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## Hardening Australia Climate change and national disaster resilience

by Athol Yates and Anthony Bergin

Evidence now suggests that the impact of climate change is being realised in Australia more rapidly than previously estimated. The observed changes include more extreme events such as droughts and storms. A new report from the Commonwealth Department of Climate Change suggests that these impacts will increase over time.<sup>1</sup> We should therefore immediately start adapting to the new environment. Delays will only result in more costly disasters in terms of life and property. In order to respond to climate change in Australia, this report offers some adaptation ideas for homeland security planners as well as other key domestic stakeholders such as our emergency services.<sup>2</sup>

Australia will need to be more resilient to those climate changes as they unfold through this century. Taking account of changing climate-induced disasters should be core business, not just to the work of our emergency services, but also to land use planners and those responsible for major infrastructure projects. Relying on insurance alone as the tool to recover from extreme weather events is not feasible: in the long run, insurance will simply not be available for some risks. There's already evidence, for example, of insurers pulling out of regions in the United States frequented by extreme weather events.

Counter disaster organisations are starting to factor in the impact of climate change for their responsibilities and there's now more attention being devoted at the federal level to link climate change with disaster management.<sup>3</sup> Given the urgency posed by climate change, a business-as-usual approach, however, means that disaster risk in Australia may be pushed to more extreme levels. This report lays out eleven recommendations for improving Australia's national disaster resilience. The recommendations are not designed to be interdependent and so are not listed in any priority order. An underlying assumption of this *Special Report* is that more needs to be done by emergency and disaster management organisations to heed the threat of climate change.

### Recognise climate change as a homeland security risk

Australia's first National Security Statement (NSS) issued by Prime Minister Rudd in December 2008 defined national security as: 'Freedom from attack or the threat of attack; the maintenance of our territorial integrity; the maintenance of our political sovereignty; the preservation of our hard won freedoms; and the maintenance of our fundamental capacity to advance economic prosperity for all Australians'.

The NSS stated that, ‘climate change represents a most fundamental national security challenge for the long term future’. It identified the following threats arising from significant climate change: unregulated population movements, declining food production, reductions in arable land, violent weather patterns and resulting catastrophic events.

In terms of anticipated impacts on Australian homeland security, climate change also has the potential to affect water shortages, increase health problems including the spread of disease, and increase potential for property damage, (for example, through more flooding, coastal erosion, storm surges and extreme weather events) and disrupt critical infrastructure. Current design criteria and building codes may be inadequate for the future climate. Increased heat, pests, water stress and diseases will pose adaptation challenges for crop and livestock production. We’ve been reminded of the deadly threat posed by extreme events to Australians this year: 374 Victorians died during the January heat waves. And there were 173 deaths from the Black Saturday Victorian bushfires.

Australian climate scientists predict a significant increase in the scale and number of extreme weather events. There will be substantially more days over 35°C, and more and longer heat waves. Although there will be more dry days, when it does rain, rainfall is likely to be more intense resulting in major flooding events. Droughts are likely to become more frequent, particularly in the south-west. High fire danger weather is likely to increase in south-east Australia. Tropical cyclones are likely to become more intense. Hail risk may increase over the south-east coast. Combined with higher sea levels, the projected increase in intensity, and possibly frequency, of tropical cyclones will cause more intense and frequent

coastal flooding.<sup>4</sup> The actual speed and magnitude of these changes are uncertain, although it’s clear that change is occurring. (See Box 1)

The latest detailed assessment of the impacts of climate change in Australia notes that the climate system is changing faster than earlier thought likely with more costly and dangerous impacts.<sup>5</sup> More extreme weather events will result in the significant destruction of infrastructure and buildings. Australia’s average annual insured losses from natural disasters are now already around \$1 billion, mainly the result of floods, hailstorms and cyclones.<sup>6</sup> Climate change induced extreme events will pose growing risks to Australian lives and property.

Australia’s security community has, however, tended to view climate change within a traditional national security framework. As noted above, the focus has been on issues such as border security (climate refugees), nation state conflicts over diminishing food and water resources and possibly greenhouse gas reduction strategies damaging Australia’s economic security.

This understanding of climate security downplays the ways in which climate change induced extreme events pose a growing risk to Australian lives and property, with the result that these issues are viewed by security planners as primarily a matter for the states and territories.

If, however, our understanding of what constitutes a threat to *homeland security* was broadened to include the potentially devastating climate change impacts on Australian lives and property, our security agencies would have a stronger mandate to contribute to addressing climate change impacts.

### Box 1: Climate change and bushfires

Bushfires are one of the most deadly types of climate related extreme events for Australia. In the past decade south-east Australia has experienced two megafires: the 2003 event destroyed 500 homes in suburban Canberra and left three people dead and the February 2009 fires in Victoria killed 173 people.

Bushfires and their impacts are influenced by many factors, including the amount and condition of the fuel load (vegetation), the vulnerability of people and infrastructure, land-cover patterns, invasions of exotic species, extreme weather events, ignition sources and management practices, such as prescribed burning to reduce fuel loads.

Climate change affects most of these factors: changing precipitation patterns, higher temperatures and increasing atmospheric CO<sub>2</sub> concentrations all influence vegetation growth, driving both changes in productivity and biomass and shifts in ecosystem composition.

The warming and drying trend in south-east Australia has made the fuel load more susceptible to burning.

Extreme fire weather days, those with extreme temperatures and high winds, are becoming more likely under a warming climate. The overall effect, which is generally towards a higher risk of large and intense fires, is difficult to estimate precisely, and can perhaps best be assessed using analysis of historical observations along with models that simulate fire behaviour under various climatic regimes.

Despite the complex relationship between climate change and fire regimes, the weight of evidence is clear: the risk of larger and more intense fires increases with increasing temperature, especially in those areas of the world, such as southern and eastern Australia, that are also experiencing a drying trend.

Will Steffen, *Climate Change 2009: Faster Change and More Serious Risks*, Department of Climate Change, Commonwealth of Australia, July 2009, pp.28–30

This would facilitate, for example, organisations such as Defence to provide relevant processes, technologies and capabilities to those agencies involved in responding to the climate change threat, including capabilities for real time, wide-area situational awareness. Acknowledging climate change as a threat to the homeland will add urgency to the issue of climate change adaptation and pose questions for long-term defence force structure decisions in areas such as remote sensing, logistics and military engineering.<sup>7</sup>

***Recommendation 1: Climate change should be acknowledged by Australian security planners as a significant homeland security threat.***

### Implement national approaches

Australia has a well-articulated disaster management framework: an *all-hazards* and *all-agency* approach, coupled with a *prepared community*. (See Box 2) The increasing threat of climate change doesn't require this framework to change. Many areas of Australia's disaster management arrangements too often, however, reflect an assumption that these framework elements are largely aspirational goals. Given the extreme threats posed by climate change, however, incremental improvements aren't sufficient.

### Box 2: Australia's disaster management framework

- *All-hazards approach*: this requires consideration of non-hazard specific arrangements suitable for managing a large range of possible risks and emergencies, while establishing unique measures for specific hazards such as chemical spills where necessary.
- *Comprehensive approach*: this requires consideration to be given to strategies across the prevention, preparedness, response and recovery spectrum.
- *All-agency approach*: this specifies that all relevant agencies should be involved in disaster management, not just emergency responders, and that coordination of activities across agencies is required.
- *The prepared community*: this requires the community to be engaged in risk management and contribute to their own risk reduction.

The areas where significant improvements are required include managing disasters larger than planned for, improving community risk education and developing real-time, wide-area situational awareness. It will be critical to incorporate mechanisms into the insurance market to encourage owners to reduce their risk exposure, to implement effective community warning systems and standardise incident operational response across agencies to enhance response efficiency.

There have been many projects arising from past reviews that have been implemented or progressed as far as practical, while waiting for agreement to be reached by all jurisdictions before full implementation can occur. What's required now, however, is a concentrated focus to ensure that there's national approaches to strengthen inter-state coordination and interoperability: the Council of Australian Governments (COAG) should drive this body of work. (See Box 3)

### Box 3: Still waiting—national disaster risk reduction activities

- A national *telephone-based community disaster alert system* has been discussed at the national level since 2004. Following the 2009 Victorian Bushfires COAG agreed to develop a national telephone emergency warning system.
  - The *Australian Emergency Management Arrangements* will bring together emergency management arrangements across all jurisdictions. The document has been under development since 2006.
- It was approved in draft form by the Ministerial Council for Police and Emergency Management at their 26 March 2008 meeting. It's still not publicly available.
- The *National Catastrophic Disaster Plan*. In 2004 a review of Australia's ability to respond to and recover from catastrophic disasters was commissioned by the Australian Emergency Management Committee. The report was completed in 2005 and recommended the development of a National Catastrophic Disaster Plan. This Plan is under development and expected to be completed this year.

***Recommendation 2: COAG should accelerate national approaches to disaster prevention, preparation, response and recovery arrangements.***

## **Strengthen Emergency Management Australia's leadership**

In the context of more extreme climate-induced weather events, there's a strong case for the Commonwealth to take a greater leadership role in emergency management, in the same way it has done in recent years with counter-terrorism.

While emergency management is primarily a matter for the states and territories, the Australian Government's role in crisis coordination and disaster response, undertaken by Emergency Management Australia (EMA) is much more passive in the face of disasters than for example, the role played by the Federal Emergency Management Agency (FEMA) in the United States.

As well as investing significant resources toward supporting state mitigation programs and not being afraid to step on the toes of those states not following its directions, FEMA coordinates the US Government response and recovery effort to domestic disasters in support of states.

This coordination function is at the heart of the US federal government's contribution to meeting the needs of disaster-affected communities. FEMA is able to influence all areas of government to assist and support: it's not just an agency within the Department of Homeland Security. FEMA has a Congressional mandate under which it operates. And it's recognised and respected by both federal and state agencies for the vital role that it plays.

The need for the Australian Government to take on a greater leadership role in responding

to significant natural disasters was a key finding reached by Counsel Assisting the Victorian Bushfire Royal Commission in their interim submissions in June this year. They concluded that when it came to the worst peacetime disaster in Australia's history: 'In reality, EMA's role appears to be passive and limited to responding to requests for assistance.'<sup>8</sup>

Improving overall national capacity ought to be a key goal. Noting the above comments made by the Counsel Assisting the Victorian Bushfires Royal Commission, and comparing EMA's capacity to that of a very similar organisation (FEMA), EMA should be the primary vehicle through which the Australian Government takes on a national disaster response coordination (not command or control) leadership role. And it should be the organisation responsible for the development of national disaster response and recovery strategies.

In order to ensure that EMA can meet the needs of government in this space, the organisation needs more than simply the current case-by-case acceptance of its role by other federal and state agencies.

EMA requires a Cabinet mandate: a mandate to lead the Australian Government's response to a crisis, to give it the power to ensure that all federal agencies are properly monitoring, testing and exercising their emergency response plans (there currently exist over thirty such federal plans), as part of the Australian Government's broader crisis response obligation and to ensure that duplication of effort is minimised across the national government.<sup>9</sup>

At the jurisdictional level, EMA should be given a mandate to coordinate state and territory resources where the response requirements of the disaster-affected jurisdiction exceed its own capacity and support from other states and territories is required.

***Recommendation 3: A national effort is required to address natural disasters. Federal Cabinet should formally give EMA the mandate to coordinate the Commonwealth's response to a crisis. The Australian Government should consult with the jurisdictions to negotiate an agreement whereby EMA coordinates national resources, where the response requirements of the disaster-affected jurisdiction exceed its own capacity and support from other states and territories is required.***

## **Accelerate catastrophic disaster preparation**

Climate change has the potential to increase the likelihood of catastrophic disasters in Australia: disasters having devastating economic, social and environmental consequences which exceed the capability of state disaster management arrangements.

It has been assumed that catastrophic disasters could be managed using existing disaster management arrangements. As was seen in the case of Hurricane Katrina in New Orleans, however, where the disaster capabilities of the city and region were completely destroyed, such disasters have the potential to overwhelm any level of disaster response capability. Substantial response may not arrive for days or weeks after the event.

The assumptions that are needed to plan for catastrophic disasters are unpalatable: significant numbers of fatalities and casualties, large areas of destruction and perhaps even the operational loss of a state government's response capabilities. While the Commonwealth will provide coordination and financial support, it can only supply limited manpower, including elements of the Australian Defence Force: the vast majority of immediate on-the-ground response support will be provided by the jurisdictions.

The 2005 *Review of Australia's Ability to Respond to and Recover from Catastrophic Disasters* concluded that the challenges for catastrophic planning included communications interoperability, transportability of professional qualifications, the handling of international support, coordination of aid and the engagement of the private sector. The study found that 'significant limitations exist in national capability to deal with the consequence of a catastrophic event arising from natural, technological or human cause'.<sup>10</sup>

The implementation of the report's thirty-two recommendations hasn't occurred to any substantial degree.<sup>11</sup> The Australian Government, in conjunction with the states is, however, developing the National Catastrophic Disaster Plan, that's expected to be completed by the end of this year.

The threat posed by climate change impacts requires that a higher priority be given to not only developing the plan, but to resolving those issues that would constrain an effective response. Importantly, it requires the plan being exercised to identify any such problems and build experience in its implementation. The challenges here include determining realistic catastrophic scenarios, a lack of models which simulate the physical, societal and economic impacts, and predicting the response from other jurisdictions. This type of exercise work is outside the capabilities of most emergency management agencies. The Department of Defence and certain consulting firms have the necessary skills in scenario generation and war gaming to facilitate this kind of exercising.

***Recommendation 4: Australian governments should accelerate the development and exercising of the National Catastrophic Disaster Plan.***

## Enhance state disaster resilience

Governments recognise that it's in their economic and political interests to reduce the disaster risk facing Australians. They have policies which require disaster risk management considerations to be factored into decision making. Some have policies that have a penalty for those that don't address disaster risk. The *Natural Disaster Relief and Recovery Arrangements* (NDRRA), for example, don't apply if the disaster for which a state government seeks federal funding support is due to poor environmental planning and commercial development. There are, however, very few instances in which penalties have been applied. And that's despite evidence that planning and development decisions were made with inadequate consideration of disaster management issues.

The need to increase the priority for integrating disaster risk considerations into government decisions is becoming more urgent due to climate change. This can be done via a range of mechanisms such as a *Climate Change Impact Statement* being attached to Budget submissions: Queensland implemented such a policy last year to increase resilience to climate variability and avoid costly changes in the future.

There are further opportunities available to the Australian Government to embed disaster resilience into decisions. It could require that projects funded under the \$22 billion *Nation Building Infrastructure* package announced in the 2009–10 Commonwealth Budget be designed to be more resilient to the incremental effects of climate change (eg. materials degradation) and extreme weather events. Projects funded under the *Disaster Resilience Australia Package*,

outlined in the 2009–10 Commonwealth Budget, could be contingent on the recipients embedding climate change considerations into their projects.<sup>12</sup>

While such initiatives would be valuable, what's now required is a whole-of-nation approach to integrating climate change considerations into infrastructure and built environment decisions made by government. COAG provides a mechanism through *National Partnership Agreements* (NPA) to achieve this outcome.

In 2008, all Australian governments agreed to the *Intergovernmental Agreement on Federal Financial Relations*, the new overarching framework for the Commonwealth's financial relations with the states and territories. It's designed to improve the quality and effectiveness of government services by reducing Commonwealth prescriptions on service delivery by the states, providing them with increased flexibility in the way they deliver services to the Australian people. It included a major rationalisation of the number of payments to the states for Specific Purpose Payments, reducing the number of such payments from over ninety to five. COAG agreed to a new form of payment, *National Partnership payments* to fund specific projects and to facilitate and/or reward states that deliver on nationally significant reforms.

COAG should develop a *National Partnership Agreement on Disaster Resilience* with the states. A proposed content of the NPA is outlined in Box 4.

***Recommendation 5: COAG should develop a National Partnership Agreement on Disaster Resilience to implement comprehensive disaster management across all jurisdictions.***

### Box 4: Proposed National Partnership Agreement on Disaster Resilience

The Council of Australian Governments agreed the necessity to deliver more rapid and sustained improvements in disaster prevention, preparation, response and recovery practices outcomes for all Australians. This requires a long-term approach and Australian governments have agreed a comprehensive ten-year strategy to accelerate it.

The Commonwealth will provide \$200 million to support this NPA. Of this, \$150 million will reward the state's measurable improvement in disaster outcomes through this NPA. The states will match the facilitation funding, including by using existing or redirected funding.

A new National Partnership Agreement on Disaster Resilience will focus on:

- advancing national approaches to disaster prevention, preparation, response and recovery arrangements
- advancing catastrophic disaster planning and exercising
- embedding all-hazards disaster risk reduction into the work of all relevant agencies, with a focus on changing hazards due to climate change
- identifying changes in hazards due to climate change
- sharing information and building research capability in addressing disaster impacts of climate risk
- producing guidance on factoring in climate change in land use planning decisions
- providing direct assistance to local government to integrate climate change into land use planning.

### Freshen state disaster management mandates

At a jurisdictional level, a key reason for the slow implementation of improved prevention and preparation initiatives, such as integrating disaster risk management considerations into land use planning, relates to current bureaucratic arrangements for disaster management.

All jurisdictions in Australia have disaster management legislation. Generally speaking, the legal policy setting nominates a lead minister responsible for ensuring that all government agencies take appropriate measures to prevent, prepare for, respond to and assist recovery from emergencies and disasters. And it defines the bureaucratic arrangements by which these tasks are done.

While the response arrangements are normally highly effective, the prevention, preparation and recovery areas of disaster management need improvement. A key reason for excellence in response is that the nominated lead Minister is normally the emergency services and/or the police Minister with direct control over response assets. This means that the Minister focuses more on ensuring that emergency services response activities are effective and efficient. The Minister doesn't, however, have direct control of other agencies which are essential to delivering improvements in the other areas of disaster management. Recovery decisions, for example, are normally made by health, community and infrastructure agencies.

To drive improvements in these other areas and across agencies requires facilitating, educating, cajoling, arbitrating, coordinating,



and encouraging. This is challenging: other agencies don't always see disaster reduction or recovery as a core function. Addressing this challenge doesn't necessarily require changes to existing legislation; it does, however, require the intent of disaster management legislation to be applied with more rigour.

Another important contribution Ministers can make is to encourage climate-hardening of critical infrastructure. Reliable and robust critical infrastructure, such as electricity, water, and telecommunication services, is fundamental to the economy and quality of life. For our ageing and medically-dependent population, it can also be essential to their survival. There are many instances, for example, where power loss has been a major contributing factor in deaths, via heat stroke, loss of home-based oxygen supply, and fatal falls and house fires during blackouts.

Much of Australia's infrastructure is ageing and stressed. This is reflected in the grades given in the *Australian Infrastructure Report Card*, published by Engineers Australia in 2005. Only drinking water supplies and airports were rated B. Electricity, roads, rail, wastewater, stormwater and gas were all graded as C.<sup>13</sup>

In addition, infrastructure isn't often designed for weather extremes, resulting in failures. In the January 2009 south-east Australia heatwave, for example, Victoria experienced power blackouts because the electricity transmission submarine cable, the *Basslink Interconnector*, was deliberately shutdown. This occurred because the air temperature at the ends of each cable exceeded its design limits, meaning continued operation would risk physical damage.<sup>14</sup>

A changing climate, coupled with ageing and design-constrained infrastructure, will cause more infrastructure failures. Addressing this requires changes to economic, technical and land use regulations, designing

infrastructure to adapt to the new climate and making communities more resilient when infrastructure fails.

Climate change risks can be used as a powerful impetus to drive this broad agenda. The key actions which disaster Ministers and agencies should focus on are embedding disaster risk into the decision making of other agencies, identifying vulnerable communities and working with the relevant agencies to reduce these vulnerabilities. And it will remain important for counter disaster agencies to ensure prevention and preparation activities retain an all-hazards focus.

***Recommendation 6: The Commonwealth and the states should empower the Minister and agency responsible for disaster management to use climate change to embed disaster risk reduction into the work of other relevant government agencies and critical infrastructure owners and operators.***

## **Prepare for larger, more complex, more frequent and multiple disasters**

As a result of climate change, disasters are likely to become larger, more complex, occur simultaneously and in regions that have either not experienced the natural hazard previously or at the same intensity or frequency. For emergency services and disaster management organisations, this means increased demand for existing response services and the need to provide additional services. An increase in heat waves, for example, will result in more heat deaths and hospital transfers by ambulance. Increases in intense and frequent rainfall events may result in long-term flooding, requiring increased transport services. It will mean an increase in demand for mitigation and recovery activities, as was recently demonstrated in the Queensland floods.<sup>15</sup>

To respond to changes in demand as a result of climate change, disaster management organisations and emergency services need to undertake a comprehensive assessment of the impact of climate change on the risks they are responsible for.<sup>16</sup> They should determine how climate change affects the supply and continuity of their services: many emergency service buildings, for example, are located in communities which are exposed to river and coastal flooding. Serious floods have the potential to result in a loss of emergency services and command centres.

And they need to develop adaptation responses to predicted changes in demand and supply risks. The responses will vary depending on the specific location and threat change: developing a pool of casual paid staff, integrating volunteers into paid services and developing new capabilities. Supply hardening, in the sense of asset protection, might include relocating emergency service depots to higher ground, having remote caches of equipment and evacuating equipment before a disaster.

The potential increase in larger disasters as a result of climate change means that one of the core objectives of disaster management bodies should be to contribute efficiently and effectively to large scale, multi-agency disasters, including developing capabilities and processes to deliver niche services.

Emergency services organisations will need to increase their involvement in prevention and preparation activities, particularly all-hazard education activities, and intervention in planning and building decisions which don't give sufficient attention to disaster mitigation.<sup>17</sup> They should be resourced to undertake education of other agencies and professionals in disaster risk management: escorting engineers, architects and planners on tours of devastated areas to identify

mitigation actions which could reduce future disaster impacts may be a good place to start.

***Recommendation 7: As a result of climate change, disaster management organisations and emergency services should recognise there's an increased risk that disasters will become larger, more complex, occur simultaneously and in regions that haven't experienced the natural hazard previously or at the same frequency or intensity. Disaster management organisations and emergency services should identify changes in risks due to climate change and develop measures to adapt to these.***

## **Share information on climate change and homeland risks**

Emergency services and disaster management organisations are now recognising the importance of integrating climate change into their activities, albeit to different degrees. There are many initiatives underway to assist them to do so, such as the development of a climate change action plan commissioned by the *Ministerial Council for Police and Emergency Management* in November 2008 and a *National Adaptation Research Plan for Disaster Management and Emergency Services*.<sup>18</sup> (See Box 5)

There's sometimes a limited awareness, however, by broader stakeholders of this work. A reason that's often advanced to justify limited consultation is that exposure of such material will raise public anxiety. The 2005 government report, *Review of Australia's Ability to Respond to and Recover from Catastrophic Disasters*, for example, only became publicly available in May this year after the Victorian Bushfires Royal Commission requested it. Not surprisingly the community wasn't spooked by the report's disclosures: the only concerns raised were why the study hadn't been released earlier.<sup>19</sup>

### **Box 5: Priority research— emergency services and climate change**

The release of the *National Adaptation Research Plan for Disaster Management and Emergency Services* is imminent. This plan was developed under the Commonwealth funded *National Climate Change Adaptation Research Facility*.

The draft Plan identifies three overarching strands to the research agenda:

- understanding the nature and location of the risks posed by climate change
- enhancing community and organisational resilience to climate change risks
- developing and implementing adaptive strategies

The priority questions requiring answers to enable emergency services and disaster managers to integrate climate change considerations into their work consist of:

- Where and how are changes in climate going to put us at greatest risk?
- What tools are needed to enable decision making under future climate uncertainty?

- What does community resilience mean in a changing climate?
- What behaviours promote community preparedness and preventive strategies in a changing climate?
- What are the most effective strategies to ensure that individuals, governments and the private sector adopt better practice in preparing for the increased risk to communities, business operations or critical infrastructure arising from climate change?
- How will climate change affect the emergency services and disaster/emergency management sectors' capacity to support response and recovery?
- What is the role of the private sector in adaptation through emergency management?
- How will the climate change adaptive capacity of other countries, particularly those in the Pacific region, impact upon the Australian disaster management system and Australian fire and emergency services organisations?

***Recommendation 8: The Ministerial Council for Police and Emergency Management should produce a consolidated list of research initiatives related to climate change, emergency services and disaster management and release this to relevant stakeholder groups.***

### **Respond to land use challenges**

The number of victims in a natural disaster is directly related to the number exposed to the hazard and their degree of vulnerability. The key factor which determines the number of people and properties exposed to a hazard is their location. This depends on historical government decisions on land use or in some cases land tenure arrangements.<sup>20</sup>

Land use decisions result in encouragement, discouragement or prohibition of development in certain areas. Some areas are deemed to be too hazard-prone for development, such as exposed coastal floodplains. Development has been allowed in other hazard-prone areas on the condition that certain mitigation control measures are taken, such as building a structure's floor level well above the height of extreme floods.

Many hazard-prone areas should never have been approved for development. The original risk was underestimated or the risk has changed over time. Mitigation control measures were inadequate or not understood at the time. Climate change induced increases in extreme events are now increasing these risks or introducing them to new areas.<sup>21</sup> The scale of past land use decisions where development is exposed to natural hazards is huge and getting larger: approximately 711,000 addresses are within 3 km of the coast and less than 6 metres above sea level. Along the NSW coast alone, 380,000 new dwellings will be built over the next twenty-five years.<sup>22</sup>

Development in hazard-prone areas and inadequate development and building controls are major contributing factors to the growing exposure of Australians to the impacts of climate change. Problems have arisen due to the politicisation of the development and building controls process in response to vested interests, the pre-existence of land tenure and development rights and the change in risk profiles over time. This isn't a novel finding: the COAG reports, *Natural Disasters in Australia: Reforming mitigation, relief and recovery arrangements* (2002) and the *National Inquiry on Bushfire Mitigation and Management* (2004) noted land use planning as the single most important mitigation measure for limiting future disaster losses in areas of new development.

The need to incorporate natural hazards and vulnerabilities into land use decisions is thus well recognised. It's quite another thing, however, to achieve this in practice: land use planning requires balancing private sector interests, public policy requirements, equity, long-term economic development, environmental conservation, and community safety and wellbeing.

Decisions are made within a framework which varies between jurisdictions, but generally involves two levels of planning: statutory and strategic planning. Generally, state governments set policy direction: local governments incorporate and implement the policy into local plans, and then use them to assess development proposals. There's generally little support or detailed guidance for local government to help them in implementing the state government policy. Local government may lack planning staff and resources to make effective decisions on disaster risk management approaches and mitigation controls.

Most state governments require their local governments to factor in climate change impacts in planning decisions. Few have been provided detailed information on how to do so. An exception is NSW: its developed draft guidance which recommends that planning decisions consider a sea level rise of up to 0.91 metres and rainfall increases of up to 30% in peak rainfall and storm volume.<sup>23</sup> A reason for the limited focus on adaptation is that until recently, the focus of planning policy has been to mitigate against greenhouse gas emissions within the built environment. While this still remains an important objective, the shift is only now emerging around adaptation.

Without this information, expensive individual climate change hazard assessments for specific areas have to be produced, or simplistic assumptions have to be made, which opens the door to developer appeals.

Decisions need to consider equity and historic issues. If the risk of storm surge damage is deemed to be too high for a coastal area, a policy option, for example, is to not renew coastal caravan parks: many park residents are long-term, low income residents with little ability to relocate.

The pressure from existing land owners for the removal and downgrading of hazard assessments and resulting development controls shouldn't be underestimated. This pressure occurs because the identification that an area is hazard-prone decreases its value. There's considerable resistance by owners to the publication of even detailed hazard maps. Political pressure and legal appeals are commonly used to remove costly requirements for hazard mitigation controls.

The number of people potentially exposed to the hazards caused by climate change is increasing. There's migration of people from rural and regional areas to urban areas. This has resulted in increased density in inner urban areas and expanding urban fringes, some of them into areas that are already flood-prone. Sea-changers and tree-changers are moving to coastal and bushfire areas, with an increased risk of coastal inundation and bushfires. With the ageing of the population, there will also be increasing numbers of Australians who will be dependent on assistance to prepare, prevent, respond and recover from disasters.

Addressing the problems of land use planning requires practical guidance for state and local governments on factoring climate change into land use decisions in hazard-prone areas. Such guidance requires credible climate change scenarios scaled to provide location specific impacts as well as standards for developments in urban floodplains, bushfire-prone bushland urban interface, landslide-prone areas and coastal areas.

A key issue is when should development be allowed and under what conditions for what flood level frequency? Such decisions may increase the number of people living in safer areas. It's likely, however, that it will take several decades before large numbers of people move from their existing residences to new developments.

To aid governments in dealing with existing developments in areas becoming more hazard-prone due to climate change, a study is required to identify the costs and benefits to all tiers of governments to assist individuals and communities to protect or retreat from these areas. Both the *protect option*, such as building flood barriers and vegetation reduction, and the *retreat option*, such as moving from areas which are indefensible, either physically or economically, have huge social, political and economic impacts which must be addressed comprehensively.

Support for local government is required to translate new climate change land use guidance into reality. The key support required is high resolution digital hazard mapping upon which to base individual and regional planning decisions; expertise and technical assistance in implementing and interpreting planning policy and translating it into planning controls; and stronger powers to allow local government to enforce planning decisions.

In addition, the insurance premium for places in risk-prone areas should accurately reflect the risk, and property owners ought to be required to have this insurance. If the true price of the risk isn't reflected in the premium, other insurance holders will be subsidising them. If people don't carry this insurance, all taxpayers will bear the cost of any subsequent government bailout of affected property owners.

If significant climate change impacts aren't factored into existing land use planning

decisions, and the problems with the existing systems aren't addressed, the damage prevention and recovery costs facing all governments will rise exponentially. The costs will be borne by future generations.

While the above discussion has focused primarily on land use planning for individual developments, climate change also requires modifying cities' existing land use strategies. Given changes in rainfall and the expansion of suburbs onto high quality arable land, water and food security are threatened. This is resulting in a reduction of capacity of these cities to adapt to climate change, as there is little ability to absorb shocks such as extended droughts. Another driver for changing city land use is to reduce greenhouse gas emissions which are significantly increased by low density housing, large distances between work and home, large intercity freight movements and a lack of public transport.

To drive these long-term, multi-stakeholder and extremely complex reforms, a new body, the *Australian Land Use Planning Taskforce*, should be established. It should be given a mandate to develop, facilitate and fund a national approach to driving climate change adaptation considerations into land use strategies and decisions. Its immediate activities should consist of:

- producing guidance for state and local government on factoring in climate change in land use planning decisions
- undertaking a study into the costs and benefits for governments of assisting individuals and communities to protect or retreat from areas becoming more hazard prone due to climate change
- providing direct assistance to local government to integrate climate change into planning
- resourcing geo-spatial information that helps map natural hazards for different local government areas to better inform land use planning decisions.

***Recommendation 9: The Commonwealth, in conjunction with states, local government, emergency services, the Australian Building Codes Board and the planning and development industry, should develop, facilitate and fund a national approach to driving climate change adaptation considerations into land use strategies and decisions. To achieve these objectives an Australian Land Use Planning Taskforce should be established.***

## **Construct resilient buildings**

The ability of buildings in Australia to resist the impact of extreme events, such as bushfires and hailstorms, is directly related to the standards to which they are built. An example of this is the Australian Standard on wind: the wind code defines the wind forces that a building needs to resist based on its location. If cyclones become more intense, resulting in higher wind speeds, or move further south, then applying existing wind codes will result in buildings being under-designed, putting the occupants in peril and increasing damage costs.

The nation's key building guideline is the Building Code of Australia (BCA). The BCA is a set of technical provisions for the design and construction of buildings throughout Australia. It includes provisions which reflect the local climate, geological and geographic conditions. The BCA is given legal effect by building regulatory legislation in each jurisdiction. The BCA is managed by the *Australian Building Codes Board*, a joint initiative of all levels of government and the building industry.

The central requirement of the BCA is to protect building occupants from injury and

death. Provisions are designed to ensure that a building has sufficient structural resilience to not collapse or fail due to an extreme event for at least the length of time that it takes for the occupants to evacuate. However, the BCA doesn't require the prevention of the operational loss of buildings and their contents due to an extreme event.<sup>24</sup> And to do so in some circumstances may be impractical: the types of design necessary to render the building safe in all circumstances will not only be cost prohibitive, but result in buildings that are difficult to inhabit. This is where the decision as to whether or not a building should be situated in some locations becomes critical, noting existing building stock and the development rights that may exist already under certain land tenure arrangements.

Notwithstanding the recent large loss of life in buildings during the Victorian bushfires, the BCA has enhanced the safety of structures. However, the lack of attention to designing buildings which are more durable and resilient has resulted in ever-increasing damages bills due to extreme events. From 2006 to 2009 insured assets incurred approximately \$4.2 billion in damage from extreme weather events alone. The cost of damage is increasing in direct proportion to the frequency of extreme weather and the growth in value and geographic footprint of the built environment. Several insurers have flagged significant increases to premiums expected in 2009 as a result of extreme weather events and losses. Government disaster recovery expenditures have increased in a similar manner.<sup>25</sup> The costs of damage to the built environment is heavily borne by individual and commercial property owners.

There are many ways to increase the durability and resilience of buildings,<sup>26</sup> but one argument against the BCA requiring that buildings be more resilient is that it will add additional cost to their construction. The *Insurance Council of Australia* estimates

that the requirement will add less than 2.5% to the initial cost, but pay for itself over the life of the building through lower damage and maintenance costs.<sup>27</sup> From a national perspective, such an investment would be beneficial to property owners through lower life-cycle costs and lower insurance premiums. It will reduce significantly the cost of recovery assistance for governments.<sup>28</sup>

However, the key reason for the inability of the BCA to address resilience relates to its mandate. The BCA is a Code that, under the terms of the Inter-Government Agreement (IGA) upon which it was established, aims to represent minimum standards. Its regulatory impact statement processes must satisfy the Office of Best Practice Regulation in this respect. Noting concerns raised by the insurance industry over resilience of building structures to extreme weather, a planned 2010 review of the IGA was brought forward to 2008 by COAG. The results of this review have not been made public. Buildings today continue to be produced that will not resist hazards predicted to be manifest over coming decades by the Intergovernmental Panel on Climate Change and CSIRO. This resistance to including property durability (as European and US building codes do) constrains Australia from addressing the most fundamental of resilience issues—the durability and operational integrity of the homes we live in and the buildings we work and play in. Leaving these considerations 'to the market' is no longer acceptable.

Climate change needs to be incorporated into the BCA more broadly, so that the Code reflects likely events in the future that the building will be expected to resist during its life. This is recognised by the Australian Building Codes Board, although it presents real challenges: the level of confidence in climate change predictions is insufficient to satisfy the rigour of the regulatory impact statement processes.

To ensure developments in land use planning and the BCA are complementary, members of the proposed *Land Use Planning Taskforce* should be represented on the Australian Building Codes Board. Consideration should be given to including a representative from the emergency services sector on the Board, so as to ensure emergency and disaster issues are integral to the BCA development.

Reforming the BCA will improve future buildings but do nothing for the existing building stock: the BCA only applies to new construction. Of Australia's housing stock, approximately 80% doesn't meet the BCA standards introduced since the 1980s. The performance of these buildings under extreme events is very variable: generally these houses have a greater propensity for disintegration than new buildings. While incremental, cost-effective improvements in building durability can be made to existing buildings, such as by increased fastening of roof elements to the structure, in general, significant improvements can only be made when the stock is completely replaced. This situation makes reforming the BCA more urgent: we need to ensure that any building constructed from now on is more durable.

***Recommendation 10: The Australian Building Codes Board should strengthen the Building Code of Australia to increase building durability and resilience.***

## **Engage Australia's volunteer network through new technologies**

An earlier ASPI report highlighted the fact that for various reasons, ranging from the threats we face to the limits of our emergency services, we need to increasingly call on the national network of emergency volunteers to deal with community emergencies.<sup>29</sup>

To enhance the central importance of volunteers both governments and emergency service organisations need to recognise the communication possibilities of Web 2.0: social networking sites like Twitter can be used as response tools to provide real-time reports to our emergency services.<sup>30</sup>

And it's important for agencies to be flexible using social media, so they can provide high-quality information to citizens efficiently. In the United States, FEMA was the first federal agency to negotiate an agreement with the video-sharing web site YouTube, and the agency has negotiated similar agreements with social networking companies Facebook and MySpace. FEMA creates podcasts for listeners to download and listen to on their iPods or phones and have their own Twitter feeds. If Twitter users in a certain geographic area report that tornadoes are approaching, for example, FEMA might send out suggestions on how to keep safe. This lets the agency communicate useful information, without committing resources before a disaster is verified by more reliable sources.

It's encouraging to note in this context, that the Victorian Government recently announced that to improve the quality and timeliness of future bushfire warnings it will examine mechanisms such as Facebook and Twitter to alert the community to official sources of information, as part of the broader mix of fire warnings.<sup>31</sup>

The internet has already proved invaluable for pandemic planning: a lot of ailing Americans enter phrases like 'flu symptoms' into Google and other search engines before they call their doctors. This has given rise to a new early warning system for fast-spreading flu outbreaks that may be able to detect regional outbreaks of the flu a week to ten days before they are reported by medical centres specialising in disease control and prevention.<sup>32</sup>



Facebook is increasingly being used in overseas emergencies; volunteers post up-to-the-minute news on the particular disaster. Some also provide advice for donations. Social networking sites can be valuable in sharing disaster preparation information for volunteers in bushfires or floods.

**Recommendation 11: Governments should review the availability and appropriateness of new and emerging social networking technologies to respond to disasters better.**

## Concluding remarks

In disaster management circles, it's well recognised that a dollar spent in mitigation saves two to ten dollars in avoided or reduced disaster response and recovery costs.

Adapting to climate change by increasing resilience will provide a similar return. If we delay action, however, we significantly increase the risk and cost of disasters caused by climate change related extreme weather events.

Climate change impacts are happening now in our own backyard. Australians' vulnerability to natural disasters is increasing. We should invest today for a safer tomorrow by making sure we have a resilient infrastructure to cope and deal with the consequences. This will ultimately make Australians safer from all hazards.

## Endnotes

- 1 Will Steffen, *Climate Change 2009: Faster Change and More Serious Risks*, Department of Climate Change, Commonwealth of Australia, July 2009.
- 2 This report is focused on the homeland security impacts of climate change and disaster resilience, not on the international security impacts of climate change and Australia's relations with its economic or political partners or how climate change may shape the use of Australian military, police or emergency response assets offshore. Aspects of these issues have been discussed in two previous ASPI reports. See Anthony Bergin and Ross Allen, *The thin green line: Climate change and Australian policing*, ASPI Special Report, October 2008. [http://www.aspi.org.au/publications/publication\\_details.aspx?ContentID=185](http://www.aspi.org.au/publications/publication_details.aspx?ContentID=185); Anthony Bergin and Jacob Townsend, *A change in climate for the Australian Defence Force*, ASPI Special Report, July 2007. [http://www.aspi.org.au/publications/publication\\_details.aspx?ContentID=133](http://www.aspi.org.au/publications/publication_details.aspx?ContentID=133)
- 3 This link has also been made in a recent study of Australia's aid program, *Investing in a Safer Future: a Disaster Risk Reduction policy for the Australian aid program*, AusAid, Canberra, June 2009. <http://www.usaid.gov.au/publications/pdf/disasterriskreduction.pdf>.
- 4 *Climate Change in Australia: Technical Report*, CSIRO 2007. Many aspects of the climate are changing near the upper boundary of the range of projections of the Intergovernmental Panel on Climate Change. See Synthesis Report from *Climate Change: Global Risks, Challenges & Decisions*, University of Copenhagen, 2009. <http://climatecongress.ku.dk/pdf/synthesisreport/>.
- 5 Will Steffen, *Climate Change 2009: Faster Change and More Serious Risks*, Department of Climate Change, Commonwealth of Australia, July 2009.
- 6 Ryan Crompton and John McAneney, 'The cost of natural disasters in Australia: the case for disaster risk reduction', *Australian Journal of Emergency Management*, Vol. 23 No. 4, November 2008.

- 7 See Anthony Bergin, 'Defending the homefront is a top priority', *The Age* 21 February 2009; Anthony Bergin, 'Defence needs to recognise climate of risk', *ABC Online Opinion*, <http://www.abc.net.au/news/stories/2009/06/12/2596161.htm>. Counsel Assisting the Victorian Bushfire Royal Commission, in their interim recommendations to the Royal Commission on 24 June 2009, noted the capacity of the Commonwealth, including through the Department of Defence and the Defence Imagery and Geospatial Organisation, to deploy assets to assist the states in the detection, tracking and suppression of bushfires was unclear. <http://www.royalcommission.vic.gov.au/Public-Hearings/SUBM-100-001-0001>, p.45.
- 8 Interim Report, Submissions of Counsel Assisting 2009 Victorian Bushfires Royal Commission, Letters Patent issued 16 February 2009. <http://www.royalcommission.vic.gov.au/Public-Hearings/SUBM-100-001-0001>, p.44.
- 9 The Department of Foreign Affairs and Trade (DFAT) undertake the lead role in overseas disaster assistance, but a Cabinet mandate on EMA's domestic role would also strengthen EMA's capacity to support DFAT in overseas disaster emergencies. The evidence is clear that disaster risk is increasing globally. See the key findings from an international analysis of disaster trends in *Global Assessment Report on Disaster Risk Reduction*, United Nations International Strategy for Disaster Reduction Secretariat, 2009.
- 10 *Review of Australia's Ability to Respond to and Recover from Catastrophic Disasters*, Catastrophic Disasters Emergency Management Capability Working Group, 2005, p.3.
- 11 One important area where more work is required is integrating business into Australian disaster planning. See *All in a day's work: Business and Australian disaster management*, ASPI Special Task Force Report, December 2008.
- 12 The Disaster Resilience Australia Package integrates the following existing emergency management grant programs: the Bushfire Mitigation Program, Natural Disaster Mitigation Program and the National Emergency Volunteer Support Fund.
- 13 The Australian Infrastructure Report Cards are available from [www.infrastructurereportcard.org.au](http://www.infrastructurereportcard.org.au).
- 14 Will Steffen, *Climate Change 2009: Faster Change and More Serious Risks*, Department of Climate Change, Commonwealth of Australia, p. 26. The upper temperature limits for normal cable operation are 43°C in Victoria and 33°C in Tasmania. Air temperatures in Tasmania reached a record high of 35°C.
- 15 Significant flooding occurred across North Queensland between January and April 2009. Over 500 tonnes of supplies and 211,000 litres of fuel were transported by charter aircraft or barge to isolated communities.
- 16 The value of climate information in reducing disaster risks was stressed in the *World Disasters Report 2009* by the International Federation of Red Cross and Red Crescent Societies, June 2009.
- 17 In February 2007, *Emergency Management Australia* commissioned the development of a school education internet-based learning resource called *Dingo Creek*, a fictitious Australian town. The aim is to engage students in the process of identifying risks from natural disasters to their immediate community and

- interrogating the emergency risk management process to mitigate the impacts of natural disaster on the Australian environment. <http://schools.ema.edu.au/>.
- 18 Developed under the Commonwealth-funded National Climate Change Adaptation Research Facility.
  - 19 See Anthony Bergin and David Templeman, 'Secrecy won't help us prepare for disaster', *ABC Online Opinion*, <http://www.abc.net.au/news/stories/2009/06/29/2610948.htm>. The Australian Government and the states opposed a journalist's freedom of information request for this 2005 report. One argument advanced was that disclosure would or could reasonably be expected to cause damage to relations between the Commonwealth and states or would divulge information on a matter communicated in confidence by the state or territory governments.
  - 20 Development in hazardous areas has occurred for a myriad of reasons, including historical development which pre-dates modern land use planning processes. In many areas, unplanned development has occurred due to people converting holiday shacks into permanent residences. In other places, development occurred with the full knowledge of its danger and regular evacuations and non-permanent development occurred.
  - 21 Climate change will affect all areas in Australia to some degree, with the greatest increase being felt in those which are currently hazard prone.
  - 22 Department of Climate Change submission to the House of Representatives Standing Committee on Climate Change, Water, Environment and the Arts Inquiry into Climate Change and Environmental Impacts on Coastal Communities, 12 June 2008.
  - 23 *Practical Consideration of Climate Change, Floodplain Risk Management Guideline*, Department of Environment and Climate Change, NSW, 2007.
  - 24 The BCA requires structures not to collapse following extreme events. The BCA is silent, however, on the need for roofs to withstand the damaging impacts of hail and the need to prevent severe damage to the building envelope such as facias and windows from windstorms.
  - 25 The Queensland Government has estimated, for example, that they will spend \$485 million of NDRRA eligible expenditure on the January–February 2009 floods, of which the Commonwealth will reimburse the state between 50–75%. For the Victorian bushfires, a \$270 million advance payment has been made under NDRRA by the Commonwealth as of 13 July 2009. In addition, \$64 million of Australian Government recovery payments has been made by Centrelink. These figures don't reflect the significant additional support provided by a range of Commonwealth agencies nor the final bill under the NDRRA arrangements.
  - 26 Such as using impact-resistant roofing materials; not putting electrical switchboards and generators in the basements of commercial buildings where flooding is possible; using high level fire-resistant materials and furnishing; installing storm shutters for all exterior windows and doors; and flood proofing buildings by installing footings so that flood barriers can be quickly dropped into place.
  - 27 Insurance Council of Australia, submission to the Review of Inter-Governmental Agreement for the Australian Building Codes Board, 30 November 2008, p.4.

- 28 Improvements in structures is being examined as part of governments' consideration of a national construction code.
- 29 David Templeman and Anthony Bergin, *Taking a punch; Building a more resilient Australia*, ASPI Strategic Insights, May 2008. [http://www.aspi.org.au/publications/publication\\_details.aspx?ContentID=165](http://www.aspi.org.au/publications/publication_details.aspx?ContentID=165)
- 30 In terms of man-made disasters, the news of the terrorist attacks in Jakarta in July 2009 broke first on Twitter, with tweets spreading the news before media outlets.
- 31 'Key changes to improve summer bushfire safety', *Media Release*, Victorian Premier John Brumby, 3 July 2009.
- 32 Miguel Helft, 'Google Uses Searches to Track Flu's Spread', *New York Times*, 11 November 2008.

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## About the Authors

**Mr Athol Yates** is Executive Director, Australian Homeland Security Research Centre. He is the author of *Climate Change Adaptation and Emergency Services Handbook (2009)* and *Handbook of Climate Change Adaptation for the Built Environment*, forthcoming next year from British publisher Wiley-Blackwell. He is the principal project consultant for Engineers Australia's *Infrastructure Report Cards* that will audit the state of Australia's economic infrastructure and be published in 2010.

**Dr Anthony Bergin** is the Director of Research Programs at ASPI. He has published widely on homeland security issues, including previous ASPI reports examining the impacts of climate change on the ADF and Australia's law enforcement community. He recently served on the ASPI Blue Ribbon Task Force that examined the role of Australian business in disaster management. He is the joint author of *Taking a punch: Building a more resilient Australia*, ASPI Strategic Insights, May 2008.

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### ASPI

Tel +61 2 6270 5100  
 Fax + 61 2 6273 9566  
 Email [enquiries@aspi.org.au](mailto:enquiries@aspi.org.au)  
 Web [www.aspi.org.au](http://www.aspi.org.au)

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