

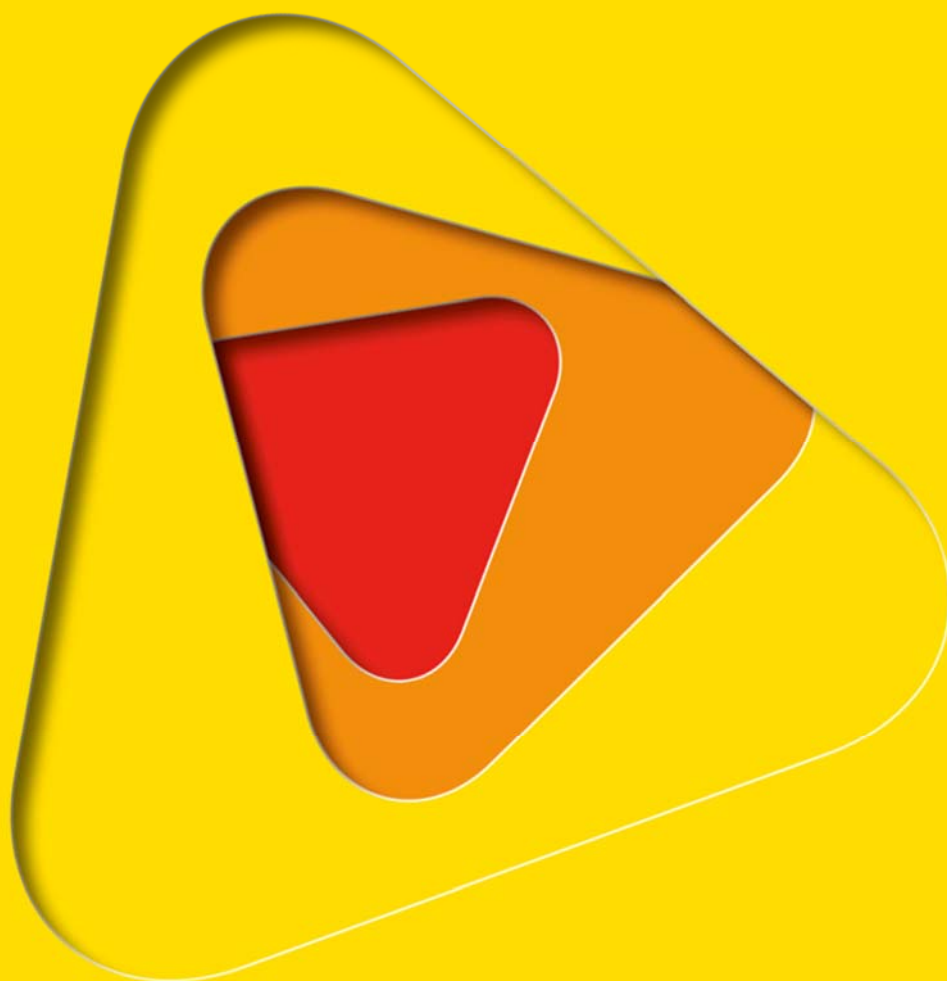


ECONOMICS OF NATURAL HAZARDS

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University of Western Australia
Bushfire and Natural Hazards CRC

Annual Report 2014





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Publisher:

Bushfire and Natural Hazards CRC

January 2015



Economics of Natural Hazards

Bushfire and Natural Hazards CRC Annual Report (2014)

Project Summary

The project tackles from an economics perspective issues relating to non-financial benefit estimation, risk analysis, and development of decision making frameworks that would help deliver value for money from public investments in natural hazard management. It has a broad scope in terms of natural hazards, including fires, earthquakes, floods, cyclones and tsunamis. It aims to improve the management of bushfires and other natural hazards by delivering the following outcomes:

1. Improved recognition of non-financial benefits of management and policy for natural hazards, influencing decisions about budget levels and about management and policy options.
2. Improved decision making about management and policy options considering the full range of relevant factors (technical, social, economic, environmental, policy).
3. Improved ability to discuss appropriate budget levels with policy makers and treasury.
4. Improved quality of economic analysis throughout the sector, resulting in stronger and more defensible analyses, and stronger support from Treasury.

The research team has extensive experience non-market valuation, integrated modelling and the economics of environmental and natural resource management and policy. The integrated modelling work builds on our previous work on prescribed burning where we developed powerful approaches for evaluating the value for money offered by alternative management and policy options. For the valuation related work, we have recruited four outstanding environmental economists with extensive experience and high expertise in valuation to be collaborators in this research: Professor Peter Boxall (University of Alberta, Canada); Professor John Rolfe (Central Queensland University); Professor Rob Johnston (Clark University, USA); and Professor Nick Hanley (University of Sterling, UK).



Introduction:

Natural hazards have a number of things in common when it comes to planning, decision making and evaluation of public investments. First, they are complex and, therefore, effective decision making and evaluation requires synthesis and integration of many different types of information within a context of high risk and uncertainty. Second, addressing these issues well requires an inherently multidisciplinary approach, often requiring information from biological sciences, physical sciences, social sciences and economics. Third, data requirements for strong decision making and helpful evaluation are extensive, and existing data sources are usually insufficient for this purpose. Fourth, some of the key impacts of natural hazards are relatively intangible, making them difficult to quantify, especially in a way that can feed into decision making. Finally, research into planning, decision making and evaluation for natural hazards is relatively lacking.

In the case of bushfires, for example, decision making requires combining information on physical, biological, social and economic aspects such as: risks of fire occurrence, risks of fire spread, frequencies of fires of different severities, impacts of weather conditions on these things, losses associated with bushfires of different severities, reductions in those losses under different prescribed burning regimes, and costs of different prescribed burning regimes. Experience in a Bushfire CRC project shows that only a minority of the required information is readily available in existing datasets. Intangible benefits of bushfire management include effects on life, health, feelings of safety, biodiversity, threatened species, and water quality. Integrated economic analysis of strategic bushfire decisions has been undertaken in Australia only for two case studies. The knowledge gaps for other hazards, such as earthquakes, floods, cyclones and tsunamis, are similarly significant.

This project aims to fill key knowledge gaps on issues related to values, risks, and decision making to deliver value for money from public investments in natural hazard management.

The Project:

The main objectives of the project are these:

- i. **Estimate in dollar terms the non-financial benefits (particularly environmental and social benefits) of management and policy for natural hazards.**

End-user organisations have indicated the need for a stronger focus on dollar valuation of non-financial benefits from natural hazard policy and management. The challenge here is that there are so many different contexts within which these values may be needed, and it is not practical or affordable to conduct new studies for each context. Environmental economists have developed a technique called “benefit transfer”, which involves attempting to extrapolate from existing studies, but even this is not an ideal solution. It requires a high level of economics expertise, and it relies on the existence of



relevant studies to extrapolate from, which is often not the case for natural hazards.

In this project, we will develop an innovative tool for efficiently generating estimates of dollar values for non-financial benefits. The aim is to develop a tool that people with only moderate economics knowledge are able to use, and that people with no economics knowledge can learn from.

ii. Undertake integrated economic analysis of management and policy for natural hazards.

This study involves integration of technical, social, biophysical and policy information within an economics framework with a decision-making focus. It is also a study that requires high levels of participation by end users. Strengths of the integrated approach to the analysis include that: it provides a mechanism for bringing research results into decision making about policy and management; it combines economic rigour with stakeholder participation; and it provides information in a form that is useful in discussions about resourcing and policy design. Two case studies will be identified in consultation with the CRC and stakeholders.

iii. Conduct risk analysis for different levels of overall budget for natural hazard policy and management, exploring the high variance of budget requirements from year to year. (PhD student project)

Emergency services organisations receive a certain budget allocation, which typically is sufficient to deal with the community's demand for emergency services in a typical year. However, there are years when emergencies are unusually numerous or serious, such that this budget falls well short of requirements. When weighing up these different types of years when setting an overall budget, how should governments strike a balance?

This analysis will involve: 1) Estimating the probability distribution of budget demands for emergency services over time; 2) Identifying the benefits of providing different types of emergency services, and the losses incurred if they are not provided; and 3) Comparing overall long-term costs and benefits of different resource levels, weighted by frequencies of the year-types.

This sub-project is intended to be a PhD project, using Victoria as a case study.

iv. Develop guidelines for the conduct of sound economic analysis of natural hazard policy and management

This component of the project involves developing an accessible and understandable guide to undertaking economic analysis of natural hazard



management and policy. The work will be based on: experience in the research undertaken to address the other project objectives; experience in the Bushfire CRC; relevant research literature and textbooks. The guide should be helpful to agencies in:

- formulating its needs for economic analysis,
- knowing what to ask economists (internal or external) to do,
- evaluating the quality of economic analysis that has been conducted,
- understanding the data requirements, and
- supporting economists beginning work on natural hazards.

The project runs between March 2014 and December 2017.

Progress to June 30 2014

Most of the activities in the first year have focused on preparatory work, including liaising with end users and other cluster members to define the research scope, recruiting postdoctoral fellows, and participating in research forums and workshops. The specific activities for the year to June 2014 are as follows:

- 1) The project leader has liaised with different end users and the cluster leader (Ed Pikusa). The list of end users was expanded to include: Metropolitan Fire and Emergency Services Board (Victoria), Department of Fire and Emergency Services (WA), Attorney-General's Department, Rural Fire Services (NSW), Fire and Emergency Services Commission SA (SAFECOM), State Fire Management Council (TAS), Office of Environment & Heritage (NSW), South Australia Metropolitan Fire Service (SAMFS)
- 2) The project leader (David Pannell) and Atakelty Hailu attended the Establishment Research Advisory Forum held during March 18-20, 2014, in Adelaide. David Pannell gave a presentation on the project. Both team members participated in cluster meetings.
- 3) A PhD top-up scholarship has been advertised (for a researcher to work on objective 3 of the project).
- 4) Potential postdoctoral researchers were approached. The postdocs will start work in the project in early 2015
- 5) Atakelty Hailu participated at the Disaster Mitigation Workshop held in Melbourne (May 23) and met with researchers from other agencies working on areas that are related to the focus of this project.
- 7) Atakelty Hailu, David Pannell and Fiona Gibson (a potential postdoc) participated in WCERE 2014 (World Congress of Environmental and Resource Economists) and attended presentations by researchers working on natural hazards in other countries (US, Europe and Japan).

**Publication list:**

David Pannell presented a poster at the World Congress of Environmental and Resource Economics (WCERE), Istanbul, 28 June-2 July, 2014. Title: “Lighting fires to prevent fires: The economics of planned burning in Australia”

David Pannell did a webinar for AFAC/Bushfire CRC, online, 17 June 2014, “Integrated economic analysis of strategic fire prevention”

David Pannell presented at the AFAC/Bushfire CRC workshop with end users, Melbourne, 23 May 2014, on “Integrated economic analysis of bushfire prevention”

Integrated project team members:

Researchers:

- David Pannell (Professor, UWA)
- Atakelty Hailu (Assoc/Prof, UWA)
- Michael Burton (Prof, UWA)
- Fiona Gibson (Assist/Prof, UWA)
- Veronique Florec (Researcher, UWA)
- Abbie Rogers (Assist/Prof, UWA)

End Users:

- Ed Pikusa (Principal Project Officer, National Risk Assessment, Measurement and Mitigation Subcommittee (RAMMS), Fire and Emergency Services Commission, SA);
- James Holyman (Executive Director, Strategy and Innovation, Metropolitan Fire and Emergency Services Board, VIC);
- Rebecca Rush (Director, Disaster Resilience Policy Section Commonwealth Attorney General’s Department);
- Stuart Midgley (Group Manager, Co-ordinated Risk Management, RFS NSW);
- Sandy Whight (State Fire Management Council (SFMC), TAS);
- David Launder (Director, Organisational Development at South Australian Metropolitan Fire Service);
- Belinda Kenny (Fire Science Interpretation Officer, Fire & Incident Management Section, NSW National Parks & Wildlife Service);
- David McKenna (Department of Environment, Water and Natural Resources (DEWNR), SA)