

# Is insurance an under-utilised mechanism in climate change adaptation? The case of bushfire management in Tasmania

By Dr Kate Booth and Dr Stewart Williams, University of Tasmania.

## ABSTRACT

**This article presents a summary of findings and recommendations from an Australian research project funded by the National Climate Change Adaptation Research Facility (NCCARF).<sup>1</sup> This case study examined the role of insurance as a mechanism for climate change adaptation. It is based on interviews about bushfire management in Tasmania.**

**Interviews were conducted with staff in state, regional and local government agencies and with representatives of the housing construction, property development and insurance sectors. The results are discussed in the context of international examples and practice, and with regard to the three key themes of insurance affordability and availability; current and potential roles for insurance; and constraints and opportunities in governance. We conclude that insurance is critical to disaster recovery but its role in preparedness remains poorly understood, under-developed and under-utilised.** <sup>R</sup>

13 per cent of all property losses were not insured (Teague *et al.*, 2010). It has also been estimated that between 27 per cent and 81 per cent of effected households were under-insured with regard to the 2003 Canberra bushfires (ASIC, 2005).

It is widely acknowledged that consumers struggle to engage with low-probability, high-loss events. Kunreuther and Pauly (2004), and Michel-Kerjan *et al.* (2011) postulate a range of factors that contribute to the lack of purchase or renewal of household insurance policies. These include non-engagement, disinterest or lack of understanding of the probability data, and an attitude of 'it will not happen to me'.

Lack of interest or knowledge about insurance is not only evident in consumer practice. In disaster management and climate change adaptation literature insurance is most commonly portrayed as a measure to assist in recovery rather than preparedness, if it gets addressed at all. As shown in the VBRC (Teague *et al.*, 2009, 2010), the *National Disaster Insurance Review* (Australian Government Treasury, 2011) and the *Queensland Floods Commission Report* (QFCI, 2012), insurance is understood primarily as a backup measure that is pursued after risk mitigation has perhaps been undertaken. Most often it is expected to be in place and available to enact after a natural disaster.

In Australia, building control and land-use planning mechanisms are key components of climate change adaptation and disaster management (Dovers, 2009; Handmer and Dovers, 2007). Building and planning issues have therefore dominated the recommendations made in recent reports from major post-bushfire inquiries (Ellis *et al.*, 2004; Esplin *et al.*, 2003; Teague *et al.*, 2009, 2010). However, these reports also point to the important role that insurance may play in bushfire management, including the need to address issues of non-insurance, under-insurance and the timeliness of payouts (Teague *et al.*, 2009). Yet in Australia, the role of insurance as a mechanism in natural hazard mitigation has rarely extended beyond such basic concerns.

The NCCARF project engaged the perspectives and knowledge of key stakeholders to identify the role

## Introduction

There is an apparent mismatch between public expectations and 'insurance reality', a mismatch that has been observed by, and reflected in the recommendations from both the *Natural Disaster Insurance Review* (Australian Government Treasury, 2011) and the *Queensland Floods Commission Report* (QFCI, 2012). Significant problems with non-insurance and under-insurance in Australia have also been noted. For example, the 2009 Victorian Bushfires Royal Commission (VBRC) stated that it was difficult to identify the levels of non-insurance and under-insurance associated with the Black Saturday bushfires, but cited evidence suggesting that about

1. This work was carried out with financial support from the Australian Government (Department of Climate Change and Energy Efficiency) and the National Climate Change Adaptation Research Facility. The views expressed herein are not necessarily the views of the Commonwealth or NCCARF, and neither the Commonwealth nor NCCARF accept responsibility for information or advice contained herein.

of insurance in bushfire management based on a Tasmanian case study. These issues are discussed in the context of an emerging national and burgeoning international literature on the role of insurance in disaster mitigation and climate change adaptation, and the project made a number of findings and recommendations (King *et al.*, 2012).<sup>2</sup> Three themes emerged as most relevant to the current and potential role of insurance as an adaptive mechanism, namely:

- insurance affordability and availability
- current and potential roles of the insurance sector, and
- constraints and opportunities in governance.

## Methods

The value of generic and all-hazard approaches to disaster management are well noted. Recent research places value on considering specific and localised disaster 'hotspots' and 'case studies' (Arnold *et al.*, 2005, 2006; Christianson *et al.*, 2011; Thomas *et al.*, 2011). Such work emphasises the benefits of paying attention to detail in disaster management, and in accounting for the environmental, social and economic variations that influence the occurrence of disasters and response and recovery. Focusing on a particular case – as with regard to the role of insurance in bushfire mitigation in Tasmania – provides an example with rich contextual detail, while allowing more generalised observations to be extended elsewhere (Wall, 2006).

In looking at opinions and practices around building and property insurance for bushfire risk management in Tasmania, 19 open-ended, semi-structured interviews were conducted of 1 to 1½ hours duration with 16 participants. These participants were identified and recruited as key stakeholders working in the public and private sectors, including:

- the Tasmanian state agencies of Premier and Cabinet, emergency management, fire services and housing
- regional council associations and individual councils, and
- private firms and employer groups in the areas of housing construction, property development and insurance.

Most of the interviews were conducted in participants' workplaces and audio-recorded. Two telephone interviews were also conducted.

Interviews were guided by questions about stakeholder practices relating to hazard mitigation, especially bushfire risks, and the actual and perceived roles of insurance in climate change adaptation. Interview transcripts were subjected to thematic analysis, and emerging key themes were interpreted in relation to the latest disaster inquiries in Australia as well as an international literature review. Extracts from

these interviews and findings from the Australian and international literature were used to inform, explain, substantiate and support the findings and associated recommendations made by the project (King *et al.*, 2012).

## Findings

### Declining insurance affordability and availability

Purchasing and maintaining an insurance policy is not always a priority or even an option for all people. The factors contributing to this are complex. For example, research undertaken after bushfires in the East Gippsland region of Victoria found that most residents had home and contents insurance, but a significant number were un-insured or under-insured, particularly with regard to assets such as farm fences, livestock and outbuildings (Whittaker *et al.*, 2012). The prioritisation of long-term and ongoing drought mitigation over planning for low probability events such as bushfires was a reason for this non-insurance and under-insurance. Other reasons included the limited financial resources associated with drought and other pressures resulting from changes in the nature of farming and rural communities.

It is broadly acknowledged that similar and associated pressures are likely to increase in light of climate change (Garnaut, 2008; 2011). With the exacerbation of associated risk it is likely that premiums will increase significantly in the future (Kunruether *et al.*, 2011). Reductions in the availability of insurance coverage and its complete withdrawal from some areas are also to be expected.

In the interviews, expectations of insurance coverage becoming more costly and less readily available were reinforced in comments made by insurance sector representatives. Several participants remarked on the positive effects of having insurance that accurately reflected new risks. Despite an expectation that higher risks and increased insurance costs would be reflected in lower land and property prices, the market was deemed by many to be an effective means to price and allocate risk. However a housing industry representative noted that higher premiums didn't necessarily equate to people avoiding high risk areas:

“If they [insurers] get some clarity around where those high risks are they'll increase their premiums accordingly and that may or may not influence people, but at the end of the day often those more remote and high-risk areas are probably, you know, cheaper and so I'm not sure how much impact

2. This interim report is published by the *Australian Journal of Emergency Management* and has not been peer-reviewed by the (NCCARF). NCCARF will arrange for peer-review and publication of the project final report and make it available at [www.nccarf.edu.au](http://www.nccarf.edu.au).

that will necessarily have unless the premiums are prohibitively expensive, or uninsurable, and people can then start to question whether or not they want to build in that area... Having said that, ... the appetite for risk is quite large on behalf of insurers.”

(Housing industry representative).

One insurance industry agent made positive reference to the US practise of property buy-back under the compulsory National Flood Insurance Program (NFIP). Some of the research participants considered that there could be problems in Australia with similar initiatives. For example governments may not be financially willing or able to engage in buy-back or retreat programs. It was acknowledged that rates of non-insurance and under-insurance would likely rise with a reduction in insurance availability and affordability. It is important to note that participants were unaware of existing schemes currently operating in Australia (Department of Justice, 2012).

The issue of affordability is addressed in part by the VBRC recommendation that the existing fire services levy be replaced by a property-based levy. A substantial reduction in insurance costs is predicted under this proposed change. The cost of insurance would drop by 24 per cent for a rural residence and 17 per cent for an urban residence (Teague *et al.*, 2010).

Taking a wide-ranging approach with a focus on climate change, Kunreuther *et al.* (2011) conducted what they describe as a “first attempt to systematically measure the implications of future climate scenarios for the pricing of catastrophe risk insurance, using the case of hurricane risk in the state of Florida, under various conditions of adaptation and reinsurance availability” (2011). They concluded that without adaptation and a worst case climate change scenario, the price of insurance would increase to the extent that it would not be affordable for many Florida residents. They recommended that reinsurance and loss reduction measures (such as the enforcement of existing building codes and retrofitting existing properties) would maintain insurance availability and affordability under such a scenario. These observations place the focus on risk mitigation measures rather than on the regulation or manipulation of risk pricing and premiums as a means of managing losses.

However, the regulation or manipulation of risk pricing and premiums may still be relevant particularly in regard to low income earners. As a housing industry representative commented:

“The homes that are probably most at risk are probably at the cheaper end of the market where these people [of lower socio-economic

status] are going to be buying in and they’re going to be the ones that the insurance companies are going to slug.”

Australian research highlights that people in social housing are hardest hit by natural disasters such as cyclones, floods and bushfires (Jacobs and Williams, 2009; Williams *et al.*, 2009; Williams and Jacobs, 2011). This is supported by research in the UK (Pitt, 2008; Priest *et al.*, 2005), the USA (Tierney, 2008), and in developing nations (Bosher, 2011; Warner *et al.*, 2010). It is broadly acknowledged that supporting low income earners in the purchase of insurance reduces demand on government post-disaster and reduces the possibility of disadvantage becoming further entrenched following a disaster.

### Current and potential roles of the insurance sector

Most participants, ranging from state housing officers to senior staff of local councils considered that the provision of planning schemes and building regulations pre-empts any significant role for insurance in risk mitigation and climate change adaptation. Representatives of the housing construction and property development sectors were likewise adamant that the combination of a more streamlined planning process and enforcement of building regulations meant insurance would continue to have a minor subsequent role (primarily for the purposes of household loss recovery).

A belief was also expressed that there is an emphasis on the purchase of insurance largely only to protect against losses resulting from an event and not to prevent it happening. According to some participants, the purchase of insurance can contribute to the reduced participation of individuals and communities in risk mitigation activities. For example, one Tasmanian Fire Services officer observed:

“People buy insurance rather than solutions... so insurance becomes a way of participating in mitigation without actually doing much... natural hazards are somebody else’s job.”

The participant also mentioned how new treatments aimed at improving the built environment’s capacity to resist fire had been driven in a large part by insurer-funded research.

Cost-effective adaptation and mitigation measures have been shown to play a significant role in reducing losses due to catastrophe (Kunreuther *et al.* 2011). However, the insurance sector appears reluctant to encourage the adoption of such measures (Kunreuther and Michel-Kerjan, 2009). Participants in this project commented that there was little interest or capacity for insurers to devote attention to localised matters.

For example, officers with local government noted the lack of any meaningful engagement with their insurers:

“As far as pro-active stuff about the insurers coming to us and saying, ‘well you know, what are you going to do about mitigating your fire risk?’, before we get into a relationship with them as they’re providing insurance – no, that doesn’t happen”

(Risk manager, local government).

Likewise, a representative of Tasmania’s housing construction industry commented that the insurance sector is driven by global players and interests, and that a few major reinsurers located elsewhere set the terms and conditions, and premiums for insurance. There was a sense of insurance failing to deliver any adaptation through either soft behavioural or hard structural changes due to the impossibility of pursuing enforcement.

Jaffee *et al.* (2010) and Kunreuther and Michel-Kerjan (2009) suggest that long-term insurance policies – policies attached to specific properties that would be renewed every five, ten or 20 years – could be linked to home improvement loans for risk reduction measures and could act to reduce premiums. As a result, householders would have better coverage, and damage and loss may also be reduced significantly. This would benefit insurers, householders and state governments.

It is important to note that representatives of the housing construction and property development sectors, in particular, emphasised the suitability and effectiveness of the market as a mechanism for managing risk. With regard to regulation (in some cases, a stated sense of over-regulation), participants reiterated how any decision to purchase insurance is a matter of personal choice for individuals, householders and businesses.

There was some evidence of emerging insurer engagement in regard to climate change adaptation. For example, one climate change adaptation project manager reported that while insurers may not be proactive in relation to giving incentives for climate change adaptation and associated risk mitigation, some insurers are accounting for climate change adaptation measures in audits of local government risk, and doing so in ways that influence premium pricing.

“As far as I am aware, all councils in our region use [a named insurance company] for their public liability and professional indemnity insurance. [This company] conducts biannual audits on its members

which include organisational risk management... The impression I get from our councils is that climate change is a relatively new area of risk that is examined in the [insurance company] audits and those that have been audited over the course of the [Regional Climate Change Adaptation Project] have been pleasantly surprised since they have, as a result of the project, scored well for climate change”

(Climate change adaptation project manager, local government).

### Constraints and opportunities in governance

Climate change adaptation is broadly acknowledged as requiring a whole-of-community approach (Garnaut, 2011). As one participant stated:

“Something like bushfire management requires everyone to participate. You need all members of the community in a vulnerable area to be doing their bit; otherwise the whole thing falls over” (Climate change adaptation project manager, local government).

However, the role of insurance is usually framed around the individual and his or her sense of responsibility and choice:

“There is always going to be that community expectation; I want to go and live by the beach or I want to go and live in the hills and the one thing that is going to drive those decision-making processes is going to be ‘can I get insurance for that?’ Because that is the biggest signal to a person that there is a risk here and then that might change their behaviour around whether or not they can accommodate that risk”

(Climate change adaptation project manager, local government).

The mixed messages here have implications for the provision of leadership, and what governance arrangements might be adopted in relation to the role of insurance in climate change adaptation.

Examples of community-based insurance initiatives include the NFIP in the United States. This program

started as a voluntary partnership between government and communities in which local governments implemented flood management regulations. Property owners in participating communities became eligible for federal flood insurance (Michel-Kerjan and Kousky, 2010). Such initiatives reflect a broader shift from management that pivots on “*government* (the practice of politics, policy and administration within the state-form) to *governance* (the co-production of many agents and agencies)” (Clarke, 2007, p. 838). This includes a shift towards partnerships between government, industry and the community.

Mixed messages from different levels of government were also reported by participants and appeared to reflect a lack of leadership. For example, a state housing officer reported:

“The insurance part of it can come in and work if you’ve got a regime of control that’s set up that allows and supports it, but if you don’t, I don’t think that you can direct it [adaptation] from the perspective of insurance... on its own. To put a fire trail through that same area of land required a planning application to go the council to put in a fire trail. Even though the Tasmanian Fire Service was saying clearly that it’s a fire-prone area and it’s a risk, you weren’t in a position as an owner to be able to go in and put a fire trail in without getting permission from the council to do that because it necessitated cutting down some vegetation. If you were to link insurance requirements in to something like that where you’ve got this odd situation where regulatory bodies are not consistent... I don’t think it would work.”

McLennan and Handmer (2012) observe a broad shift in disaster-related policy away from government responsibility for risk management and towards the individualisation and privatisation of risk. In this project, a senior bureaucrat discussed the principles embedded in draft policy on the role of state government in relation to risk. These principles clearly demonstrate the shift towards placing emphasis on the roles and responsibilities of the individual:

1. Private risks associated with natural hazards are the responsibility of individuals and businesses.
2. Government should encourage public and private risks to be factored into investment decisions.

3. Government, because of the position it is in, can support individuals and others to understand and manage their private risks through education, the provision of evidence and frameworks to facilitate collective action where individuals can’t reasonably act upon their own.
4. Government should ensure that private investment minimises unacceptable public risk.
5. Government as a responsible corporate citizen should avoid investment regulation and policies that give rise to public and private risk (Senior emergency management officer, State Government).

The VBRC takes risk management in the near opposite direction. As McLennan and Handmer (2012) state:

“the Royal Commission called for a shift towards greater government leadership and responsibility in Australian bushfire risk management. Underpinning this call was the view that government agencies have far greater capacity to identify bushfire risk and to manage important aspects of that risk under extreme and variable conditions.”

The dynamics between government and the insurance industry in Australia shows a shift in governance arrangements which appears aligned with those provided by the VBRC. Relations between government and insurers have become openly strained (ABC, 2012) following eight official natural disasters in 2011 that included cyclones, floods and bushfires resulting in \$5 billion losses and approximately 275,000 claims. There has been a move by government to consider more stringent regulation for the insurance industry, particularly in light of public frustration regarding the number of unpaid and unresolved insurance claims.

Informed by the long history of uncertainty and debate over flood insurance in Australia (Smith and Handmer, 1989) the *National Disaster Insurance Review* made recommendations stating, amongst other things:

- Recommendation 1: That all home building insurance policies include flood cover.
- Recommendation 13: That all insurers offering small business insurance be obliged to include flood cover on an opt-out basis, instead of an opt-in/opt-out basis as at present, in all of their small business package policies.
- Recommendation 32: That all home building insurance policies providing sum insured cover be modified by the end of 2014 so as to include replacement value cover in the event of total loss of the home (Australian Government Treasury, 2011).

The Queensland Floods Commission also made recommendations directly targeting the operations of the insurance industry, including that:

- Insurers should review their existing system and processes and implement any improvements necessary to ensure that accurate and complete records of conversations with policy-holders are made.
- The Insurance Council of Australia should amend clause 3.4.3 of the *General Insurance Code of Practice* so that it requires insurers to inform policy-holders of their right to request a review of an insurer's decision to refuse to provide access to information on which it relied in assessing claims (QFCI, 2012).

Historically intervention and regulation of the insurance industry in Australia regarding natural disasters has been less rigorous than in the USA. In some cases, insurers have been restricted by legislation from cancelling policies as a means of ensuring that coverage continued. In Australia, much of the public/private interaction has focused on dialogue between sectors regarding building standards, planning codes, government assistance in times of disaster, and taxation reform (Wilkins, 2010). Given recent events and emerging trends this focus on dialogue may not remain the status quo.

Research participants representing the housing construction and property development sectors stressed a sense of over-regulation. Suggestions that insurance might be a useful addition to the usual approaches of land-use planning and building control in risk management were rejected by representatives from this sector.

There are a number of overseas initiatives that involve collaboration between government and the insurance sector in relation to disasters (Figure 1). These initiatives tend to focus on the role of insurance in recovery rather than preparedness, but they do illustrate that a variety of regulatory and non-regulatory opportunities exist, and that there is room for significant innovation in this area.

## Discussion

The NCCARF project findings show that the practicalities of using insurance in bushfire management are currently limited, and yet there are opportunities and signs of initiative. Further research and the subsequent implementation of research findings are required if insurance is to contribute meaningfully to climate change adaptation and risk mitigation.

**Figure 1.** Examples of the role of government in insurance and risk management.

In developing regions and nations a range of innovative insurance partnerships between the public and private sectors are being explored and implemented (Warner *et al.*, 2009; Warner *et al.*, 2010). For example, the Caribbean Catastrophe Risk Insurance Facility (CCRIF) brought together Caribbean nations in partnership with the World Bank to create a not-for-profit insurance vehicle (Warner *et al.*, 2010). A Board of Directors that includes representatives from participating nations and technical experts oversees governance and strategic decisions. The operational and risk management functions are carried out by a private risk company. This includes modelling, calculation of loss, and policy sales and premium collections. Reinsurance and Alternative Risk Transfer is placed in international markets via a Placement Broker.

Key features of the CCRIF include:

- To trigger an insurance payout, CCRIF uses a catastrophe model to estimate the loss for any actual events, with the same model, calibrated against real historical events and losses, used to evaluate the risk and price the insurance contract.
- By pooling the risks of its members the CCRIF serves as a risk aggregator and can provide insurance coverage at a comparatively low premium.
- CCRIF member countries can decide on the level of coverage for each peril insured (Warner *et al.*, 2010, p.20).

In the United States, Kunreuther *et al.* (2011) describe the intersection of public and private insurance in Florida in the aftermath of the 2004 and 2005 hurricane seasons which included Hurricane Katrina. In the aftermath insurers filed for an increase in insurance rates. Only a portion was approved by the state insurance regulator. This added to existing public/private tensions where the focus is on insurance affordability and the latter on the market and insurer sustainability. In response, large insurers reduced the amount of coverage they provided in high hurricane risk regions. At the same time, Citizens Property Insurance Corporation (CPIC) – a state-run insurance company – was permitted to charge lower, subsidised rates than its private competitors and consequently became the largest homeowner insurer in Florida. In addition, it is legislated that any deficit faced by the CPIC in the aftermath of a major hurricane can be recouped from its private competitors in Florida. The private insurers then have to levy this amount against their own policy holders.

Kunreuther *et al.* (2011) sound a note of caution regarding the sustainability of such an approach, as they argue that CPIC's premium pool is invariably not going to meet catastrophic losses. Thus, this private/public insurance hybrid has significant ramifications for the broader insurance sector.

In summary:

- Availability and affordability. Further research could explore the likely changes in the availability and affordability of insurance in light of climate change with respect to natural disasters in an Australian context, and notably with reference to low income earners and vulnerable communities.
- Roles for insurance. Insurance could be better deployed in risk mitigation, including preparedness as well as recovery, with greater consideration of the factors that influence consumer participation and insurer incentives in climate change adaptation. This could include a comprehensive review of its current and potential roles.
- Governance constraints and opportunities. Governance structures related to climate change adaptation and natural hazard risk mitigation are reviewed with a focus on the provision of greater leadership. This includes further exploration of both non-regulatory and regulatory approaches regarding the role of insurance in adaptation.

In addition, input from participants suggests that more work is required on the following:

- Data sets and risk mapping. It is important to have accurate, consistent data and risk maps readily available to the public. This information is a central determinant in the role of insurance in climate change adaptation.
- Disaster-specific research. The vast majority of research to date, particularly in the USA and UK, has focused on the role of insurance in relation to flooding. Little is known about the current and possibly enhanced roles of insurance in relation to managing bushfires and other hazards at a regional level in Australia particularly in relation to climate change.
- Liability uncertainty. Uncertainty exists in relation to how liability issues will play out with regard to climate change. A review of liability laws and associated issues in light of climate change is required.
- Stakeholder uncertainty. There is evidence that key stakeholders have differing, and at times, uncertain understandings of the nature and role of insurance in climate change adaptation and risk mitigation. Education about this and associated issues, as well as policy reform would be beneficial.

## Conclusion

It is clear that insurance is currently playing a substantial role in disaster recovery even if it is still problematic in terms of poor uptake, availability and coverage. However, its role in preparedness remains poorly understood, under-developed and under-utilised. It is apparent that insurance could play a far more significant role in this regard.

There are a number of issues that require consideration in order to progress insurance as a climate change adaptation as well as risk mitigation mechanism. These issues are insurance availability and affordability,

current and potential roles of the insurance sector, and constraints and opportunities with regard to governance. A recurring theme is the need for further research. Interagency, intergovernment and public/private sector collaboration is required to fully comprehend the usefulness and versatility of insurance as a mechanism for climate change adaptation and risk mitigation.

Climate change poses major concerns for those involved in natural hazards, disaster and emergency risk management. It is predicted that events such as Victoria's 2009 Black Saturday bushfires and the 2010-11 Queensland floods will increase in both frequency and intensity. Insurance, if developed and used in conjunction with other mechanisms, promises pro-active and meaningful outcomes. However, significant progression in understanding and innovation is required.

## References

- ABC.** 2012. *Radio National: AM with Tony Eastley 23/2/12*, Australian Broadcasting Corporation, <http://www.abc.net.au/radionational/programs/breakfast/2012-02-23/3846628>
- Arnold, M., Chen, R.S., Deichmann, U., Dilley, M., Lerner-Lam, A.L., Pullen, R.E., Trohanis, Z.** 2005. *Natural Disaster Hotspots. Disaster risk management series 6. World Bank, Washington DC, USA.*
- Arnold, M., Chen, R.S., Deichmann, U., Dilley, M., Lerner-Lam, A.L., Pullen, R.E., Trohanis, Z.** 2006. *Natural Disaster Hotspots: Case Studies. Disaster risk management series 6. World Bank, Washington DC, USA.*
- ASIC.** 2005. *Getting Home Insurance Right: A Report on Home Building Underinsurance. Australian Securities and Investment Commission, Gippsland, Victoria.*
- Bosher, L.** 2011. *Household and governmental perceptions of risk: Implications for the appropriateness of housing provision in South India. Housing Studies, 26(2), 241-257.*
- Christianson, A., McGee, T. and Jardine, C.** 2011. *Canadian wildfire communication strategies. Australian Journal of Emergence Management, 26(3): 40-51.*
- Clarke, J.** 2007. *Introduction: governing the social. Cultural Studies, 21(6): 837-846.*
- Department of Justice.** 2012. *Bushfire Buy-back Scheme, State of Victoria, www.justice.vic.gov.au/buyback*
- Dovers, S.** 2009. *Normalising adaptation. Global Environmental Change, 19, 4-6.*
- Ellis, S., Kanowski, P., Whelan, R.** 2004. *National Inquiry on Bushfire Mitigation and Management. Commonwealth of Australia, Canberra.*
- Esplin, B., Gill, A. and Enright, N.** 2003. *Report of the Inquiry into the 2002-2003 Victorian Bushfires. State Government of Victoria, Melbourne.*
- Garnaut, R.** 2008. *The Garnaut Climate Change Review: Final Report. Cambridge University Press, Cambridge and Melbourne.*
- Garnaut, R.** 2011. *The Garnaut Review 2011: Australia in the Global Response to Climate Change. Cambridge University Press, Cambridge and Melbourne.*

**Handmer, J.W. and Dovers, S.** 2007. *The Handbook of Disaster and Emergency Policies and Institutions*. Earthscan, London, UK.

**Jacobs, K. and Williams, S.** 2009. *Natural Disaster Preparation and Response: Issues for State Housing Authorities, AHURI Final Report 131*. Australian Housing and Urban Research Institution, Melbourne.

**Jaffee, D., Kunreuther, H. and Michel-Kerjan, E.** 2010. Long-term property insurance. *Journal of Insurance Regulation*, 28(2), 167-187.

**King, D., Ginger, J., Williams, S., Cottrell, A., Gurtner, Y., Leitch, C., Henderson, D., Jayasinghe, N., Kim, P., Booth, K., Ewin, C., Innes, K., Jacobs, K., Jago-Bassingthwaite, M. and Jackson, L.** 2012. *Planning, Building and Insuring: Adaptation of Built Environment to Climate Change Induced Increased Intensity of Natural Hazards*. National Climate Change Adaptation Research Facility, Griffith University, Brisbane, in press.

**Kunreuther, H. and Michel-Kerjan, E.** 2009. *Managing Catastrophes through Insurance: Challenges and Opportunities for Reducing Future Risks*. Working paper #2009-11-30, Risk Management and Decision Processes Center. The Wharton School, University of Pennsylvania, Philadelphia, USA.

**Kunreuther, H., Michel-Kerjan, E. and Ranger, N.** 2011. *Insuring Climate Catastrophes in Florida: An Analysis of Insurance Pricing and Capacity under various Scenarios of Climate Change and Adaptation Measures*. Working Paper #60, Centre for Climate Change Economics and Policy. The Wharton School, University of Pennsylvania, Pennsylvania, USA.

**Kunreuther, H. and Pauly, M.** 2004. Neglecting disaster: Why don't people insure against large losses. *The Journal of Risk and Uncertainty*, 28(1), 5-21.

**McLennan, B. and Handmer, J.** 2012. Reframing responsibility-sharing for bushfire risk management in Australia after Black Saturday. *Environmental Hazards*. 11(1), 1-15.

**Michel-Kerjan, E. and Kousky, C.** 2010. Come rain or shine: Evidence on flood insurance purchases in Florida. *The Journal of Risk and Insurance*, 77(2), 369-397.

**Michel-Kerjan, E., Lemoyne de Forges, S. and Kunreuther, H.** 2011. Policy tenure under the US National Flood Insurance Program (NFIP), Risk Analysis, <http://onlinelibrary.wiley.com/doi/10.1111/j.1539-6924.2011.01671.x/full>

**Pitt, M.** 2008. *Learning Lessons from the 2007 Floods*. HM Government, London, UK.

**Priest, S.J., Clark, M.J. and Treby, E.J.** 2005. Flood insurance: the challenge of the uninsured. *Area* 37(3): 295-302.

**QFCI.** 2012. *Queensland Floods Commission Report: Final Report*. Queensland Floods Commission of Inquiry, Brisbane.

**Smith, D.I. and Handmer, J.W.** 1989. *Flood Insurance and Relief in Australia*. Proceedings Centre for Resource and Environmental Studies Workshop, Australian National University, Canberra.

**Teague, B., McLeod, R. and Pascoe, S.** 2009. *Victorian Bushfire Royal Commission: Interim Report*. Parliament of Victoria, Melbourne.

**Teague, B., McLeod, R. and Pascoe, S.** 2010. *Victorian Bushfire Royal Commission: Final Report*. Parliament of Victoria, Melbourne.

**The Australian Government Treasury.** 2011. *National Disaster Insurance Review: Inquiry into Flood Insurance and Related Matters*. Commonwealth of Australia, ACT.

**Thomas, M., King, D., Keogh, D.U., Apan, A. and Mushtaq, S.** 2011. Resilience to climate change impacts: A review of flood mitigation policy in Queensland, Australia. *Australian Journal of Emergency Management*, 26(1): 8-17.

**Tierney, K.** 2008. Hurricane Katrina: catastrophic impacts and alarming lessons. In: Quigley, J.M. and Rosenthal L.A. (Eds) *Risking House and Home: Disasters, Cities, Public Policy*, Berkeley Public Policy Press, Berkeley CA, USA: 119-136.

**Wall, M.** 2006. The case study method and management learning: making the most of a strong story telling tradition in emergency services management education, *Australian Journal of Emergency Management*, 21(2): 11-16.

**Warner, K., Zissener, M., Kreft, S., Höpfe, P., Bals, C., Linnerooth-Bayer, J., Haas, A., Gurenko, E., Loster, T. and Burton, I.** 2010. *Solutions for Vulnerable Countries and People: Designing and Implementing Disaster Risk Reduction and Insurance for Adaptation*. United Nations University, Institute for Environment and Human Society, Bonn, Germany.

**Warner, K., Ranger, N., Surminski, S., Arnold, M., Linnerooth-Bayer, J., Michel-Kerjan, E., Kovacs, P. and Herweijer, C.** 2009. *Adaptation to Climate Change: Linking Disaster Risk Reduction and Insurance*. United Nations International Strategy for Disaster Reduction Secretariat, Geneva, Switzerland.

**Whittaker, J., Handmer, J. and Mercer, D.** 2012. Vulnerability to bushfires in rural Australia: A case study from East Gippsland. *Journal of Rural Studies*, 28(2), 161-173.

**Wilkins, M.** 2010. The need for a multi-level approach to climate change – an Australian insurance perspective. *The Geneva Papers on Risk and Insurance*, 35(2), 336-348.

**Williams, S., Jacobs, K., Newman, P. and Blakeley, E.J.** 2009. *Disaster Preparation and Response: A Guide for State Housing Authorities*. AHURI Positioning Paper No. 113. Australian Housing and Urban Research Institution, Melbourne.

**Williams, S. and Jacobs, K.** 2011. Introduction: Disaster, housing, actuarialism and the securitization of risk. *Housing Studies*, 26(2), 185-195.

## About the authors

**Dr Kate Booth** is an interdisciplinary researcher and lecturer with an interest in the environment and qualitative research, University of Tasmania.

**Dr Stewart Williams** is a human geographer with an interest in how we think about natural hazards, University of Tasmania.