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HOW RISK INFORMS NATURAL HAZARD MANAGEMENT: A STUDY OF THE INTERFACE BETWEEN RISK MODELLING AND LOCAL GOVERNMENT POLICIES AND PROCEDURES

Non-peer reviewed research proceedings from the Bushfire and Natural Hazards CRC & AFAC conference
Sydney, 4 – 6 September 2017

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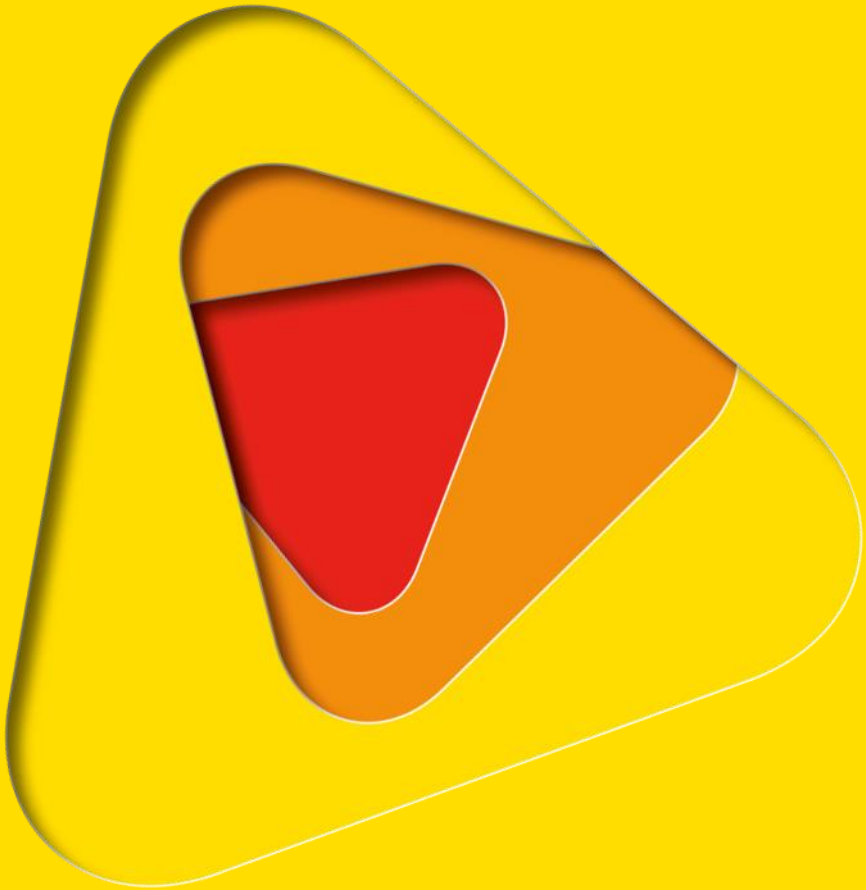

Version	Release history	Date
1.0	Initial release of document	04/09/2017

Publisher:
Bushfire and Natural Hazards CRC

September 2017

Citation: Crawford, M. (2017). How risk informs natural hazard management: a study of the interface between risk modelling and local government policies and procedures. In M. Rumsewicz (Ed.), *Research Forum 2017: proceedings from the Research Forum at the Bushfire and Natural Hazards CRC & AFAC Conference*. Melbourne: Bushfire and Natural Hazards CRC.

EXTENDED ABSTRACT

This extended abstract explores the use of risk modelling as a tool to support local government in New Zealand to better develop policy and procedure for natural hazard management.

New Zealand is an island nation in which events such as earthquake, volcanic activity, tsunami, flooding, storm, and landslide occur with sufficient intensity that substantial damage and loss of life results (King & Bell, 2006). Given the severity of natural hazard risks, it is an increasingly important focus for national and local governance to ensure natural hazards are understood and managed effectively. However, local government understanding and management of natural hazard risk is fraught with challenges, including uncertainty over how they should be managed (LGNZ, 2014; Saunders et al., 2015), scarce data on natural hazards (Tonkin & Taylor, 2016; MWH, 2016), and limited appreciation of natural hazard risks (LGNZ, 2014; Tonkin & Taylor, 2016).

Underlying these challenges is the disconnect of 'science to policy', and the subjective nature of risk perception. While scientists, policy writers and practitioners agree on the importance and value of science informed policy and practice, bridging the science to practice gap is not a simple task. It depends on a mutual spirit of partnership and interest between the scientific and practice communities (Vogel, 2007). Kilvington & Saunders (2016) reflect on this in their recent review of how natural hazards science is incorporated in local government decision making in New Zealand, recognising that "despite genuine and ongoing efforts to improve the relationships between science information users and producers, research agencies still struggle in many ways to fully transition their communication practice towards new ideals" (Kilvington & Saunders, 2016. p4.). Secondly, risk is a social construction. It is an intangible concept that only exists through being individually qualified within a social context (Dake, 1992; Renn, et al., 1992; Van Nuffelen, 2004). As such, risk perception is subjective, involving a person's feelings, beliefs, attitudes and judgements about the harm and loss associated with the consequences of an event. Risk perception is framed by culture, society, experience, and feelings (Doyle et al., 2014), is built on local values and norms, and is depend on disciplinary frameworks (WSS Fellows on RIA, 2014). Therefore, the way one person perceives a risk can be significantly different to the way another person perceives that same risk, which then influences their motivation to engage in natural hazard risk management actions (Donahue, et al., 2014; McIvor, et al., 2009; Paton, et al., 2013).

Given this background, the need for improved risk communication between science, policy and practice has been increasingly recognised (WSS Fellows on RIA, 2014; Kuhlicke & Demeritt, 2014). However, much of the research has focussed on the tenets and mental models of risk communication (Bostrom, et al., 2008; Fischhoff, et al., 1993; Khan and Kelman, 2012; Lindenfeld, et al., 2014), and while there has been a call for the use of tangible heuristics and models to support decisions for effective risk management (The World Bank, 2014; WSS Fellows on RIA 2014), little is known about how effective risk models are for the communication of natural hazard risk from science to policy and vice versa (Komendantova et al., 2014).

Given the time restraints for practitioners, an engagement method was adopted that rapidly provided an inclusive space for discussion, avoided engagement fatigue and remained focussed. In light if this, the research team used focus group discussions. A focus group is a qualitative research method enabling a group of

people to discuss their perceptions, opinions, beliefs, and attitudes towards something in an interactive group setting where participants are free to talk with other group members. This method was used because it enables open and creative discussion and produces data and insights that would be less accessible without the interaction found in the group (Flick, 2006).

Five regional councils were engaged, using focus group methods, to explore the use of risk modelling as a tool to support local government natural hazard risk management. Each council approached has varied attributes relating to the size of the region for which it has responsibility, management structure, and the regional hazard landscapes. Focus group sessions were held with:

- Wellington
- Hawke's Bay
- Canterbury
- Nelson/ Tasman
- Bay of Plenty

Focus group sessions had six to fifteen participants attending from natural hazard risk management roles across the council. Data was captured through notes taken during the focus group sessions and through dictaphone recordings. The data were then analysed using thematic analysis, a common form of analysis in qualitative research. Themes were identified using an inductive, 'bottom up' approach, where the themes identified emerge from the data itself (Patton, 2015). Resultant themes were coded according to themes inspired by the objectives of the research in addition to unexpected themes that were identified during the analysis. Two qualitative analysis software packages were used for this - NVivo and QDA Miner 4 Lite.

Following the thematic analysis, the individually identified codes were reviewed and regrouped into mutually agreed themes. This approach is based on content analysis, a process of organising information into categories related to the central questions of the research (Bowen, 2009). The goal of content analysis is to reduce the material; for this research it meant that less relevant themes were skipped, and then the remaining similar themes were bundled and summarised.

The results identify three themes: 1) 'the role of natural hazards management within and across councils'; 2) 'risk data drivers and needs for natural hazard management'; 3) 'risk data pathways'. These themes interact and influence each other, and are examined in turn.

1) Some councils recognised the confusion of different roles being 'responsible' for natural hazard risk management, i.e. emergency management, land-use planning, engineering, or building control, yet it being a shared function across most departments and groups across council. There was disagreement between raising the profile of these roles within council decisions that require a risk informed approach, versus labelling natural hazard risk management as a certain roles responsibility alone. Entry points for natural hazard management to engage across council were a common point of discussion. There were a spread of approaches ranging from complete integration of the natural hazard function across council, which naturally provided easy access to important discussions and decisions, through to issues where the natural hazard risk management function remained isolated and had to 'push' its way into discussions that they were able to find out about. The ease of integration across council appeared to stem from the influence of key individuals within the

group, either explicitly in terms of specially designed 'knowledge broker' roles (Meyer, 2010), where the role bridges across the range of natural hazard roles within the council, or specific staff with a strong drive and influence to integrate across council, or the ability of groups to draw in staff from across council.

2) The two most frequently discussed needs for natural hazard risk management data focussed on risk communication and real-time event response. However, cutting across these activities were influential threads relating to uncertainty, external influencers and experience. Communicating natural hazard risks was recognised not just for increasing hazard awareness, but also as key for gaining input and agreement for council policies designed to reduce community exposure and vulnerability. Natural hazards practitioners discussed the importance of communicating risk information for influencing decision making on future development, specifically the communication of economic loss information to justify actions for reducing risk. Speed of data access, analysis and interpretation was a critical discussion point, with most participants agreeing that the ability to gather or produce real-time information during a crisis would be beneficial.

3) Essential to discussions was each natural hazard management function's ability to access risk data and the relevance of information available. This was most prevalent with the emergency management function, which described themselves as 'gatherers' rather than generators of risk information and therefore reliant on a range of external information sources from other parts of the council as well as from outside agencies. Participants also reported a lack of knowledge of what data their council held, adding that even if they knew of its existence it was often in a format that couldn't be used outside of its original context. Another challenge lay in the cost of data collection or management, where the cost of collecting data for cross-council use did not meet the benefits and was abandoned.

In summary, the results depict a challenging environment for the natural hazard management function to better develop policy and procedure in New Zealand local government. This is not only because of confusion over the different roles for natural hazard risk management and limited influence for decision making, but also because of lack of data availability and suitability. As such, results show that there appears to be no standard approach to generating or sourcing risk data and there is no simple pathway for its communication.

While it is a challenging environment, there is definite engagement from natural hazard management practitioners on the use of risk modelling to better develop policy and procedure. In general, practitioners have a good understanding of what the risks are, and how risk modelling can aid in natural hazard risk management. However, the focus group sessions show that there is a continued disconnect across science – policy interface and resulting practice. Even though the risks are known by the scientists and practitioners, there is a disconnect between them and the development of better policy and practice.

The disconnect between science, policy and practice is well covered, identifying challenges such as the different knowledge discourses between scientific knowledge and local knowledge (Nursey-Bray et al., 2014); lack of integrative processes linking bottom-up and top-down actions (Gaillard & Mercer, 2012); and the need for more inter-connectedness across contributing programmes (Glasgow & Emmons, 2007). Saunders and Kilvington (2016) refer to a mix factors disconnecting science from practice, including: differing planning time frames, lack of skills and resources, unavailability of consultants or knowledge brokers, and social and political pressures.

Nevertheless, practitioners agree that the use of natural hazard risk modelling can be useful as a communication pathway, specifically with its ability to spatially communicate risk on a map, being a very engaging way to influence decision maker perceptions to develop better policy (Bostrom, 2008; McInerney et al., 2014; Thompson et al., 2015). However at its current state of development, natural hazard risk modelling has a long way to go, with simple risk models, 'klunky' usability, and lack of supporting data. Even though the only way that natural hazard risk modelling can develop is through being used, practitioners are reluctant to use it because of the pre-existence of alternative tools, the considerable resource pressures (time, capability and money) needed to invest in its development, and the lack of assurance that an improved perception of natural hazard risk would actually change decision maker actions, considering their wider social and political environments.

Given these challenges, what options are there to enable risk modelling as a tool to support local government in New Zealand to better develop policy and procedure for natural hazard management?

- Legislate greater mandate for how natural hazard risk management is achieved in New Zealand local government
- Support and enable knowledge brokerage for natural hazard risk management
- Employ participatory, democratic approaches between 'science', 'practice and 'policy' for developing natural hazard risk management policy
- Enable greater capacity and capability for collecting natural hazard risk data

ACKNOWLEDGEMENTS

I would like to acknowledge my co-authors in the paper that we are developing from which I pulled this subject. Thank you to Kate Crowley and Sally Potter for the comments and help you have provided in formatting a manuscript to become a journal article.

I would like to my supervisors for the PhD I have underway, David Johnston, Wendy Saunders, Emma Hudson-Doyle and Graham Leonard. Thank you for all your good advice and encouragement during this interesting and exciting, but testing time.

Finally, I would like to acknowledge my wife Claire, for supporting me while I am constantly away from her and our children, working late into the night and travelling off to conferences. Thank you with all my heart.

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