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Hazard Note

Natural Hazards Research Australia

Topics in this edition | Emergency management | Risk analysis | Communities

The planners and the people – bridging the gap in disaster risk reduction

About this project

Community risk assessment is essential when preparing for, responding to and recovering from the impact of natural hazards. Historically, community risk assessment is either led by agencies (top-down) or by communities (bottom-up). Such a one-sided approach creates an incomplete picture of community risk. The project team wanted to better understand the barriers to and opportunities for more coordinated community risk assessment practices. A guideline was developed that includes integration principles for community risk assessment, complemented with a range of alternative definitions and measurements of risk to be tailored to local needs.

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Learn more about this project online
naturalhazards.com.au/research/research-projects/community-risk-assessment

Summary

As the frequency and severity of natural hazards increase, so does interest in reviewing, modifying or redeveloping approaches to and the use of community risk assessments. This reflects recognition of the need to better consider the dynamic and complex nature of community risk.

A key shift is the integration of community-driven, bottom-up community risk assessment with organisation-driven, top-down approaches. Bottom-up approaches can include focus groups, key informant interviews, hazard mapping, seasonal calendar analyses and transect walks, all generally aiming to facilitate group decision making. Top-down approaches can include statistical analyses simulation models and index-based analyses, which generally aim to use historical trends to predict future scenarios.

These two categories of approaches are rarely combined and therefore fail to create a holistic view of risk.

The guideline was developed to inform the revision, modification or creation of community risk assessment practices. It was developed from a systematic literature review, complemented by a review of common practices, including alternative definitions, conceptualisations and measurements of community risk assessment. The guideline can be adapted to the needs and context of use, alongside an evidence-informed set of principles for improving community risk assessment.

The guideline advises the integration of bottom-up and top-down approaches for community risk assessment across communities, businesses and governments, and consider associated technical and ecological systems. The aim of this system-wide approach is to complement the technical, quantitative top-down community risk assessment, with locally driven, contextually rich bottom-up community risk assessment.

Above: New South Wales SES members performing a flood rescue training exercise.
Photo: New South Wales SES

Background

Scientists and emergency practitioners increasingly call for fundamental change in community risk assessment, specifically to consider integration of bottom-up and top-down community risk assessment.

Bottom-up community risk assessment is dominated by local, First Nations and contextual knowledge, which is often qualitative and sometimes anecdotal.

Top-down community risk assessment is dominated by technical knowledge, which is supported by scientific assessment and often quantitative.

The call for change recognises and responds to the challenges facing existing practices and the theoretical basis of addressing contemporary needs, requiring consideration of the complex, dynamic and multifaceted nature of community risk.

Current community risk assessment approaches may provide a static risk rating for a region, while the nature of the real risk is dynamic, such as when a major local event with tourist visitors changes the risk profile of a community. A blanket rating for a whole region is also likely to ignore the diversity of needs and variations between risk profiles of individuals within a community.

More importantly, community preferences may differ from those defined by supporting organisations; for example, an emergency response organisation may prioritise protection of homes, while a community may determine a key employment source, such as a mill or factory, more important because if it is lost many community members would have no financial capacity to survive.

While significant advances in mapping hazard exposure have been made, these nuances are often overlooked in top-down technical models of community risk assessment.

Research methodology

The Community Risk Assessment project explored the challenges in linking technical and local knowledge in community risk assessment.

The research was conducted in two phases: a systematic literature review including grey literature and common practices; and semi-structured interviews with emergency management sector professionals.

The systematic literature review provided an understanding of the state-of-the-art community risk assessment methods reflected in academic literature, with 950 documents returned by a search for disaster risk assessment on the Scopus and Web of Science databases.

Following a series of automatic and manual filtering of inclusion criteria (i.e. language, quality of publication, and relevance to community risk assessment), 45 documents were analysed.

Grey literature and current risk assessment frameworks and policy documents across Australia and internationally were also reviewed to inform the literature review.

Semi-structured interviews were conducted with 29 professionals from a range of emergency management organisations.

These were followed by a thematic analysis of the main challenges and potential ways of incorporating local and traditional knowledge in community risk assessment solutions, as identified by interviewees.

The thematic analysis provided a set of alternatives that conceptualise, define and measure community risk based on the literature and a set of principles for the development of community risk assessment based on empirical data from interviews.

Research findings

Primarily, a growing call for a paradigm shift in community risk assessment was observed.

The project's empirical data suggests a gap in the integration of bottom-up and top-down community risk assessment, specifically relating to the hazard exposure analysis of localised and real-time vulnerability data.

Involving communities in disaster risk assessment promotes higher data quality through the integration of community insights, bridging data gaps, capturing community-specific responses to disaster risks and aligning strategies and resources to ensure a more effective response.

However, this also requires an array of technical, sociopolitical, organisational and financial challenges to be overcome – specifically, the challenge of comprehensively addressing various facets of risk, including community perceptions, values and priorities while ensuring the technical and scientific rigour of community risk assessments.

Future initiatives to integrate bottom-up and top-down community risk assessment should address three critical areas:

1. **Integration does not happen by itself and must be resourced.**
   Organisational and community resource limitations mean that community risk assessment initiatives compete with other priorities, especially the growing interest in technological and digital initiatives. Integrating bottom-up and top-down approaches requires the emergency management sector to recognise and understand the importance and efficacy of community risk assessment.

   This will ensure adequate resourcing so that local, First Nations, and organisational knowledge is integrated.

2. **Integration must be bi-directional.**
   Community knowledge integration should run in parallel with the integration of technical and organisation-driven knowledge within communities.

   This often occurs through workshops, awareness campaigns and different communication channels. It helps communities to understand organisations' top-down approach – for example, technical decisions – and increase the effectiveness of coordinated actions during disasters.

   Increasing organisational acceptance of community input also fosters better connections and provides exposure to diverse views and ideas.

Figure 1: The New South Wales SES Community Summary by Local Government Area dashboard.

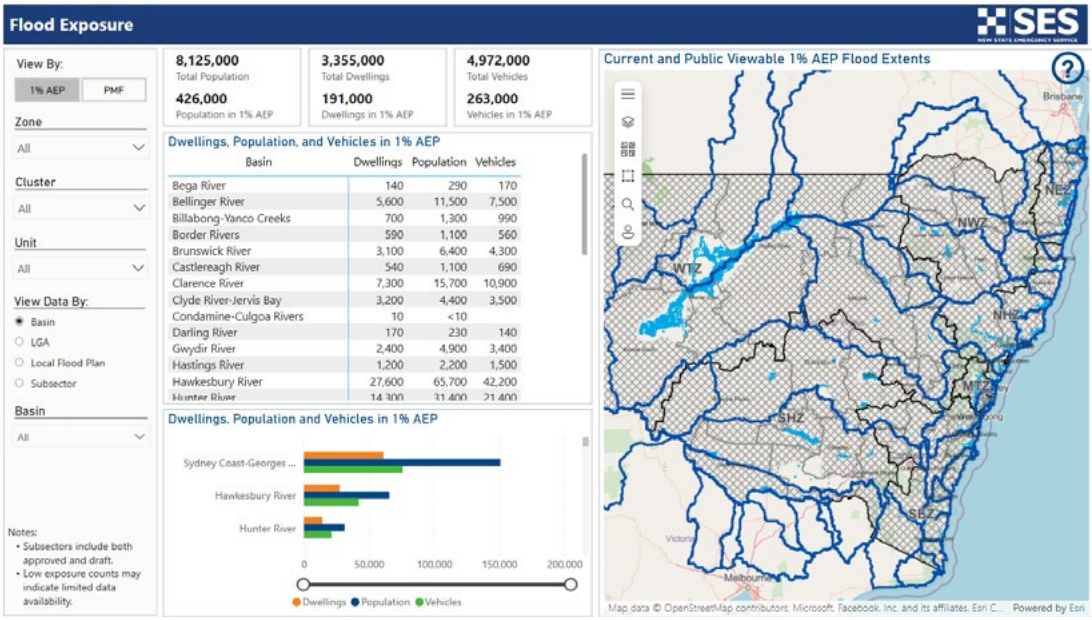

Figure 2: The New South Wales SES Flood Exposure dashboard.

3. **Integration level depends on context.** Greater integration is not always the best solution. The level of integration must be based on stakeholder needs and the nature of the natural hazard.

   Emergency management organisations and communities can work together to map the appropriate level of integration and how community knowledge can be integrated, accounting for capacity, funding and timeframes.

   To address the challenges identified by the literature review and empirical study, the guideline uses a set of principles to answer the questions:

- What **should** be done by community risk assessment?
- What **can** be done in community risk assessment?

The principles provide a range of options to guide the development or revision of community risk assessment frameworks and conceptualise, define and measure risk.

Understanding the ways community risk can be defined and measured can help communities understand what works best for them and develop new approaches for their community and context.

Research impact

An implementation workshop with participants from the New South Wales SES and the University of Sydney identified ways the project outcomes and guideline could be applied in the New South Wales SES and other emergency management organisations in different states and territories.

The need to listen and learn from communities was emphasised and the following were highlighted as agency focus areas:

- communication channels, their reach and efficacy
- understanding community beliefs, values and preferences
- understanding local arrangements, especially how communities self-organise in the absence of emergency services
- understanding community resources and local capability, as well as how they can be enhanced to be most effective
- understanding the make-up of communities, including the leaders and champions and their understanding of risk
- understanding information and data including First Nations knowledge, contextual validation of previous experiences, local signals, historic data and localised impacts.

A critical reflection of the barriers to and limitations of implementing the project outcomes and guideline included:

- **resourcing** – historical prioritisation of response versus resilience and lack of emphasis on social aspects of resilience building
- **existing practices** – inefficiencies in community consultation approaches, moving beyond tokenistic engagement and potential damage of asking for but not using local knowledge
- **organisational culture** – the commitment required to engage communities and appreciate community-led engagement and local knowledge
- **scope of actions** – shifting the emergency organisations' expectations to move beyond response and across the prevention, preparedness, response and recovery spectrum.

Integrating local knowledge into community risk assessment will require the emergency management sector to make a paradigm shift over both the near and long terms.

Opportunities explored included:

- emergency planning
  - balance of focus between social and physical risk domains
  - development of community-led disaster plans
  - use of local stories and their power to compel action
  - use of simple, positive educational messaging
  - adoption of community-centric decision making
  - recognition of contributions by, and challenges for, community members with additional needs
  - use of combined community engagement activities with response exercises

End-user statement

Sara Morgan, Senior Project Officer, New South Wales SES

The work undertaken by the University of Sydney and supported by Natural Hazards Research Australia was an initial step in understanding the components of a comprehensive, multi-dimensional community risk assessment.

This assessment aimed to define risk levels and the impact of key natural hazards on social, economic, built and natural environments.

Working closely with the research team was an integral part of this project, as we were able to undertake an iterative approach together and incorporate learnings as they emerged.

The outcomes of this work effectively provide strong support for working further to integrate top-down and bottom-up risk assessment approaches to provide more comprehensive and accurate understanding and predictions while also acknowledging the high level of complexity and nuance associated with data collection and consistency.

This work has further reinforced that the end-use purpose remains the critical factor, as it defines the inputs and analysis required to best understand our communities and their needs.

Above: A group of New South Wales SES members. Photo: New South Wales SES

- community strategy
  - identification of principles for appropriate community representation levels
  - creation of advisory community representative roles and committees
  - development of strong, effective partnerships with First Nations communities and local community service providers
  - use of existing interagency networks to better understand community needs
  - development of a formal platform for bilateral engagement
  - establishment of formal community action teams within agencies
  - use of social network mapping
  - identification and enlistment of community champions and teams
  - empowerment and encouragement of school-aged children as leaders of their parents', carers' and families' understanding and risk education
- system
  - establishment of risk assessment system to capture, share and use community-based networks, data and knowledge
  - determination of the best way to capture the 'voice of the community' through engagement, inquiries, media and other platforms
- resourcing
  - prioritisation of community engagement through resources and long-term funding to ensure adequate time to develop local relationships
  - support of programs that enable community design and variability instead of prescribed approaches
  - development and resourcing of additional paid and volunteer agency community engagement positions to work directly with communities
- agency culture
  - positioning of community engagement as a valid, complex, long-term investment with high-level organisational champions who recognise the complexity of success measures as separate from response outcomes
  - use of clear, positive and specific language about community risk and engagement
  - valuing of community engagement at the local level
  - encouragement of shared values between agencies and communities
  - enhancement of agency-wide understanding of the definitions of 'community' and associated layers to create structure for communities with nuanced and targeted plans.

Natural Hazards Research Australia is the national centre for natural hazard resilience and disaster risk reduction, funded by the Australian Government and Participants.

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