of Reference for the Special Inquiry focussed on the following issues of interest: prevention and mitigation activities; laws, practices and policy impacts; risk management and enforcement; information/communication/education; and, coordination (GWA 2011:194).

In Queensland, as a result of an unusually strong La Nina event and prolonged intense monsoonal rainfall, extreme flooding occurred in the Brisbane River valley and surrounding areas from late 2010 to early 2011. The flooding resulted in the deaths of 35 people, and an estimated \$5 billion worth of damage. The La Nina event in question and its associated rainfall were forecast by the Bureau of Meteorology, which briefed the Queensland government of the threat in advance of the floods. As a result of these events, the Queensland government established a Commission of Inquiry into the floods. These events occurred in the context of a history of extreme floods in the Brisbane area, and were preceded by prolonged drought in the State of Queensland between 2001 and 2009. The Commission of Inquiry gave considerable attention to the operation of dams during the flooding and, in particular, Wivenhoe Dam's operation as a flood mitigation facility. Both flood mitigation and water supply in the region are managed via a series of dams on the Brisbane River that control the flow of water according to the level of priority given to either policy objective. The Commission's expert hydrologist estimated that the dams contributed only part of the Brisbane flooding with the remainder entering the Brisbane River downstream of the dams during the events of January 2011 (QFCI 2012:524). The other principle concern of the Commission's investigation related to the adequacy and implementation of Queensland's planning and disaster risk management systems.

The reports from the three official inquiries into these events were analysed and compared to the literature on disaster risk management. The result was the identification of four recurrent themes.

First, there is a need to improve interagency communication and collaboration. This is clearly important for all organisations dealing with disaster risk management, but it could also be extended to include agencies dealing with climate change adaptation, hence facilitating a greater integration of the two policy areas.

Second, there is a need to develop institutional arrangements that support continual improvement and policy learning. As climate change is going to impact on the exposure of people to disasters, so climate agencies would need to share information with the emergency services in order to improve their institutional learning.

Third, there is a need to improve community engagement and communication. This includes improving the level of understanding of current vulnerabilities to disasters and how these risks are likely to vary as the climate changes.

Finally, there is a need to refocus attention on resilience. Actions taken to improve resilience to the impacts of climate change may also help to improve resilience to disasters and vice versa. The themes therefore offer not only the opportunity to improve disaster risk

management but also provide points where there may be some integration with climate change adaptation. Each theme was investigated further by conducting semi-structured interviews and workshops with key stakeholders in Perth, Melbourne and Brisbane. The stakeholders included people involved with both disaster risk management and climate change adaptation. The findings of this research are presented in the following sections.

## 6. INTERAGENCY COMMUNICATION & COLLABORATION<sup>1</sup>

### 6.1 *The literature and inquiry reports*

Over the last two decades many of the top-down, hierarchical, command-and-control approaches to policy have been replaced by more collaborative models that reflect “a more dynamic and flexible network model that facilitates multiorganizational, intergovernmental, and intersectoral cooperation” (Waugh & Streib 2006:131). This is certainly the case in Australia where disaster risk management arrangements are formed around an interagency and intergovernmental approach spanning all three levels of government and working closely together with volunteers, non-government organisations, businesses and the community. This shift also reflects an increasing understanding that disaster risk management, like climate change adaptation; deals with problems that are not easily solved. Further, both are addressed by separate communities of policymakers, practitioners and researchers who often use different words for similar issues and ideas (Mitchell, et al. 2010:20).

The Victorian Bushfire Royal Commission found that the “operational response was hindered by difference between agencies’ systems, processes and procedures” (VBRC 2010a:18) and “true integration was not achieved” (VBRC 2010a:8). The special inquiry into the Perth bushfires concluded that “optimum coordination of available resources to fight the Perth Hills fires of 5 and 6 February 2011 was not provided” and stated that the reason was a failure to “properly consult and coordinate” (GWA 2011:133). The report on the Queensland floods recommended better communication and cooperation between major infrastructure providers (such as power, water, and dam operators) as well as emergency services, state government departments and local councils (QFCI 2012:28). Goode, et al. (2012:17), in their review that includes these cases, note that each agency has its own specialised knowledge in relation to specific risks and that there is a lack of understanding between these “silos of knowledge”. All three inquiries highlighted to need clarify roles and responsibilities, improve coordination and leadership arrangements, and bolster interagency communication.

Disaster risk management requires the ability of government officials to interact effectively with each other and the broader community (Waugh & Streib 2006:131). Effective interagency communication and collaboration is essential for delivering a coordinated all hazards, all agency approach as advocated by Emergency Management Australia and state governments. Improved networking, cooperation, collaboration and cooperation has the potential to deliver a range of benefits in both disaster management and climate change contexts relating to the building of interagency trust, improved information exchange, collaborative decision-making, risk sharing and pooling limited resources to achieve common goals. These points apply equally to climate change adaptation (APSC 2007; Head 2008; Garnaut 2008) and environmental policy in general (Ross & Dovers 2008).

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<sup>1</sup> The views expressed in sections 6 to 10 of this report are those of the respondents. They do not necessarily represent the views of the authors.

## 6.2 Interviews

The interviews conducted during this project found overwhelming support for the need to improve interagency communication and collaboration, echoing both the official inquiry reports and the findings of the literature review. As one respondent stated, *“it’s working in partnership, recognising the skills of the various agencies and how they can actually complement each other but having a common goal”* (West Australian government official 3). There was also broad recognition that climate change has major implications for disaster risk management and that any improvements should encompass organisations addressing both policy issues. As one Victorian interviewee put it *“you do not find many climate change sceptics on the end of hoses anymore ... they are dealing with increasing numbers of fires, increasing rainfall events, increasing storm events”* (Victorian government official 10). One of the Queensland interviewees suggested that this collaboration should extend to cover all levels of government and other sectors: *“I think it’s state government’s responsibility to ensure that there is a framework in place to enable, whoever it is, whether it’s local government, or if it’s industry, enable them with the tools and equip them with the tools to be able to deliver on it”* (Queensland government official 2).

Several key barriers to interagency communication and collaboration emerged in both the interviews and workshops. One was the ‘silo mentality’ where staff are so focussed on their particular arena of action that they fail to see the broader implications of their work for other agencies and miss where the efforts of other agencies might be helpful to them. West Australian government official 4 stated that until climate change *“becomes relevant to my sphere of work - tangibly relevant - it won’t make it a speck of difference.”* Communicating across different types of expertise was another barrier because different professionals often do not ‘speak the same language’. A third issue was the problem of ‘turf wars’, where staff saw other agencies as competitors and so guarded their knowledge, powers and resources. Another problem was the lack of trust, particularly where there were antagonistic relations between key stakeholders and/or a history of personal dislike. Finally, there was the issue of the ‘message from the top’, where the executive and/or government do not place a high priority on interagency communication and collaboration. These factors have also come up in previous research into collaborative governance (see, for example, Rolfe, et al. 2009; Howes 2008; Liebrecht & Howes 2006).

Participants in this project suggested that such barriers are exacerbated by a lack of shared vision, fragmented legislation or policies, institutional structures that discourage collaboration, organisational cultures that encourage staff to distance themselves from other agencies, and a lack of a shared knowledge base. West Australian government official 5, for example, argued that *“there would have to be a lot more dialogue between researchers and specialists and what are essentially blue-collar operational people.”* The participants also suggested that these barriers could be broken down by building social capital across organisations, but the challenge lay in how this might be achieved. This challenge was particularly evident when considering how to get significantly different types of agencies to work together, such as those involved in disaster risk management as opposed to climate change adaptation.

*“We all - all organisations really need to be thinking about how their policies, programs, asset management, decision-making is climate-sensitive and to what extent climate change impacts may influence them and think about those and incorporate those into their thinking, along with all the other drivers and changing things that they need to take into account” (West Australian government official 1).*

### **6.3 Workshops**

Collaboration within and between tiers of government was seen as important by the overwhelming majority of participants in all three workshops. It was noted that the somewhat artificial distinction between the operational aspects of emergency management (e.g. response) and the more human aspects (e.g. recovery) is a significant barrier to collaboration. There is a lack of communication, a lack of shared understanding, a lack of shared goals, a lack of shared language, and ‘turf protection’. It was suggested that this is not because people don’t want to work together but it is more due to the demarcation of responsibilities and the management of these responsibilities. It was agreed that there was a need to challenge the ingrained culture of certain agencies. Role clarity and role complementarity, trust and shared goals based on ongoing contact and networking, information sharing and open communication were believed to be keys to effective collaboration. It should be noted that these issues are not unique to the disaster risk management or climate change sectors. The need for informal communication as a complementary activity to formal communication and collaborative efforts (such as taskforces and inter-departmental working groups) was emphasised.

The key themes around improving interagency collaboration and capitalising on the strengths of existing approaches centred on:

- The importance of role clarity and shared goals;
- Political and executive support for collaboration; and,
- Emphasising regional and local approaches to collaboration.

#### **6.3.1 The importance of role clarity and shared goals**

Participants argued that existing emergency management models such as PPRR do not adequately consider the roles of different agencies and the community. While it was generally agreed that improved role clarity for agencies across the different PPRR phases (not just in response) would support collaboration, it was also recognised that support agencies (police, child protection, etc.) are already experienced in recognising responsibilities, filling gaps, and working across hazards, and seem very willing to do so. Language/terminology difficulties were seen as real barriers which can affect interoperability and collaboration opportunities. For instance the PPRR model may be popular within the emergency management community but it does not necessarily resonate with or reflect the priorities of the community or human services sectors. A common platform of shared goals based on a common language and understanding borne out of dialogue and collaboration was seen to be one of the key benefits and pre-conditions of increased collaboration.

#### **6.3.2 Political and executive support for collaboration**

Participants observed that many practitioners were willing to work more collaboratively but senior officer commitment can be difficult to achieve. This may be a function of political pressure, the need for control, the availability of funding and other resources, risk aversion,

or concerns about accountability. Further, because the staff time and resources required are often not accounted for, collaborative efforts rely heavily on the existing goodwill, relationships and the enthusiasm of individual officers. Potential strategies for facilitating improved collaboration included:

- A clear message from the top (at every level of government) that everyone will work together to breakdown existing cultural and historical barriers and work more collaboratively;
- The promotion of collaboration champions; and,
- The broadening of committee membership to include non-government interests.

Leadership in social and cultural alignment involved finding the common ground and synergies through: acceptance of differences; recognition of various skills; demonstrations of how this is relevant to them; inclusion of a conciliatory decision-making style that includes other people in decisions; open dialogue; and an openness to admitting and dealing with mistakes. Increments for maintaining momentum of cultural changes include: common understandings; action plans; flexibility between steps; incentives to drive it; funding and collaboration opportunities; and the will and structure to collaborate. Disarming defensiveness will require strong leadership.

Participants reported that success stories in promoting effective collaboration are often linked to a passionate and committed champion. Champions are the ones who get collaborative meetings up and running. Working together has relied heavily on existing goodwill, relationships and the enthusiasm of individual officers. Willingness among individuals and leadership to work together is important and personalities play a big part in getting this going. This has required informal communication and collaboration to make it work in practice. One of the measures of success is the confidence that people have in the organisation and its people. You can measure those things. It's about creating hope. The biggest return is at regions and state level.

### **6.3.3 *Emphasising local and regional approaches to collaboration***

Participants emphasised the importance of local and regional approaches to collaboration. Local government was recognised as an important stakeholder because it has regular exposure to a range of disasters and detailed knowledge of local communities. It was noted, however, that local government boundaries are artificial political barriers that can confine collaborative efforts. There needs to be the ability to transcend existing boundaries in order to address issues.



## 7. INSTITUTIONAL IMPROVEMENT AND LEARNING

### 7.1 *The literature and inquiry reports*

All institutions of government have to respond to rapidly changing economic, social and environmental contexts. As a consequence they need to redesign their structures and procedures to enable continual improvement and policy learning. The Victorian Bushfires Royal Commission (2010c:81, 86, 229) promoted the need for agencies to learn from their experience and conduct more research into the level and distribution of risk. The Perth Hills bushfire report recommended a new set of institutional reviews, education and training (GWA 2011:188), while the Brisbane floods inquiry recommended improving hydrodynamic modelling and forecasting to improve decision-making (QFCI 2011:24, 62). Goode, et al. (2012:16) note that each of these inquiries also highlighted a number of institutional issues associated with state emergency management arrangements.

Part of the solution to these challenges requires innovative solutions that can be modified in the light of experience and on-the-ground feedback (ASPC 2007:1, 3). Effective disaster risk management requires imagination, initiative, a coordinated process for sharing learning and “a willingness to use information, however imperfect or incomplete to fuel action” (Waugh & Streib 2006:135). Successfully tackling these problems requires a broad acceptance and understanding from governments and Ministers that there are no quick fixes and that levels of uncertainty around the solutions need to be tolerated. Successfully addressing such problems takes time and resources and adopting innovative approaches may result in the occasional failure or the need for policy change or adjustment (APSC 2007:36). In order to be effective disaster risk management and climate adaptation need to be integrated into mainstream government operations and with each other. Furthermore, approaches require continuous review to encourage policy learning and improvement. Institutional arrangements which support this may include integrating climate adaptation into all phases of PPRR (Birkmann & von Teichman 2011).

### 7.2 *Interviews*

A number of interview participants highlighted the limitations of the PPRR model of disaster risk management. The lack of long-term follow-up in this model is a case in point. It was suggested by Queensland government official 5 that the political focus on emergency management provisions only reaches adequate levels in the aftermath of an extreme event and that this focus quickly fades as the government’s attention switches to other priorities. As a result of the short time horizons of political priorities the lessons learned from these events were often stymied by an inability to use the recovery phase of the emergency management process to feed into preventative measures in an iterative way:

*“there's a window of opportunity after any major event in a place to say, this is what we have to embed in the corporate knowledge and understanding, ... We've only got this little window of opportunity to do that in, otherwise people forget. ... the priorities get overtaken by the next most important thing”* (Queensland government official 5).

Interview participants were in general agreement that more and better data about climate risk would be helpful for ensuring more effective institutional responses. In this respect, participants appeared at times to be under the impression that certainty about the nature and

magnitude of climate change risks is possible. There was also recognition from some participants that effective emergency management was not always limited by a lack of risk data, and that the needs of communities to build resilience varied considerably: *“it’s not a one size fits all across the state. To improve the resilience of one community will be very different to another community.”* (Queensland government official 2). Although improved risk data was important, participants were in agreement that it is more important for institutions to understand the characteristics of community resilience and vulnerability, which vary considerably depending on location and the communities in question.

Participants appeared to agree that the PPRR model did not adequately address the process of ensuring a common understanding of priorities and risks between emergency management institutions, nor the process of deliberating about what the best response should be. Explicitly addressing these issues would encourage a more effective process of institutional learning, but such an approach needed to be more inclusive of the public as well:

*“You need to have a conciliatory decision-making style that includes other people in your decisions. The people you’re affecting need to be included in those decisions. They might not like the decision that’s made, but they need to understand why they’re being made and have some input into the decision, some ownership. You can’t just impose policies”* (West Australian government official 7).

### **7.3 Workshops**

Workshop participants noted that institutional learning was vital to meeting the challenges posed by both climate change and emergency management. It was recognised that effective learning is based on the ability to reconceptualise problems. Participants suggested that true institutional learning requires a significant cultural shift and acknowledged that there can be limited space for learning in a high pressure environment. Space needs to be provided for reflection and learning from both mistakes and successes. Participants noted that the emergency management community does not integrate policy, education, learning and evaluation well because its culture is focussed on response and some highlighted the limitations of the PPRR model.

The key themes around improving institutional learning centred on:

- Learning from each other; and,
- Models for learning.

#### **7.3.1 Learning from each other**

Participants believed that learning and positive change could be supported by a combination of formal and informal interactions between researchers, practitioners, policy makers and the broader community. Participants noted that practitioners from within the government and the community have a great deal of knowledge and experience that can be utilised. The concept of a community of practice network involving researchers, practitioners and policy makers to share ideas and knowledge was proposed. While some participants were enthusiastic about the potential contribution of researchers to improving practice, others argued that research does not necessarily improve practice but may just legitimise what practitioners already know and do. Participants suggested that in order to influence practice, researchers must ensure that their findings are presented and promoted in an accessible way for the emergency management community.

Some participants proposed that non-government organisations or electronic learning repositories could be used to facilitate collaboration and sharing of knowledge. It was suggested that such repositories should be accessible for researchers, practitioners and the broader community so they can contribute to, learn from, and facilitate, interagency and inter-community learning, communication and collaboration.

### **7.3.2 Models for learning**

Participants proposed that the government responses to dealing with water resource management issues during the long drought in all three states provided a model for community engagement, resilience, dealing with climate change, interagency collaboration and institutional learning. These examples could inform the emergency management and climate change adaptation communities. Good examples of community engagement to change behaviour were thought to be those associated with water restrictions, supply and storage, especially in relation to demand management. It was felt that although they were based on scientific information, these programs were generally relevant and accessible to the community because they avoided jargon and were well targeted and topical. Further, a high level of relevant public information (including scientific information) was made available regarding actual and projected water shortage and water usage, including daily information on dam levels and progress towards achieving water use targets.

It was also felt that the level of government and agency commitment to providing ongoing funding and support contributed to this success. This was because it was not one-off or one season only and allowed the programs, strategies and funding to have a long-term focus and long-term goals. Participants believed that there was commitment at the highest level of government to address water issues, demonstrated by the formation of senior officers group working across agencies in a number of the jurisdictions considered. The long-term focus and high level commitment also facilitated the building of internal capacity and skills to deal with the issues and also allowed for water issues to become mainstreamed (i.e. become embedded in the core business and decision-making of agencies, local government, business and the community) and modified/enhanced over time based on learning. Unlike broader climate issues which are politically contested participants felt that there was general community, scientific and government agreement that water was in short and decreasing supply and that changes need to be made to current practices because all parties accepted that there was a high probability of water shortage regardless of the cause. Participants believed that targeted incentive programs (e.g. rebates for water tanks) helped to build and support resilience and to support changes in behaviour.

## 8. COMMUNITY ENGAGEMENT AND COMMUNICATION

### 8.1 *The literature and inquiry reports*

Responding to problems associated with disaster risk management and climate change adaptation requires a whole-of-government approach that necessarily relies on a willingness to work across agency boundaries and in a devolved way with communities and businesses (Productivity Commission 2012; APSC 2007:36). Through their review of recent disaster inquiries, including the three we are analysing, Goode, et al. (2012:17-18) note that there is scope for improvement in community engagement particularly with respect to clearly communicating risks and hazards. Our own analysis of the 2009 Victorian Bushfires Royal Commission (VBRC) bore this finding out with repeated references to the need for better community engagement and communication appearing in its reports (VBRC 2010c:3, 31, 34, 37, 230, 352). Similarly, it emerged in the report into the 2011 Perth Hills bushfires which extended the concept to include the shared responsibility for disaster risk management across sectors (GWA 2011:13, 46). It also appeared in the Queensland Floods Commission of Inquiry (QFCI) final report with regards to improving community preparedness and assisting local groups (QFCI 2012:118, 122).

It is important that disaster risk management and climate adaptation do not narrowly focus their efforts on creating disaster-specific legislation, administrative arrangements and institutional structures. They must also enhance capacity at the grassroots or local level (O'Brien, et al. 2006:73) in ways that value the contributions of local knowledge and expertise, especially in terms of adapting general goals to specific local contexts (Dovers 1998:9). Communities often do not make a distinction between disaster risk management and climate adaptation efforts (Gero, et al. 2012), so effectively engaging the community in understanding the challenges of both, as well as actively involving them in identifying possible solutions, is important. It is also important that issues are widely discussed by all relevant stakeholders in order to ensure an appreciation of their complexity (Productivity Commission 2012; APSC 2007:27). This may involve the adoption of a “more distributed and participatory approach” (Beck 2011:305) to defining problems that acknowledges how people experience risk, addresses what are essentially normative issues, and actively engages them in both defining and implementing potential solutions. This more flexible and inclusive approach would engage a wider range of political actors, experts and the public “in a shared enterprise of responsible knowledge making” (Beck 2011:305). The idea of shared responsibility in disaster planning, preparedness, response and recovery was particularly evident in both the Perth Hills and Victorian Bushfires inquiries (GWA 2011:13, 46; VBRC 2010c:37). Unfortunately there can be limited detail as to how these commitments to increased public involvement might be put into practice (Burton & Mustelin 2011).

Notwithstanding these challenges, the benefits that may be delivered by a more participatory approach could include more effective implementation of measures because they would be “well understood by affected communities who through involvement in their formulation and implementation enjoy some sense of ongoing ownership and control” (Dovers 1998:9). This is particularly important in the context of disaster risk management due to its heavy reliance on voluntarism and the need to foster mutual assistance arrangements among and between communities (Waugh & Streib 2006:131). Research has shown that greater inclusion and participation can deliver tangible benefits in terms of building resilient communities (Handmer, et al. 2011:8). However, a possible challenge to broader community engagement

is that it represents a potential challenge to epistemic (knowledge-based) communities and approaches, such as disaster risk management professionals (Dovers 1998:9). This was particularly evident in the Victorian and Perth Hills bushfires where there was sometimes a tension between the risk assessments of home owners and those of emergency managers (VBRC 2010c:37, 230; GWA 2011:13, 46).

## 8.2 Interviews

In general the interviewees saw the importance of good community engagement, particularly with regards to getting people to be better prepared for a disaster or the impacts of climate change. Many felt that there was room for improvement but they were sometimes uncertain on how this could be achieved.

There was a general agreement that engagement should be more than just giving out information. *“I don't think it's an educational program. I think it's an awareness and mature talking about it”* (Victorian government official 1). It may also require some sort of interaction with key agencies. *“Well it means people being actively involved right across the state, not just in SES headquarters or CFA headquarters or regional offices”* (Victorian government official 2).

While it was recognised that a major disaster heightens public awareness temporarily, one of the key problems is maintaining community interest:

*“It's an issue of consistency and maintaining that and carrying the learning through. So [within] the community obviously interest waxes and wanes with the impact of different disasters. So you know if we had big bushfires there'll be a lot of interest in bushfire planning and bushfire emergency response. The event that we had hopefully means that there'll be a lot of interest in flooding for the next decade”* (Queensland government official 1).

There seemed to be a feeling that emergency management had had more success with community engagement than climate change.

*“I think on the emergency management side, there - seem to have done a reasonable amount of work there ... given the resources they've had, they've probably done quite well. ... But in other areas of climate change adaptation, there's certainly room for a greater commitment and greater effort and resources to be put into community engagement and other stakeholder engagement”* (West Australian government official 1).

While committing resources to community engagement is important, it is often difficult to communicate the implications of climate change science effectively. Despite this one interviewee optimistically suggested that:

*“as the community becomes more aware of climate change as a reality and it's not tainted by political views, so it has a scientific basis to it, then I think they're more amenable to take in their own protective measures and also working in better with local councils in the council risk management”* (Queensland government official 5).

### **8.3 Workshops**

Workshop participants recognised that community engagement is resource intensive (in terms of time, money, skills, and people) and needs to be well designed to be successful. Participants suggested that community engagement often focussed on methods rather than goals. Instead, the focus should be on how to empower the community to be involved in decision-making processes in an informed way and to engage in actions that support their own resilience. Community engagement efforts must recognise, respect and value local knowledge. It should also identify priority areas where the risk is high and engagement is low and develop strategies to engage with these communities in a useful way to manage risks. While the process must also communicate any shifts in the risk profile that are likely to result from climate change, participants recognised that impacts at the local level are difficult to predict with certainty. Participants also recognised that while community engagement can unrealistically raise expectations of what governments can do, it also has the potential to open important channels for dialogue and shared understanding, which form the basis for developing collective strategies to manage risks. Indeed, many participants acknowledged the importance of being clear about the state's ability to protect them from natural disasters and support their recovery and the opportunities presented by facilitating improved community resilience and self-reliance.

Participants provided examples of good community engagement activities that had been conducted in the past (e.g. water conservation programs during the drought 2001-09). These included examples driven by government agencies, businesses, communities and volunteers. Some of the key features of these examples included: enthusiasm and support from the non-government sector and community groups; and, the provision of targeted activities delivered in a way that resonated with the audience because it was meaningful, relevant, encouraged participation and inspired action.

The key themes around improving community engagement and capitalising on the strengths of existing approaches centred on:

- Changing the way we engage with people (the 'how');
- Supporting locally driven engagement and planning;
- When engagement should occur;
- Who should be engaged;
- Supporting a broader all-hazards engagement focus; and,
- The role of media in supporting engagement.

#### **8.3.1 Changing the way we engage with people**

It was recognised that examples of increased community engagement at the ground level by disaster risk management agencies represented a shift in understanding. This demonstrated that programs need to be more targeted and focussed to trial new community engagement methods and to adapt existing techniques. It was noted that this does not occur across the board and that some parts of the sector are resistant to change.

Some participants noted the willingness in parts of the disaster risk management sector to trial new methods and to adapt existing techniques. It was also noted that the timing of community engagement activities is vital. Successful programs seized the advantages

offered by increased interest in post-disaster events. However, it was recognised that both community and emergency management resources are often stretched at this time.

Examples of good community engagement practices included:

- Voluntary advisory services provided by emergency management agencies or non-government organisations to help people to develop personal preparedness plans (e.g. bushfire plans);
- Holding more open public meetings (i.e. meetings that are open to anyone in the public rather than specific community groups) to discuss emergency management issues;
- Engaging with the artistic community to assist in accessing a variety of people and getting the emergency management message out;
- Making better use of the range of social media and new media;
- Supporting on-line information and engagement activities with local and community-based infrastructure and systems;
- Using less technical language and jargon in communication, education and engagement materials; and,
- Targeting engagement activities to different audiences/demographics to ensure that they are meaningful, relevant, encourage participation, and inspire action.

### ***8.3.2 Supporting locally driven community engagement and planning***

The use of high impact and cost-effective methods is important because current funding mechanisms are not supportive of sustained engagement. The expanded use of volunteers and other non-emergency management professionals to conduct engagement activities was seen as a positive trend in this regard. Examples included:

- Increasing the use of volunteers and human services agencies to undertake community engagement and education activities including enlisting volunteers to undertake community door knock campaigns;
- Increasing support for community driven emergency planning activities supported by relevant state agencies and the use of local community advocates to promote issues; and,
- Using and connecting existing community networks.

All of these suggestions, however, carry some risk as volunteers, community organisations and networks have limited resources and personnel.

### ***8.3.3 Defining who should be engaged***

A key challenge for improving community engagement was seen to be around defining who should be engaged. This included ensuring that marginalised or vulnerable groups and individuals (such as children, young people, and culturally and linguistically diverse members of the community) were not excluded and had adequate opportunity to participate and influence decisions. Issues were identified regarding how 'community' should be defined and how the use of municipal boundaries might encourage demarcation and artificial boundaries.

### ***8.3.4 Supporting a broader engagement focus***

A significant challenge of current approaches to community engagement was seen to be the tendency for agencies to focus activities narrowly on their own interests (e.g. bushfire) at the

expense of an all hazards approach. It was noted that because the community has a range of different interests and priorities, and do not experience hazards in isolation, engagement needs to be about all hazards at the local level. Participants suggested that it may be appropriate for emergency management agencies to consider opportunities to link into existing broader community engagement activities. It was also suggested that engagement activities needed to encompass preparation in addition to response measures.

### ***8.3.5 The role of media in supporting engagement***

Participants recognised the important role that traditional media can play in getting information out during response situations. It was felt, however, that the mainstream media often presents a very negative picture of emergency management with a focus on perceived 'failures' rather than the successful avoidance of more extensive damage or loss of life. The limited opportunity to provide counter views may encourage communities and politicians to be influenced by a culture of blame. Participants suggested that media outlets needed to be more ethical when dealing with communities pre-, post- and during disasters and to treat the community with more respect. Participants believed that a greater engagement with social and new media might help to support a better informed community debate. It was also suggested that emergency management organisations need to be permitted to give out information more quickly during an event, even if there is a risk of being 'half-right'. This would give the community the opportunity to take action, rather than waiting too long for perfect information.



## 9. A RENEWED FOCUS ON RESILIENCE

### 9.1 *The literature and inquiry reports*

It has been suggested that there is a “need to move emergency management approaches beyond a response-oriented focus on hazard mitigation to consider vulnerability reduction and community resilience” (Handmer, et al. 2011:16). This proposed shift needs to be considered alongside the current emergency management context which is often described as taking place in a cycle of four distinct phases of Prevent-Prepare-Respond-Recover (PPRR) broadly relating to the management of impacts before, during and after a disaster event. Although the emergency services have found the PPRR approach useful over many years, it has been criticised as setting up artificial barriers between elements, assuming that each may appear equally important (and to have equal weight in all circumstances), and that each must be considered and implemented in the same order. It has also been suggested that adopting the PPRR approach has focussed efforts on response and reactive considerations (Rogers 2011). Cronstedt (2002:12) suggests that this may be a “carry-over from the emergency management paradigm that focussed on the hazard rather than vulnerability” and the complex underlying drivers of vulnerabilities to various hazards. There is a move towards embracing the idea of community resilience as “a new driving principle” (Goode, et al. 2012:20).

Although the use of the concept resilience has become increasingly prevalent in the emergency management sector in Australia in recent years (Handmer, et al. 2011:6) the inquiry reports demonstrate a lack of consensus on the definition of resilience in the disaster setting (VBRC 2010c:31, 34, 230; GWA 2011:13, 46; QFCI 2011:115, 118, 122). This finding is supported by the work of Goode, et al. (2012:20). It is also consistent with other policy domains, including climate adaptation, in which there is no clarity around “what resilience means, beyond the simple assumption that it is good to be resilient” (Davoudi 2012:299).

Contemporary Australian disaster risk management approaches generally recognise that the elements of PPRR are interactive clusters rather than stages conducted sequentially, with most policy approaches using PPRR simply as a convenient description of the different elements. However, while such an approach recognises a blending across the elements of the model it is somewhat less progressive in terms of its recognition of the importance of concepts like resilience. It has been suggested that effective disaster risk management demands a greater focus on resilience throughout all PPRR phases and that it cannot be properly addressed through reliance on response (Handmer & Dovers 2007:170), i.e. it needs a proactive, rather than reactive, approach. In 2011 the Australian Government released the *National Strategy for Disaster Resilience* (NSDR) (COAG 2011) which obliges disaster risk management organisations to recognise and attempt to address the idea of resilience including the community’s ability to prepare for, respond to, and recover from disaster events. Prosser and Peters (2010:10) argue that the “whole-of-government approach to disaster resilience” as advocated by the NSDR “brings with it broader cross jurisdictional and cross departmental policy challenges. Not the least of which is the different understandings of resilience, which may be used by departments and policy makers.” They advise that the task is not so much about gathering consensus from these various viewpoints around a single definition or interpretation of the term resilience. Rather, it involves the

challenge of developing a “holistic approach” that generates a “common understanding that is robust enough to operate in different policy contexts” (Prosser & Peters 2010:10-11).

Building community resilience to disasters will be critical to the success of future disaster risk management. The NSDR emphasises the important role that partnerships between the government, emergency service providers and the community play in building resilience and empowering communities to become self-reliant. However, while the importance of shared (but not equal) responsibility for hazard preparedness was evident in all of the case studies this was not always achieved and there may be opportunities for significant improvement.

## **9.2 Interviews**

Building community resilience is the “new driving principle” in disaster risk management, and there are at present tensions concerning a lack of consensus on its definition and the evidence-base for the efficacy of this new approach (Goode, et al. 2012: 20). The Royal Commission report on the Victorian bushfires was released in 2009 and both the Perth Hills and Queensland Flood Inquiry reports were released the same year as the NSDR in 2011. Goode, et al. (2012: 20) argue that three case studies therefore did not include NSDR priorities in their Terms of Reference. The Perth Hills Bushfire Review specifically noted that community resilience was “not necessarily obvious” at the time the Terms of Reference for the inquiry was prepared. But upon reflection, and due to the process of the inquiry, community resilience was identified as a missing but contributing factor for shared responsibility (GWA, 2011: 11-14). Further down the track, the Victorian government (2011) released the green paper: *Towards a more resilient and safer Victoria*.

How to ‘share responsibility’ with communities continues to be contentious. For West Australian government official 7 community resilience is about “*making sure that the people - the population shares the responsibility*”. The interviewees reported that delegation and acceptance of responsibilities will apply to a wide and diverse range of organisations and members within communities, and as such, the ‘degree’ of shared responsibility will vary. Victorian government official 5 points out that shared responsibility “*doesn't mean equal responsibility. I think that's important.*”

The resilience approach is also compounded by differences in meaning associated with ‘community’ and ‘resilience’. As Queensland government official 2 argues that: “*To improve the resilience of one community will be very different to another community*”. For many interviewees resilience is about “*community resourcefulness*” (West Australian government official 5) and “*community development and strength has got to be about building resilience; resilience to a whole range of things of which natural events are just one*” (Victorian government official 6). For West Australian government official 3, the meaning of community resilience was expressed as:

*“How connected they are as a community. Whether they're just groups of people who live in that area but there's no connectedness or whether there are the social ties that actually bind people together”.*

Researcher 1 noted that: *“A resilient community is one which pulls together. A not so resilient community would be one that just evaporates and people go their own separate ways”*. Many interviewees argued for enhancing individual and systemic abilities to adapt and be flexible in dealing with their particular issues: *“we don’t want to go back to where we were before the event. We want to learn from it and move on”* (West Australian government official 6). It was widely acknowledged that people learn by experience, and that the experience of hardship and resilience go hand in hand. Our research findings demonstrated that the understanding of risk was inherently linked with the acquisition of ‘abilities’ and ‘capacities’ to make improvements. In light of this, the concern for community resilience in the face of climate impacts is articulated by West Australian government official 7:

*“If you want to adapt to climate change you’ve got to understand you’re living in a bloody harsh environment. Western Australian bushfire environment is the toughest bushfire environment in the world... So we’re going to get the fires and we’re not hardening the community up for it.”*

Interviewees observed that a challenge for disaster risk reduction was that *“people don’t generally like being told... what they shouldn’t do and what they should do”* (Researcher 1) and that emergency services personnel *“constantly encounter communities that aren’t particularly well-prepared, despite all the messages and warnings and things like that”* (West Australian government official 5). Interviewees also reported that unrealistic expectations within communities are commonplace noting that *“in Australia, there’s been a growing sense of entitlement, which has actually undermined the resilience that may have existed 50 years ago. People expect things, expect the Government to bail them out”* (Victorian government official 5). For Queensland government official 3, this expectation is largely a result of improved emergency response: *“We were... our own worst enemies in that we constantly improve our response such that we raise expectations that we’re always going to respond and that has a negative effect on building resilience.”* West Australian government official 7 articulates the struggle at hand with counteracting community non-engagement:

*“We’re at a loss as to how you penetrate it. You’ve got to penetrate the community, give them the facts of where they are... We’ve tended to disempower the community. I think we have to re-empower the community. Every time you take something off them that they can’t do - like some Councils around Perth have said you can’t burn anything off anymore, you’ve got to chip it or take it to the rubbish dump. People don’t burn their bush box off in the city. So they’ve been disempowered”.*

Conversely, other communities were identified as wanting the autonomy to make their own decisions and test their own resilience. Many interviewees agreed that resilience was based on people: ‘knowing each other’, ‘caring about *their* homes and families’ and local knowledge. Victorian government official 5 reported that:

*“It’s not a question of Government not fulfilling its responsibilities. It’s actually coming from communities often who are saying ... this is our community, these are our lives, we...want to have a say over what happens and that applies ... right across the whole model, including recovery at the end.”*

The overriding message from all three inquiries was that improved education and engagement is needed to enable well-informed communities to develop their own effective adaptation and risk management strategies (Howes, et al. 2012a: 7). Throughout our research, interviewees raised concerns with the idea of ‘community’ and a potentially narrow application of this notion in the emergency management field. Approaches advocated by interviewees involved “*getting out, talking, [and] much more on the ground interaction*” (West Australian government official 6). West Australian government official 5 felt it was about:

*“spending time talking to landowners, visiting community events, not hand[ing] out pamphlets in the community education type sense, but to be talking to people about community matters in a way that builds that trust and build that relationship”.*

Many interviewees argued that existing emergency management models such as PPRR do not adequately consider the roles of community or resilience at different phases and how to better involve them. Implications for the PPRR model included a greater emphasis on adaptive capacity and resilience building. West Australian government official 4 stated that this involved “*a return to the risk management model which focuses on: 1) what are you trying to achieve given the context? 2) what will stop you from achieving that? and, 3) what are the best things we can do to treat that?*”

Many interviewees agreed that disaster risk reduction practitioners require longer-term horizons which incorporate conceptualisations of resilience and community that are not oversimplified. This would build robustness into the patchwork of ‘community resilience’. Viewing communities and their resilience as a patchwork of elements and dynamics avoids oversimplifications and highlights more targeted pathways for building and mobilising communities for disaster resilience.

### **9.3 Workshops**

In the workshops participants suggested that emergency management agencies in the past have tended to focus more on the immediate response to an event and less on preparation and long-term adaptive recovery. This is starting to change with agencies and the community beginning to consider the idea of resilience. Participants proposed that resilience needs to be understood as a social system — not just individuals or households — and needs to be seen as something much broader than disaster risk reduction.

Participants suggested that resilience which already exists within community groups needed to be recognised and supported. In terms of community-based resilience, getting back to informal relationships outside government control was seen as important and highlighted the need for basic human interactions. Discussions on youth resilience highlighted the importance of social media as a form of communication. There was also recognition of the need for business to be a part of the solution and the importance of economic and social networks.

While the resilience of the community, as well as disaster risk management organisations, were seen as important in responding to climate change and disasters, there was a perception that efficiency, economic growth and fiscal discipline were given a higher priority by government. This was reflected by a preoccupation with quantifying the economic costs and benefits of programs and proposals. Participants questioned whether an economic

argument that focused on both the immediate and longer-term could be used to support approaches which address resilience issues.

In summary, the key themes that emerged with regards to improving resilience and capitalising on the strengths of existing approaches centred on:

- Recognising the contribution of volunteers and community groups to resilience;
- Recognising the impact of demographic shifts on resilience; and,
- Shared responsibility and facilitating self-reliance.

### ***9.3.1 Recognising the contribution of volunteers and community groups to resilience***

Some participants highlighted the importance of community connectedness and self-reliance in achieving resilience. Many acknowledged and applauded the work of volunteers. There was a perception that some volunteer groups may have been denied the opportunity to assist during emergencies (e.g. they were not able to make tea and sandwiches for emergency volunteers because of hygiene training requirements). Such restrictions effectively stripped such organisations of the ability to contribute to improving community resilience. Participants suggested that the contribution of volunteers and non-emergency management community groups (such as service organisations) should be acknowledged, supported and enhanced, as they assist in emergency situations and recovery.

### ***9.3.2 Recognising the impact of demographic shifts on resilience***

Participants recognised that demographic shifts have had a range of implications for emergency management and that these needed to be recognised in community engagement and resilience building. Issues raised included that:

- In some areas the aging population profile has resulted in a demand for more face-to-face information and active involvement through volunteering;
- There is an increasingly high mobility rate (i.e. people not staying in the same community) which can have both a positive and a negative impact on community resilience (e.g. the relocation of urban people to peri-urban and rural-residential areas for lifestyle reasons doesn't necessarily correspond with a good understanding of the risks or expectations of service delivery);
- There is an increasing number of people from non-English speaking backgrounds that may make communication difficult;
- Changing lifestyles and limited personal experience of hardship may have reduced resilience at the individual and community level; and,
- The link between resilience, risk and vulnerability needs to be better understood to support informed community and government decision-making.

### ***9.3.3 Shared responsibility and facilitating self-reliance***

Some participants believed that community resilience needs to be based on shaping social norms that make preparation for emergencies part of everyday life and that this needed to be based on an all hazards approach. The metaphor of a first aid kit was proposed because they were seen to embody the ideals of preparedness and self-reliance built on an all hazards approach because a first aid contains a range of multi-purpose supplies to respond

to a range of injuries regardless of their cause. First aid kits were also seen to be part of everyday living and integrated into everyday decision-making and response.

The idea of shared responsibility was considered to be an important component of building community resilience, however, some participants felt that, to date, the implementation of this idea had been top-down in its approach. It was argued that shared responsibility requires the government to support the community in developing the life and decision-making skills to prepare for, and respond to, hazards. Incentive programs (e.g. subsidies for water tanks or solar panels) can facilitate positive changes in behaviour and self-reliance. It is important to note that this focus on self-reliance and community empowerment was seen as a complement to, not a replacement for, the provision of government services and infrastructure. Shared responsibility is also contingent on the understanding that community, household, social, infrastructure and organisational/government resilience are interconnected.

## 10. INTEGRATING DISASTER RISK MANAGEMENT AND CLIMATE CHANGE ADAPTATION

### 10.1 *The literature and inquiry reports*

The past few years have seen significant progress in the convergence of climate change adaptation and disaster risk management, at least in terms of intentions and policy statements, so that there is now a significant overlap of concepts and shared goals (Mitchell, et al. 2010). There is also a general agreement, both nationally and internationally, that adaptation is an important tool for managing risks, reducing vulnerability and building resilience (COAG 2007:3; UN-HFA 2005; UN-ISDR 2009). Despite this recognition significant barriers to effective policy integration remain (Mitchell, et al. 2010).

The Victorian Bushfires Royal Commission identified climate change as having implications for bushfire policy reform (VBRC 2010c:xvii, 13) and supported vulnerability and risk assessments to examine the potential impacts of climate change on fire management, including *“the extent to which adaptive management of fire regimes in the face of climate change, especially the use of prescribed burning, may mitigate risk to multiple landscape values”* (VBRC 2010c Appendix A: 22). The Royal Commission suggested that:

*“Research should embrace future challenges facing Australia, among them the impact of climate change on the frequency and nature of bushfire and the subject of fire at the peri-urban fringe”* (VBRC 2010c:392).

Climate change was acknowledged as an issue for land use planning with the Commission noting that *“consideration should be given to the increasing risk exposure arising from climate change projections of more frequent occurrence of catastrophic fire”* (VBRC 2010c:223). Climate change was also seen by the Commission as an argument for increased prescribed burning (VBRC 2010c:292).

The Special Inquiry into the Perth Hills bushfires referred to long-term weather forecasts by the Bureau of Meteorology (BOM) that provided *“significant data to suggest that the Perth Hills and the immediate area are undergoing significant climate change when viewed over a thirty year period”* (GWA 2011:11). It further acknowledged that:

*“The warming of the earth’s surface will have the potential to impact directly upon fuel loads and their management into the future and while not a Term of Reference the Climate Commission’s Report appears compelling, the evidence that the Earth is warming on a multi-decadal timescale, and at a very fast rate by geological standards, is now overwhelming”* (GWA 2011:12).

The Special Inquiry noted the vulnerabilities, particularly as they relate to the built environment and services. In terms of preparation, it is suggested that all sectors increase awareness of critical infrastructure service supplies and its realities related to water, power and the functioning of roads and bridges. With regards to response measures, the focus was on Incident Action Plans and assessments of bridge integrity. As it related to infrastructure, recovery involved: calculating the true costs to infrastructure; field exercises with tests of critical infrastructure; and the upkeep of fire hydrants for water supply. The Special Inquiry stated that: *“the first step is to recognise that changes to our climate can be the catalyst to reform legislation and policy as they apply to the Perth Hills”* (GWA 2011:12).

With policy and legislative reform in mind, one specific recommendation was put forward that: *“The State Government recognise the projected changes in climate and potential impact on future fire events”* (GWA 2011:158). The Special Inquiry noted that this is *“highly relevant to Terms of Reference 1 in terms of preparations for the future”*. This relates to questioning the *adequacy* of current preventative measures, specifically prescribed burning and other bushfire mitigation activities. In light of this, it is advised that *“some recognition should be given to the changes in climate that might require a new approach to prevention against bushfires”* (GWA 2011:11). The Special Inquiry called for legislative and policy reform and a new approach, but exactly what legislation and policy this refers to is left unspecified. Moreover, how learning may be integrated to facilitate a new approach is unstated.

The Queensland Floods Inquiry report does not discuss the relationship between current flood mitigation and climate change adaptation, nor does it recommend specific consideration of climate change in flood mitigation policy and practice. It does, however, discuss briefly how climate change may influence flood impacts and how it will be considered within flood modelling and dam management. The expectation is that the range of variability associated with climate change will be incorporated into the Monte Carlo analyses undertaken by SEQWater (2010) and the various local authorities in the process of modelling potential future flooding extremes. The report also highlighted the problem of using climate change information in terms of potential liability on the part of a local council from doing so, and notes concerns from the Local Government Association of Queensland:

*“...councils are concerned about the prospect of liability; for example, for losses caused by flood where rebuilding has been approved after previous flooding, even if the owner knew of the risk... Gold Coast City Council has raised similar concerns about liability should it publish information about possible effects of climate change, and has pointed out that the lack of legislative prescription for flood modelling may leave local government flood modelling open to challenge on a case by case basis”* (QFCI 2012:128).

## **10.2 Interviews**

In all of the interviews there was a clear consensus that climate change adaptation needs to be factored into disaster risk management. It was seen as *“an amplifier of risk and a lot of what the climate change people are looking at is fundamentally exactly the same things that emergency management people are looking at”* (Victorian government official 3). It was also seen to cause *“shifts in risk profiles”* (West Australian government official 1). Other respondents acknowledged that climate change will lead to greater environmental volatility (Victorian government official 6) and increased uncertainty (Victorian government official 7 and Researcher 1).

One respondent argued that climate change would have to be factored into day-to-day decision-making as well as the overall approach of the emergency management sector and the broader public service:

*“Well implications for the sector are clearly that it has to do its business in a different way than it’s done it in the past. That more of the same is just simply not going to work and the other key theme that came out during the bushfires and the floods*



*review in Victoria is a focus on what's called the 'all agencies, all risks approach'"* (Victorian government official 2).

Another suggested that: *"It's got to become part of the risk analysis and I think they're starting to do it here as far as particularly around bushfires"* (West Australian government official 3). Another respondent suggested that: *"Land use planning has a critical role to actually help support adaptation strategies because they are generational"* (Queensland government official 2).

One of the key barriers to the integration was the need for emergency service workers to understand the impacts of climate change on disasters in order to change what they do:

*"That is a real challenge because the emergency management practitioners need to be - need to understand - they won't change behaviour until they first grasp the understanding. Then they start to say, well that is relevant to me and perhaps I do need to change my behaviour and then over time it will change"* (West Australian government official 4).

Another suggested that one way to do this was to *"get the scientists who have a lot to share about climate change and climate change adaptation talking to the operational people"* (West Australian government official 5).

One respondent suggested that this engagement and learning should extend across the whole public sector to the community: *"So there's interest across all the agencies and better preparation, better understanding and adaptation measures preparing communities for that"* (Queensland government official 1). Another argued that:

*"as the community becomes more aware of climate change as a reality and it's not tainted by political views, so it has a scientific basis to it, then I think they're more amenable to take in their own protective measures and also working in better with local councils in the council risk management"* (Queensland government official 5).

Any attempt at policy integration will rely on the political will of the government of the day, and changes of governments can lead to major changes in priorities (Queensland government official 2). It will also have to be backed up with some serious funding (Victorian government official 10). The acceptance of the need to change must extend to both public sector workers (Queensland government official 3 and West Australian government official 4) and the broader community (Victorian government official 9).

### **10.3 Workshops**

Some participants suggested that there is still a lot of uncertainty around climate change within political and community arenas and that it remains a controversial issue. They suggested that there is limited political confidence to act because it can be difficult to sell the idea to government when there is limited community, media or business support for action. There is also the problem of the conflation of climate change with climate variability. Projecting the future impact of extreme events is problematic, but the uncertainty should not be seen as a barrier to planning for change. Current day vulnerability can be used as an initial platform for thinking through the impacts of future extreme events.

Confidence in climate science is a contested political issue that influences government commitments to community information and education programs. Many participants, particularly those not actively engaged in a climate change related role, suggested that climate change is difficult to understand, uncertain and is far from the daily lived experience, which makes it difficult to engage on the issue. Similarly, participants noted that many people do not believe that a disaster event will happen to them so they do not act because the threat is not perceived as real.

Participants argued that climate change adaptation needs to be mainstreamed and pitched at a level to which emergency management practitioners, policymakers and the community can relate. Research on the likely impacts at the household and community level needs to be both available and accessible (jargon free) to support a better understanding especially in terms of resilience and preparedness. It was proposed that climate and other science should form part of disaster risk reduction messages. The information required to assist people to make informed decisions should be accessible both in terms of the way that it is presented (its language) and its availability. The availability and promotion of this kind of scientific information was seen to be a vital component of building trust, increasing knowledge and acceptance of climate issues and risks.

It was observed that the politics of climate change restricts the ability to integrate it into established and 'respectable' fields like emergency management. It was suggested that the adoption of adaptation strategies across the public sector is patchy. Those agencies which tend to do this best are those that are dependent on, and influenced by, climate change in a significant way (e.g. agriculture or water agencies). It was agreed that there is a need to recognise that disaster risk reduction and emergency management activities are significantly affected by climate. In order to become respected and integrated into decision-making it was proposed that climate change discussions need to become part of the day-to-day business of government and business.

There was also some discussion regarding the clash between climate change adaptation and emergency management, disaster management and disaster risk reduction discourses and the potential impact of this on shared understandings between the disciplines.

## 11. TOWARDS A NEW APPROACH

The objective of this project was to reconceptualise the twin problems of disaster risk management and climate change adaptation, develop the foundations for a more integrated, nationally consistent approach to both issues, supported by appropriate institutional changes and policy tools, and propose practical changes to existing policy/planning responses. The preceding sections of this report have addressed all three of these objectives to varying degrees by summarising the relevant responses of the participating stakeholders. This section offers suggestions for change that are based on the analysis of the data collected. First, some options for reconceptualising the problem are outlined. Then, four proposals are introduced for practical changes that together form pathways towards a more integrated approach to disaster risk management and climate change adaptation. Proposals 1 to 3 were put forward by the research team at all three workshops for review by the stakeholders. Proposal 3, in particular, would help with the development of risk context analysis tools through institutional learning. Proposal 4 is a composite of suggestions for organisational change that emerged from the workshop participants and interviewees themselves.

The ideas outlined here have some parallel with studies in other policy areas. Ross and Dovers (2008), for example, proposed various strategies to integrate sustainability into mainstream policies. Rolfe, et al. (2009) reviewed ways to improve government and community engagement in the delivery of public services. Liebrecht and Howes (2006) considered improvements in interagency collaboration between the state and local levels of government. Howes and Dedekorkut-Howes (2012) offered strategies to encourage collaboration on climate change adaptation policymaking and planning from the national to the local level. Smit and Wandel (2006) considered ways to improve stakeholder participation in community adaptation. What we offer here, however, is a fresh take on the integration of disaster risk management and climate change adaptation

### ***11.1 Reconceptualising the problem***

One of the first steps in reconceptualising problems is to review the key concepts that they entail. In this case there has been some over-simplification in the understanding of both 'community' and 'resilience' that can have some significant implications for the appropriateness, effectiveness and efficiency of policies or plans. This is particularly important at the very first stage of the policy making process where a risk-context analysis is needed to provide an appropriate foundation for the policy analysis and assist with the development and/or choice of appropriate policy tools.

First, it is important to recognise there is not just one homogeneous community. Any group of people will contain different communities that may be based on geography (i.e. residents of the same area), interest (e.g. clubs, churches or internet-based activities), or circumstance (such as a shared experience) (UKCO 2010). Any policy or plan will therefore have to identify which is the target community and be flexible enough to cope with the diversity amongst its members. One size does not fit all!

Second, resilience is a complex term with many different definitions. One of the more widely accepted is offered by the IPCC that defines resilience as:

*“The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions” (IPCC 2012:5).*

Hence it can be seen in various guises, such as the resistance to, accommodation of, or recovery from an impact. Further, different members of a community will have differing levels and types of resilience or vulnerability. These will in turn be influenced by environmental, economic and social factors.

The rethinking of these two concepts suggests that any effective policy or plan will have to be context specific. It will need to recognise the diversity within a given community and tailor its engagement programs accordingly.

The next point goes back to the debate summarised in section 4.2 regarding whether policymaking can be understood as a process that is best described either as rational comprehensive or incremental. In this context it may be a wise strategy to abandon pursuit of the rational comprehensive ideal that risks holding up the policymaking process because of: 1) the high level of uncertainty inherent in climate change adaptation and disaster risk management; and, 2) the highly contested political context. A Bayesian iterative approach could be more helpful, where: various incremental responses are tried; their effectiveness, efficiency and appropriateness are reviewed; and, the results are used to inform preparations for the next round of responses. This will not produce a comprehensive plan, but it can lead to significant, context-specific changes over time within a broader policy framework. These ideas will be followed up in later publications.

### **11.2 Proposal 1: Collaborative funding**

Traditionally all three levels of government have funded specific departments or agencies and their associated programs. This may encourage competition for funds between agencies or levels of government and discourage collaboration. What if part of the pool of public funding was set aside and attached to resolving particular problems? What if agencies were encouraged to form consortiums across all levels of government, as well as with the private and community sectors, in order to bid for these funds? This could create a tangible financial incentive that encourages multi-level, interagency collaboration, as well as cross-sector partnerships (hence sharing the responsibility with business and the community). Some of the issues to which the money could be attached would be finding ways to build resilience to a range of natural disasters (such as floods and bushfires) and climate change.

This proposal was raised for discussion at all three workshops and generally got a favourable response. There were some concerns, however, about the amount of time that would be taken up in applying for funding and undertaking project reporting, and the uncertainty around whether a project may get approval. Other concerns included the need to ensure that the approach gave adequate consideration to local and contextual issues, that it was seen to complement existing programs, and that it did not prevent agencies from delivering their ‘core services’.

In terms of practicality, there are already precedents for this approach to funding. Landcare grants have been operating for over two decades, allowing local community groups, government agencies, and businesses to bid for funding to rehabilitate various local

environments. More recently, the National Climate Change Adaptation Facility (which funds this project) offers grants to research specific problems that are bid for by consortiums of different universities, research organisations and government agencies. Although all levels of government are currently attempting to rein in spending, this proposal could simply be an expansion of the existing *Natural Disaster Resilience Program* grants scheme that is run under partnership agreements between the state and federal governments. Further, there are funds in the *Caring for Our Country* program (that includes Landcare) and *Infrastructure Australia* (that encourages public-private partnerships). Finally, COAG is currently reviewing its funding of the *National Partnership Agreements* devised in 2009, so this may be an opportune time to try this proposal.

### **11.3 Proposal 2: Local community resilience grants**

Two key points that kept recurring throughout this research are: (1) the key role that local governments have to play in both climate change adaptation and disaster risk management; and, (2) the need for a sense of shared responsibility where the community and business take action to improve their own resilience. One way to address both these points could be through the development of a local community resilience grants scheme. The idea is that each council could set aside a small amount of their budget, (perhaps only a few hundred thousand dollars would be necessary) and advertise for the community to come up with proposals for simple projects to improve local resilience to disasters and climate change. (One project, for example, might be to establish a network of volunteers who take responsibility for ensuring that a particular group of elderly people get to safety during an emergency.) The council could then hold a public meeting and let the community vote on which proposals to fund. This could encourage innovative improvements in resilience and raise community awareness about their vulnerability.

This proposal was discussed at the workshops and was generally endorsed. There were some concerns, however, about whether the community was convinced of the need to take action on climate change. Further, there was the question of whether there was a suitable level of awareness of the vulnerability to disasters such as floods and bushfires. Finally, there was the view that some sections of the community may believe that this kind of action should be left to the government. These concerns suggest that there would need to be a well-tailored public education and community engagement program to support such a scheme.

On the practical side, many local governments already offer similar community grants programs. Some grants are used to fund local volunteer groups (such as surf life saving) while others fund small nature conservation projects and community centres. This proposal could simply create a new category of grants, redirect some of the existing money into building local resilience, and change the selection process to allow for a popular vote. Some work would obviously have to be done to assess the costs and benefits of such a program.

### **11.4 Proposal 3: Embedded researchers**

The need for the emergency management workforce to understand the implications of climate change for disaster risk management emerged as a recurring theme throughout this project, particularly with regards to risk-context analyses. It was a need recognised by senior executives, officers on the ground, volunteers, and community groups. The problem is that climate science is complex and there are a lot of uncertainties in trying to identify impacts at

the local level. One proposal that we put forward was to embed climate researchers within emergency management organisations so that they could work with staff on developing a shared understanding of the risks and direct their research into areas of shared priority. This could be a two-way exchange and the researchers could also learn about the process of disaster risk management. Ideally they would have regular contact with front-line troops to improve their understanding of the shifting risk profile, as well as senior levels of management to help them see the big picture and recognise their shared objectives with other agencies.

This idea was discussed along with a wide range of alternatives at the workshops and received qualified support. There were some concerns about how these researchers could be funded, who they would answer to, their ability to remain independent, and whether there would be some sensitivity if their research outputs were construed as critical of the host organisation.

There are a several options for addressing these concerns. Some large agencies already have a research department, so adding a climate expert would fit easily into existing structures. Other agencies might not have this capacity but could potentially engage in ongoing partnerships with organisations that have the required expertise. Finally, there is the option of forming a consortium to research and learn about a specific threat. This might draw on existing funding such as the *Australian Research Council Linkage Grant* scheme or perhaps the kind of funds provided by our first proposal on collaborative funding.

### **11.5 Proposal 4: Organisational change**

A number of different organisational change strategies emerged during this project that can be knitted together to form a coherent package for improvement. Starting at the top, COAG will need to play a key role in ensuring all levels of government are working towards an integrated approach to disaster risk management and climate change adaptation. It has already made a move towards a nationally consistent approach in both these individual areas (e.g. with the *National Climate Change Adaptation Framework*, the *National Emergency Risk Assessment Guideline*, and the *National Strategy for Disaster Resilience*) and has been supported by the relevant Ministerial and departmental committees (see section 4). What is needed is to review and reform existing arrangements into a more coherent system. This also needs to be done at the state level of government in order to generate a consistent executive commitment to improving resilience.

The next change would be to create new, and/or revamp existing, interagency senior officer groups to translate executive commitment into day-to-day management changes within agencies. Finally, a network of ‘champions’ should be created across all agencies that involve staff who will look for ways to implement adaptation measures and provide points of interagency collaboration. These champions could be selected on the basis of their interpersonal skills, enthusiasm and willingness to develop long-term working relationships with staff in other agencies. They would also form working partnerships with business and community organisations.

These ideas emerged from the interviews and participants in the workshops. Several participants talked about examples of where some of these changes had happened on a small scale but they emphasised the need for both a top-down commitment, and a bottom-up enthusiasm for change. A recurring theme was the need to build social capital within and

between organisations. The point was also made that staff need clear guidelines to decide when to collaborate and when to go it alone, as collective action requires a considerable investment of time and resources.

## 12. CONCLUSIONS

Climate change has been labelled a 'wicked' policy problem because it is difficult to define, has complicated/unforeseen consequences, and requires a whole-of-government response. One of its potential impacts is to increase the frequency, duration and/or intensity of disasters such as floods and bushfires. These will have varying impacts on communities according to their climate, geography, and socio-economic status. What is therefore needed is a nationally consistent response to both climate change adaptation and disaster risk management that is built upon appropriate risk-context analyses and supported by the practical reform of both policy institutions and tools.

This project has addressed this problem using a comparative case study of the 2009 Victorian bushfires, the 2011 Perth Hills bushfires, and the 2011 Brisbane floods. The project started with a literature review and analysis of the inquiry reports into these events then moved on to interviews and workshops with key stakeholders. Four themes emerged from this analysis, relating to the need for improvements in: interagency communication and collaboration; institutional improvement and learning; community engagement and communication; and, a renewed focus on resilience. These themes provide the starting points for improving disaster risk management and integrating it with climate change adaptation.

Some broad directions for reconceptualising the problems have been introduced and will be followed up in later publications. Four proposals for practical institutional and policy tool reform were also put forward that address the themes identified. First, was the idea of providing collaborative funding that would encourage agencies at all levels to work in partnership with each other, businesses and communities. Second, local community resilience grants could raise public awareness about local vulnerabilities and lead to some practical improvements in resilience. Third, embedding climate researchers in disaster risk management agencies would help these organisations to learn about the implications of climate change for their work and help them develop a shared goal of improving resilience. Finally, organisational changes that would improve networking across all sectors and levels were outlined.

The consistency between the broader academic literature, the inquiry reports, the collected interview data and the feedback from the workshops suggest a high degree of confidence in our findings. Obviously there is a lot more work that needs to be done in this area, particularly with regards to following up on the detailed implementation of the proposed changes.



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## **GLOSSARY**

The following definitions are quoted directly from the IPCC (2012) and Althaus, Bridgman & Davis (2007). [Annotations have been added in square brackets.]

### ***Adaptation***

“In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate” (IPCC 2012:5).

### ***Climate Change***

“A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use” (IPCC 2012:5).

### ***Climate Extreme (extreme weather or climate event)***

“The occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. For simplicity, both extreme weather events and extreme climate events are referred to collectively as ‘climate extremes’” (IPCC 2012:5).

### ***Disaster***

“Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery” (IPCC 2012:5).

### ***Disaster Risk***

“The likelihood over a specified time period of severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery” (IPCC 2012:5).

### ***Disaster Risk Management***

“Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, resilience, and sustainable development” (IPCC 2012:5).



### ***Policy***

“Policy is the instrument of governance, the decisions that direct public resources in one direction but not another. It is the outcome of the competition between ideas, interests and ideology that impels our political system” (Althaus, Bridgman & Davis 2007:5).

### ***Resilience***

“The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions” (IPCC 2012:5).

### ***Vulnerability***

“The propensity or predisposition to be adversely affected” (IPCC 2012: 5). [Please note that both bio-physical and socio-economic factors may contribute to this propensity or predisposition.]

### ***Wicked Problems***

“‘Wicked problems’ refer to those dilemmas that either cannot be defined or, at best, are not open to easy formulation. Rittel and Webber (1973) explain that wicked problems are unstable in that they are characterised by embedded interdependencies where a possible ‘solution’ can create yet another interlocking complex problem. Moreover, it is difficult to obtain clear or definitive expertise regarding possible solutions because the problem is either ‘shifting’ or there is no way of learning about the issue without trying potential ‘answers’ that come with unintended consequences. It is impossible to isolate the problem, let alone work out what to do about it” (Althaus, Bridgman & Davis 2007:54).



