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THE SOCIAL LIFE OF SCIENCE IN BUSHFIRE POLICY AND PLANNING: TALES FROM VICTORIA AND THE NORTHERN TERRITORY

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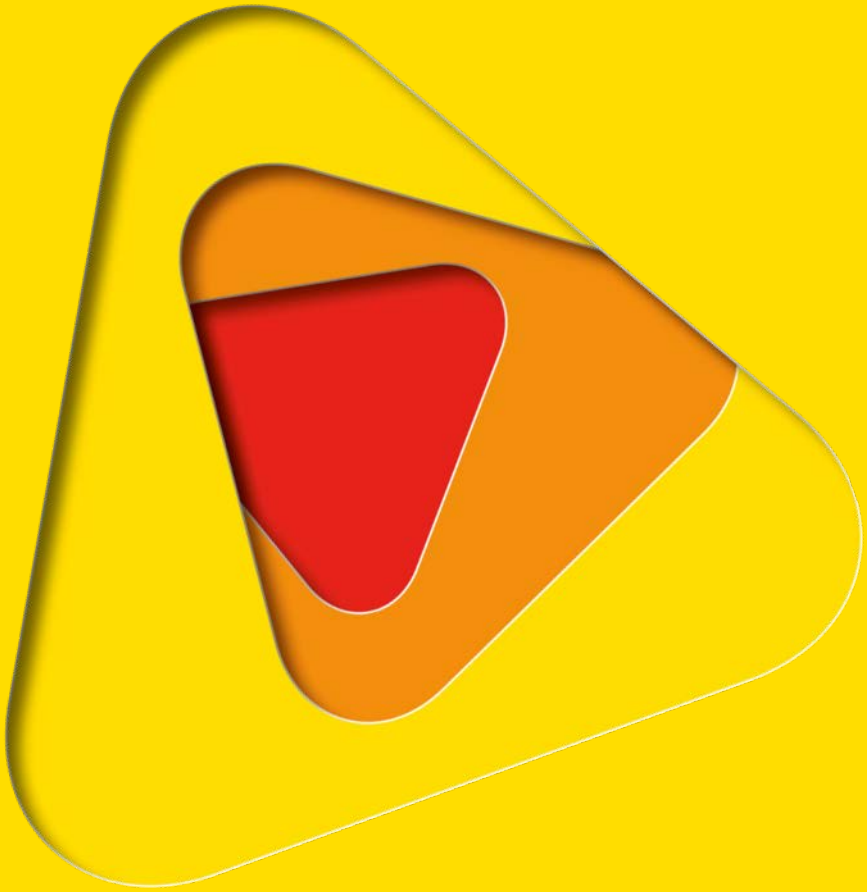

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ABSTRACT

Quite rightly, practitioners in the natural hazards sector hold science in high regard. Scientific research has provided significant insights into our predictions of, and preparation for, events whose behaviours and occurrence are both high consequence and highly uncertain. As such, it is unsurprising that government agencies often emphasise their commitment to having 'science-led' or 'evidence-based' policies. But the routes between science, policy and planning are complex and variable. That is, while we may often hear (or say) that there is a straightforward relationship between scientific research, natural hazards policy and management practice this is based more in aspiration than reality. Experience suggests that having more scientific research does not always lead to less scientific uncertainty, just as having more scientific research or less scientific uncertainty does not always lead to more political action.

To briefly note three reasons for this lack of linearity, let us first begin with science itself. Scientific research is necessarily an open-ended process in which uncertainties can often be reduced but cannot be resolved; all going according to plan it follows a parabolic curve towards a certainty it cannot reach. The consequence of this is that there are often abundant reasons to delay decisions about how to proceed, just as there are abundant opportunities for scientists, politicians, policymakers or others to deliberate on the meaning of remaining uncertainties (Sarewitz, 2004). Secondly, as researchers from diverse fields have shown, the interface between scientific research and government policy is pervasively shaped by contemporary politics. Funders, researchers, policymakers, administrators and practitioners are not immune to the influence, whether directly or indirectly, of the priorities and affordances of the systems they find themselves in. Thirdly, and perhaps most importantly, there are many obstacles to integrating scientific research within government agencies. These include resource constraints and institutional cultures that influence how, and if, new research is utilised.

In short, scientific research has a 'social life'. We mean this in the sense that it emerges from and circulates within social settings with their own intricate dynamics, including research institutions, government agencies, field sites, parliaments, newsrooms, and so on. As political scientist Brian Head argues (2008; 2014), policy decisions typically stem from politics, judgment and debate, rather than just powerful research results. This suggests that while any successful implementation requires systematic research (or 'science'), program management experience (or 'practice'), and political judgment, there is also no universal recipe for success. Diverse capacities and institutions are necessary and their cumulative and individual effectiveness is more often something determined by their interactions than by a checklist of criteria (Hunt and Shackley, 1999). The 'success' of scientific findings, policies and hazard management agencies are interdependent, meaning one cannot be successful without the others.

In this paper, we do not seek to provide advice about how the interface between natural hazard science, policy and practice could or should be managed. Instead we approach this interface from, in a sense, the 'other side'. Rather than adopt more standard approaches to these issues, such as the analysis of policy documents, our research focuses instead upon practitioners' perceptions and experiences. In Australia, as elsewhere, there has been little social science research of such expert communities. However, we believe they provide crucial insight into the undercurrents of policy and practice. Attention solely to policy documents or

scientific innovations, we suggest, would lead us to elide or miss other significant factors driving sectors' successes and failures in addressing issues such as natural hazard risk. Through empirical case studies of risk mitigation we address how scientific research has been influential in shaping policy and practice. Drawing upon interviews and workshops with practitioners, we explore three different but related lines of inquiry. First, what are the influences shaping how scientific research has been integrated into these contexts? Second, how do practitioners encounter and manage uncertainties? Third, what does 'science' mean in these contexts?

To this end, the researchers have pursued two empirical case studies in the north and south of Australia. In each we begin by interviewing practitioners in the area to gain an understanding from them of how science and other forms of knowledge inform their work and what they feel are the key issues and uncertainties that they face. We then hold a workshop to discuss these factors using scenario exercises where practitioners are given different scenarios, or predictions, of what the area they work in might be like in 20 years' time (see Wodak and Neale, 2015). Understandably, people who work in the natural hazards sector are often focused upon the immediate context: What is going to happen this season? What is happening in the community this year? A scenario exercise is a sound method for both moving discussions outside established parameters and to gain critical perspective on those parameters (James et al., 2015). For this research project the focus has fallen on longer trends, how should we best prepare for these futures, and how science can and should inform these preparations. To date we have held workshops for two case studies, one in the Barwon-Otway area of south-west Victoria and one in the Greater Darwin area of the Northern Territory.

These case studies were chosen on the basis of expert advice about sites in which scientific knowledge was changing how risk is calculated and managed. For example, for the last several years the Barwon-Otway area has been the site of a pilot, led by the Department of Environment, Land, Water and Planning, to test an alternative strategy to how to mitigate bushfire risk. To simplify significantly, the risk-based strategy involves, first, the generation of loss estimates from suites of bushfires simulated within PHOENIX RapidFire (a two-dimensional bushfire simulator) and, second, the comparison of asset losses between those suites (Ackland et al., 2014). This might involve, for example, simulating fires under worst case (i.e. Black Saturday conditions) weather conditions, in which a) no planned or unplanned fires have occurred for several decades, b) all public land has been prescribed burned, as well as c) some accidental fires and some prescribed burning have occurred. Given the model's ability to predict house losses from the intensity of each fire, the three suites can therefore be compared to reveal the benefit of fire in the landscape and the residual risk that remains. A more complex arrangement, also trialled, might compare multiple asset losses across multiple suites, each comprising thousands of simulations using random ignition and weather scenarios.

The Northern Territory is quite a different context to 'down south,' as Territorians often point out, though it also presents interesting parallels in natural hazard management. As part of the tropical savannah, the Greater Darwin area has an annual bushfire season in which approximately 40 per cent of the total area is typically burnt. Every year, as the wet season subsides, practitioners work to 'burn off' with the aim of reducing fuel loads during the late dry season; this abundance of fire is widely accepted as part of Territory life and its environment. However, there are several trends at work in the Greater Darwin area that are now changing the bushfire risk and its mitigation. One primary driver in this situation is Gamba grass, a pasture

species introduced in the 1970s and 1980s that grows tall, thick and flammable if not grazed intensively (Setterfield et al., 2013). Gamba is very invasive and has, over the past decade, turned parts of the Greater Darwin area to monoculture, creating high fuel loads that, in the right conditions, produce up to eight times more heat that native grassfires. Another driver of change is the increased level of subdivision and housing development surrounding Darwin, as areas such as Palmerston and Litchfield take up some of the city's population pressure. Bushfires, previously understood as a minor risk in the Northern Territory, are beginning to claim houses and other assets in the areas infested with gamba. Our qualitative research with practitioners has given us a new understanding of how crucial science and practitioners have been to understanding this risk and responding to it through policy and planning.

In the full version of this paper, we will report on key findings from these two case studies and establish several links between them. While practitioners often stress the importance of pairing scientific tools and research, they also place significant emphasis on the importance of professional experience, local knowledge, and interpersonal trust in applying them. One aspect of this is that, in order to be utilised in practice or incorporated into policy, new knowledge must often overcome a variety of institutional obstacles (however minor). Another is that while we may often narrate hazard management as led by scientific progress, practitioners are keenly aware of the extent to which much of the real world does not fit tidily within algorithms. The many uncertainties practitioners still face are often managed through discretion, intuition and experience, exposing them to forms of liability and responsibility they in turn assess in terms of 'risk'. Additionally, whether or not scientific knowledge ameliorates existing uncertainties of risk mitigation, there is clear evidence that it routinely creates new uncertainties that may or may not be amenable to technical solutions. For example, once agencies have a new level of information about where risk lies in the landscape, or the benefit and potential of mitigation, what is the ethical requirement for passing that information on to the wider public? What is the best strategy technically? What is the best strategy politically? While, as Eburn and Handmer argue (2012: 19), there 'is no legal impediment to releasing reasonably accurate hazard information,' there are clear disincentives to freely releasing information that is highly complex and has the potential to be reused in negative ways.

What is clear is that scientific research, whether in a laboratory or a landscape, is never simply technical. Nor is there a single stable entity we might call 'science'; it is instead, as van Kerkhoff and Lebel state (2006), a 'permeable, changeable, and contestable' thing. As such, the ways in which decision-makers and practitioners integrate and utilise science is a thoroughly social question, shaped by the capacities and affordances of the contexts in which they operate. While it is important to continue to place a high value on scientific research in the natural hazards sector, it is also important to remember that this research is embedded in social dynamics and social networks – a 'social life' which we are, at present, only beginning to understand.

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