



RISK OWNERSHIP AND NATURAL HAZARDS: ACROSS SYSTEMS AND ACROSS VALUES

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Cover: Prescribed burning to reduce fire risk in Victoria.

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ABSTRACT

Severe natural hazards can propagate through systems, creating the potential for disasters. The strategic management of such disasters through risk mitigation, resilience and recovery requires the clear identification of who owns the assets at risk and who has responsibility for the relevant aspects of risk management. Most of the existing literature on risk ownership addresses risk to a single entity such as a household, business or organisation. However, disasters affect many entities, crossing institutional boundaries, changing ownership as they do so, potentially leading to some risks being unowned. A framework for assessing risk ownership at this scale needs to cover the institutions affected by disasters and those involved in disaster management, the different values at risk and current institutional arrangements that constitute risk ownership. This is being addressed in the Australian context through the construction of an economic geography of disaster risk and ownership arrangements. A desktop study of existing risk ownership arrangements suggests that the most complete coverage is for relief and recovery, with limited arrangements for risk mitigation affecting property and infrastructure. Intangible values affecting society and the environment are not well covered, suggesting a need to develop methods for addressing these values. This paper discusses some of the basic building blocks for doing so.



INTRODUCTION

This paper examines the concept of risk ownership for natural hazard risk management, what happens to risk ownership when natural hazard impacts, responses and responsibilities cross domains, and existing arrangements in Australia that pertain to these concepts. It uses risk ownership as a vehicle for risk governance, suggesting that if a risk is adequately 'owned', then it will be managed appropriately, whereas if it is not, then values at risk from natural hazards will be exposed to damage and loss that is potentially avoidable.

This work contributes to the BNHCRC project "Mapping and understanding bushfire and natural hazard vulnerability and risks at the institutional scale". We address risk ownership with respect to strategic risk management before and after events but not emergency response during events, which requires quite a different type of ownership relating to operational matters.

Natural disasters needs to be understood as a type of systemic risk, where severe hazards have the potential to harm people, property and natural systems resulting in disasters. In doing so, risks will cross domains that are geographic, institutional or a combination of both, transferring between different levels of government or the private and public spheres. A wide variety of values, both market and non-market-based, will be affected. As such, risk ownership is an important contributor to the governance of such risks (Jones et al., 2013).

Currently in Australia, identified spending for risk recovery at the Federal and State Government level outweighs spending on risk mitigation by greater than 20 to 1 (Productivity Commission, 2014a). As most of this recovery spending is spent on roads and bridges, we can reasonably assume that similar deficits may exist in other important areas of value, particularly 'softer' social and environmental areas. Especially public values shared in common, where risk ownership may be shared and unclear.

Two questions are addressed:

1. What general forms of risk ownership are associated with the different types of values at risk?
2. What current ownership arrangements are in place for managing natural hazard risks?



RISK OWNERSHIP AND NATURAL HAZARD RISK

The concept of risk ownership stems from two traditions: from economics (especially capitalism) and from risk management. Within economics the main emphasis is on the asset or resource owner, where the ownership of resources and the potential for substantial loss is linked to control of those resources (Robertson, 1923). Under risk management, a risk owner is a person or entity with the accountability and authority to manage a risk (ISO, 2009), placing the emphasis more on managing the risk itself, rather than the asset, although it can be one and the same thing.

With respect to capital risk, Robertson (1923) maintained that (1) those who stand to lose most heavily should have the power of decisions and (2) that those who are taking risks by using their resources should not have their authority handed to others. This describes the 'normal' aspect of risk ownership in a market-based economy, covering the interests that an owner has in an asset or enterprise, extending to areas such as property rights. This is because the capitalist is expected to risk their assets to produce future income. The degree to which natural hazards are managed will depend on the owner's willingness to assess the conditions under which they may 'lose most heavily' from natural hazard risk. Governments are keen to see citizens and business manage as much of their asset risk as possible to minimise demands on public funds for relief and recovery (Productivity Commission, 2014a).

The recent Productivity Commission review on Natural Disaster Funding Arrangements (2014a) considers risk owners primarily through asset ownership, which emphasises the economic rather than the risk-management tradition. Although they address aspects of accountability and responsibility for risk separate to ownership, we take the view that this is too limiting, and that the identification of shared and changing accountabilities and responsibilities under natural disasters requires a broader approach consistent with the risk standard (Young et al., 2015).

The risk standard invests the risk owner with the accountability and authority for risk management, which are quite different roles. We prefer to substitute responsibility for authority because it is better suited to both formal and informal roles (Young et al., 2015). Accountability is an audit task to ensure that an action has been carried out, whereas responsibility is the duty to carry out an action. Both accountability and responsibility are needed to manage systemic risk that concerns both tangible (economic) and intangible (social and environmental) values.

Natural hazard risks range from those that can be considered as being acceptable and within the limits of existing capacity to those that exceed a critical threshold, requiring external resources for effective recovery. Lack of awareness or incomplete knowledge may mean that a risk is unowned, in the sense that the resource owner may be accountable but not responsible, or neither accountable nor responsible (Young et al., 2015). In such cases, responsibility for post event damage and loss will be unallocated.

Generally, risk ownership is addressed at an organisational or enterprise scale. Standard risk ownership guidance addresses these types of ownership from a broad range of business perspectives, natural hazard risk being one (Buehler et al., 2008; Gerken et al., 2010). At an event or multi-event scale, risk ownership at



the institutional level becomes important, where the formal and informal rules and arrangements matter most.

Ownership also varies according to the broad range of values, assets and otherwise, that are at risk. These are divided into five value clusters based on Jones et al. (2013). Three clusters cover built, social and environmental assets and infrastructure under both public and private ownership. The other two represent goods and services produced by those assets. These clusters provide a wide range of benefits measured in both monetary and non-monetary terms. The latter includes intrinsic values associated with human lives, cultural values and areas of natural value.

For social and environmental assets and infrastructure, and the benefits that flow from these, the issue of risk ownership becomes much more dispersed. This includes the commons and non-exclusive goods such as air and water. Where the crown acts as custodian for the public, values are held in trust. Other assets such as forests, which provide a broad range of values may be in both private and public hands.



FRAMEWORKS AND METHODS

The project applies two linked frameworks: Ostrom's Institutional Analysis and Development Framework (Ostrom, 2007; McGinnis, 2011; Ostrom, 2011; Eiser et al., 2012) and the more conventional risk management framework (ISO, 2009), to assess ownership in three phases: (1) ownership of values at risk in the pre-risk or normal phase; (2) ownership of mitigating severe risks associated with events likely to cross domains resulting in disasters and allocation between normal and exceptional; (3) ownership in the post event(s) phase of recovery from damage and loss (Young et al., 2015).

The first phase of the project is creating an economic geography that is mapping the five main areas of value: built, social and natural assets and infrastructure and the goods and services provided by these. These are being overlain onto hazard data such as frequency, magnitude and location of the hazard to construct values at risk. These values include:

- dollar values (e.g., property values, household income),
- assets valued in their own right (e.g., sites of cultural importance), and
- proxy values that represent natural and human values (e.g., ecological health and vulnerable people and groups).

The mapping is being carried out using a web-based open-source map-based system that links natural hazard and risk data with a wide variety of value-based data, which will allow users to compare and contrast very different types of values within a single platform. Its aim is also to make a variety of values at risk more visible, especially intangible values and those in public ownership. The current domain covers Victoria and will be expended to other states over time.

A tiered approach starts with high level values such as household income, industry income, employment, demographics, high value conservation land and agricultural production. Under these are more derived variables allocating specific risks (e.g., population vulnerability to heat) associated with each hazard. Broad groups of ownership of these values at risk that account for public, private (individuals, business and industry), government (local, state and federal) and community are being created.

These will also inform which values represent key vulnerabilities or the potential for loss that are clearly owned, partially owned or are unowned. Having a broad understanding of this aspect of ownership then opens the way to investigating accountabilities and responsibilities for managing risk on two fronts: pre-event mitigation and post-event response and recovery.



CURRENT FUNDING AND OWNERSHIP ARRANGEMENTS

A recent study by the project outlines publicly available information on natural hazard risk ownership within Australian jurisdictions (Young et al., 2015). Risk ownership is explored through three questions:

- Who pays for the risk?
- Who manages (is responsible) for the risk?
- Who is accountable for the risk?

Ownership was examined within a matrix of broad institutions (federal, state/territory and local government, business and industry and civil society) and values (built, social and environment assets and infrastructure). Ownership across this matrix was allocated according to individual hazards, ownership of assets, tasks associated with the risk management process and policy/legislative instruments (Young et al., 2015). Many of these arrangements are tiered and are designed to formalise ownership between different levels of government, between the public and private domains and between the government and the individual.

Funding to address natural disasters is provided by all levels of government, community groups and charities, as well as individuals and business sectors (Biggs, 2012). Funding arrangements are divided into pre- and post-disaster categories (Table 1). Pre-disaster funding addresses disaster mitigation and post-disaster funding concerns relief and recovery. The Australian Government has a role in providing financial assistance to other levels of government and the broader community for natural disaster recovery and relief due to its greater ability to raise revenue (Williams, 2012; Productivity Commission, 2014a).

Relief funding refers to short term assistance to households affected by natural disasters and recovery funding mainly concerns reconstruction efforts to repair or replace damaged infrastructure provided via the Natural Disaster Relief and Recovery Arrangements (NDRRA). The Australian Government Disaster Recovery Payment (AGDRP) is a one-off, non means-tested payment of \$1000 for adults and \$400 for children who are adversely affected by a major disaster.

Commonwealth funding to states for mitigation from 2009–10 to 2012–13 totalled \$296 million. The main mechanism for this funding is the National Partnership Agreement on Natural Disaster Resilience (NPANDR; \$115 million from the Commonwealth and \$110 million from the states over the same period). Mitigation spending was about 3% of total Commonwealth expenditure on natural hazards in recent years (Productivity Commission, 2014a). In comparison, during 2002–03 and 2012–13 total recovery expenditure was at least \$13,400 million from all levels of government (Productivity Commission, 2014a). \$71 million was contributed through the National Emergency Management Program (NEMP), which contributes to both mitigation and recovery.



Role	Responsibility	Current arrangements
Risk mitigation	All governments	Mitigation activities General infrastructure spending Risk transfer via insurance
	Private/Industry	Risk transfer via insurance Property improvements OH&S measures
	Community	Risk transfer via insurance Development of hazard management plans Property improvements
	Australian Government	Provide funding through NPANDR and NEMP
Relief and recovery arrangements	State and local governments	Land use planning Building regulations
	Australian Government	Provide recovery funding through the NDRRA Provide relief funding through the AGDRP Other relief and recovery funding policies
	State and local governments	Funding and financing of recovery Utilise Australian Government recovery funding
	Private/Industry	Provision of essential items, food, water, energy, support services
	Community	Donations and volunteers and support services through local community organisations

TABLE 1. EXISTING HIGH LEVEL RESPONSIBILITIES FOR NATURAL HAZARD RISK OWNERSHIP (ADAPTED FROM PRODUCTIVITY COMMISSION (2014B, P. 271)).

Commonwealth reimbursement for recovery is based on state government spending on eligible measures each financial year, counting only events where state government expenditure exceeds the 'small disaster criterion' (currently \$240,000), however this has resulted in Commonwealth contributions to cost-sharing of up to 75% (Productivity Commission, 2014a). To be eligible, state and local governments must have adequate insurance (Department of Finance and Deregulation, 2012). Of \$975 million of declared state assets Australia-wide 32% are insured (Productivity Commission, 2014b).

The Productivity Commission (2014a) criticises the entry level for reimbursement via the NDRRA as being too low, discouraging insurance and mitigation measures being undertaken by state and local government. Although the benefits of mitigation cannot be reliably quantified at present, the imbalance between mitigation and recovery payments leads the PC to recommend an increase in Commonwealth funding to \$200 million pa with equal contributions from the states.

Insurers play an important role in natural disaster management by providing households, businesses and governments with products that help to manage residual risk and finance the cost of a natural disaster. Over 1970 to 2013, nominal losses totalled \$21 billion, with the bulk of that being attributed to increased exposure (Productivity Commission, 2014a), although this attribution is heavily debated (Crompton et al., 2010; Nicholls, 2011). Insurance provides a signal to policyholders about the level of risk they face, encouraging them to undertake risk reduction measures such as mitigation (Australian Treasury, 2011).

Not all public and private mitigation is currently being captured by the above estimates. State and local governments also undertake a significant amount of mitigation and resilience activities as part of broader infrastructure and service



delivery activities. The range of mitigation and resilience works are diverse including: fire trail maintenance and fire hazard mitigation; identification of levees and infrastructure at risk; and studies and reviews on land planning, emergency planning and capability assessment, and flood water movements. The Victorian Government noted that '[a]cross its State Departments and Agencies, Victoria spent in excess of \$3.583 billion over the period from 2002–03 to 2013–14 (an average of \$298.6 million per year)' (Victorian Govt 2014, sub. 113, p. 3). Other key policy areas, such as adaptation and resilience programs, are generally not included in such estimates but do contribute to levels of risk ownership (Young et al., 2015).

Damages and loss was identified by the Productivity Commission (2014a) as being direct, indirect and intangible. However, the overwhelming majority of finance provided is for direct loss. Currently, hidden losses cannot be reliably assessed. Social and natural infrastructure and assets that fail during a natural disaster have the potential to result in significant negative externalities for society. These forms of infrastructure are not eligible for funding under the NDRRA (AG, 2012) as they are not defined as essential public assets, despite the fact these forms of infrastructure being vital to the functioning of society (e.g., Frankenberg et al., 2013).

Households and businesses are responsible for protecting their property and assets from natural disasters by either formally or informally identifying risks, undertaking mitigation actions and obtaining appropriate levels of insurance (AG, 2009). However, there is widespread agreement that under-insurance and lack of awareness about exposure to natural hazards is a significant issue. Important aspects of human welfare are unowned; for example, recent events suggest the need for greater investments in mitigation strategies for community mental health (Morrissey and Reser, 2007).

Volunteers and not-for-profit agencies contribute to pre and post natural disaster funding by reducing fiscal costs of disaster response and recovery. They also lead to higher community awareness of risks and to community resilience. The role of the community in mitigating risk to public and private assets can also be considerable by contributing to ecological resilience in landscapes through activities such as Landcare.

However, the level of donations for natural disasters is highly variable. For example, the Cyclone Larry appeal raised about \$20 million compared to the Black Saturday appeal, which raised about \$400 million (Latham et al., 2010). The varying success of different appeals is due to reasons such as the level of media attention, the speed of onset, the scale of the tragedy (e.g., the number of lives lost) and the type of disaster. Relief appeals also require a large injection of resources, especially if collecting donated goods (Young et al., 2015).

Recent events and potential losses of natural infrastructure, e.g., forest losses in bushfire putting a water supply out of action for an extended period, have more recently become evident, but have not been formally identified (Young et al., 2015). High value natural heritage, such as Australia's World Heritage properties, also lack comprehensive plans that can mitigate changing risks despite being very exposed (Australian National University, 2009).

The Institutional Analysis and Development Framework Laying out risk ownership a more detailed way than currently is the case, has the potential to better delineate where current arrangements are comprehensive, partial and/or



disconnected (Young et al., 2015). It can also help outline imbalances between mitigation and response and recovery and potentially identify where 'unowned' loss and damage is occurring or may occur in the future. The differences between capital risk ownership and that defined via risk management arrangements, if reconciled, can also help to better define the rights and responsibilities between public and private institutions.



CONCLUSIONS AND NEXT STEPS

Review of pre- and post-event policies and strategies revealed ownership strengths in these areas (Young et al., 2015):

- Widespread and well-developed early and medium-term response plans for impacts on built assets and infrastructure and to a lesser extent on social assets and infrastructure.
- Growing ownership in risk planning and preparation at the state and local level, and for civil society and business and industry in designated high-risk areas for specific hazards.
- Broad ownership by civil society of overall hazard risk in terms of insurance coverage, although growing exposure increases the risk of under-insurance.

And ownership gaps in these areas:

- Mitigating risk to environmental assets and infrastructure with gaps in coverage for both built and social assets and infrastructure.
- Despite a degree of existing resilience, the contribution of resilience to the risk management process and how it can be applied is not well defined. Accountabilities also extend beyond emergency management into broader social, economic and environmental policy.
- Long-term recovery in social and environmental assets and infrastructure.

The recent review by the Productivity Commission Productivity Commission (2014a) makes recommendations for government policy with respect to improved fiscal responsibility and better accountability and transparency, especially with regard to minimising recovery costs. However, allocations for what the PC called 'shared risks', require the clear identification of risk ownership at the institutional scale, especially those pertaining to indirect and intangible values.

Ostrom's Institutional Analysis and Development Framework is being adapted to address how risk ownership is being applied at the institutional scale. This is identifying the stated and implicit rules governing institutional relationships pertaining to strategic management of natural hazard risk. This is being done on a multi-risk basis, because the combination of future hazards is essentially unpredictable. Ownership arrangements therefore need to be robust, capable of dealing with a wide range of outcomes. The expansion of the concept of risk ownership to take in a broader range of values at risk is an important part of preventing loss to intangible values. In the short term, these may not appear on balance sheets, but will in the longer term if not adequately managed.



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