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TOPICS IN THIS EDITION | DECISION-MAKING | ECONOMICS | MITIGATION | RISK ANALYSIS

PLANNING FOR THE FUTURE: PRIORITISING MITIGATION OPTIONS AND IMPROVING RISK REDUCTION

ABOUT THIS PROJECT

This research was conducted as part of the *Improved decision support for natural hazard risk reduction* project.

AUTHORS

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SUMMARY

This project is developing tools to help emergency managers and planners better understand how risks from multiple natural hazards change into the future, and how to best manage and minimise these risks. A decision support system has been developed that models future risks from coastal inundation, river flooding, bushfires and earthquakes, and how they may vary based on climate, economic and population changes. This system, coupled with processes to consider how a region may develop into the future, allows emergency managers and planners to consider how to best mitigate risks, while taking into account the resources available to undertake mitigation activities.



▲ **Above:** RESEARCH HAS DEVELOPED WAYS TO MODEL FUTURE RISK, BASED ON CHANGES TO CLIMATE, POPULATION AND MITIGATION MEASURES. PHOTO: SOUTH AUSTRALIA STATE EMERGENCY SERVICE.

CONTEXT

Future risk is a function of decisions made today. It is important to consider risk as dynamic rather than static; as is currently done. To explore how to manage risk into the future, an integrated and dynamic approach is needed that considers different drivers and options impacting on future risk.

BACKGROUND

Significant discrepancies exist between the level of relief and recovery spending in Australia versus the investment in prevention and preparedness. This is despite the wealth of analysis showing positive benefit cost analysis of anywhere between 1.4 and 70 to 1 (i.e. spending \$1 on mitigation will save

anywhere between \$1.40 and \$70 in response and recovery costs). Although it seems obvious that it is better, 'to build a fence at the top of a cliff, than park an ambulance at the bottom', there are challenges in determining where and when to build it, and how tall it should be. This project therefore looks to integrate the best understanding of risk from various emergency and land management agencies and researchers to allow decision makers and planners to better plan how to build the figurative fence at the top of the cliff.

BUSHFIRE AND NATURAL HAZARDS CRC RESEARCH

The project has and is developing decision support systems for long term risk reduction

planning. A case study for Adelaide and surrounding regions is now complete, while case studies for Melbourne and surrounding regions, along with Tasmania, are well developed. These software systems integrate modelling and knowledge from government departments and agencies across the three locations to ensure the system best fits the use required by different organisations.

A participatory, design focused approach was taken to the software development. This has seen prototypes developed and implemented within organisations via training courses and workshops. These prototypes can then be revised as organisations use the system more and gain a greater appreciation for its capabilities.

RESEARCH FINDINGS

To date, modelling approaches for dynamic risk assessments and long-term planning/policy impact assessment have been developed. This has also been supplemented with scenario exercises which have explored what the future of risk and resilience could look like in Adelaide and surrounds (see Riddell *et al.*, 2017). Similar outputs will soon be available for the greater Melbourne case study, which extended the range of mitigation options to include elements of social programs such as community engagement and education. Work for Tasmania also considers different scenarios for future development based on economic and population growth, as well as considering optimising the spending of mitigation budgets across different scenarios.

The results of scenario modelling for greater Adelaide highlighted the variability in regional risk based on variability of the drivers into the future. They also showed the importance of effective planning of new regional developments to ensure a safer future. It is hoped that more integration of this scenario work can build strategic capacity across agencies in the understanding of future risk.

HOW IS THIS RESEARCH BEING USED?

Multiple workshops have been held to inform the development of the system. Discussion has centred around:

- available risk reduction options and their benefits
- costs – positive and negative – across multiple criteria
- drivers for regional change and uncertainties
- current and desired decision/policy making processes.

These discussions have been incorporated within the design of the software, and insights can also be used to inform various other policy processes and risk assessments.

The software is now available for

END-USER STATEMENT

All emergency management practitioners and land managers across Australia make choices in an effort to minimise losses from natural disasters.

They ask questions like ‘what are the benefits and costs of mitigation options?’, ‘how do we quantify many of the intangibles?’ and ‘who owns the risk?’ In a multi-stakeholder environment this is complicated, and it is hoped tools such those developed through this research will help agencies answer these important questions, leading to better decisions in mitigating future natural hazards.

– **Ed Pikusa, Manager Policy and Reporting – Fire & Flood Management Unit, Department of Environment, Water and Natural Resources South Australia.**

FURTHER READING

Global Facility for Disaster Reduction and Recovery (2016), The making of a riskier future: how our decisions are shaping future disaster risk, Washington, USA, World Bank.

Maier HR, Guillaume JHA, van Delden H, Riddell GA, Haasnoot M, Kwakkel JH (2016), An uncertain future, deep uncertainty, scenarios, robustness and adaptation: how do they fit together? *Environmental Modelling and Software* **81**, pp 154-164.

Riddell GA, van Delden H, Dandy GC, Maier HR, Zecchin AC, Newman JN, Newland CP (2017), Futures Greater Adelaide 2050: an exploration of disaster risk and the future, Bushfire and Natural Hazards CRC.

Adelaide and surrounding areas.

End-users from SA’s Department of Environment, Water and Natural Resources are being trained in its use, along with other agencies. It is hoped with further integration into South Australian emergency management agencies and land management departments, improvements can be made to better inform risk reduction planning into the future in the state.

More broadly, it is expected the software will be used within agencies and departments for their own planning and resourcing requirements. It will give users a better understanding of the future risks, both from natural hazards and organisational perspectives. The software and scenario processes can also be used as effective communication tools between different agencies to have a common tool for discussion and exploring combined strengths and weakness and between agencies and the community.

FUTURE DIRECTIONS

The case studies for greater Melbourne and Tasmania are well developed, with the scenario software expected to be available late 2017 for end-users in these areas. Future efforts will focus on improving several components of the study, including aligning indicators - improved economic assessment of policies and broader consideration of values at risk, and improving the consideration and modelling of demographics and associated vulnerabilities - with agency/department needs.

There will also be a significant emphasis on how to best integrate the system within end-user organisations, and what capacities need to be developed to improve organisations’ abilities to engage with future risk and strategic planning.

The team is always interested in applying the process to new regions, bringing in new knowledge to improve the system, making it more effective and robust.

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