Ecological disaster risk reduction and resilience

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Introduction

This paper highlights an opportunity to improve our knowledge and understanding of the ecological dimensions of disaster risk reduction and resilience. It is part of a scoping process the Australian Institute for Disaster Resilience (AIDR) is undertaking to refine the focus of a future Handbook on the theme.

Ecological disaster risk reduction and resilience revolves around the idea that preserving and enhancing natural environments can provide ongoing benefits to human populations such as clean air and water, biodiversity, cultural and recreational opportunities and can enhance the disaster resilience of communities as part of a multi-disciplinary approach to disaster risk reduction (see Lowe *et al.* 2022; Martin *et al.* 2021; Rendón, Sandorf & Beaumont 2022). The United Nations (2019) states:

> *The widespread loss of biodiversity and ecosystem health is evidence of a failure to account for and manage the breadth of exposed global assets. That loss also has a major effect on risk reduction and the mitigation of environmental hazards.* (p.145).

The importance of this concept is recognised in international policies such as:

- *United Nations Convention on Biological Diversity* that recognises biological diversity is a global asset of tremendous value for present and future generations
- *Sendai Framework for Disaster Risk Reduction 2015–2030* that identifies the opportunity to build back better, including integrating disaster risk reduction into all stages of development
- *The 2030 Agenda for Sustainable Development*:
  - Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
  - Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reserve land degradation and halt biodiversity loss.

This is particularly relevant with events such as the 2019–20 bushfires in Australia that were described by the Royal Commission into National Natural Disaster Arrangements as an 'ecological disaster' with '…predicted serous, long-term, adverse effects on biodiversity'. The destruction of significant habitat and loss of species during the bushfires resulted in an estimated 3 billion animals killed or displaced and tens of millions of hectares of land affected (Commonwealth of Australia 2020).

Various disciplines are involved with ecological disaster risk reduction and resilience including disaster management professionals, emergency responders, ecologists, planners, scientists and engineers. However, there is currently limited guidance on the many opportunities provided by ecological disaster risk reduction and resilience and we are seeking to fill that gap.

Benefits

While a disaster can impact on ecological systems (see Fujii *et al.* 2021), protecting and enhancing these systems can assist with reduction of risk from high-risk hazards. Multi-disciplinary benefits of a healthy ecological system are being explored as part of an ongoing commitment to improving and sharing knowledge.

The co-benefits of protecting, restoring and managing ecological functions are evident when we walk around areas that integrate ecosystems into communities and protected areas. Ecological disaster risk reduction can protect and enhance native flora and fauna and enhance where people live, work and play while assisting with disaster risk reduction (see Alexander *et al.* 2021, Hagedoorn *et al.* 2021, Kalantari *et al.* 2018, Lallemant *et al.* 2021).

There is a growing trend to incorporate nature-based solutions into environments that seeks to protect and manage ecosystems while improving

Talbaragar river crossing, Merriwa.

Image: Mark Maund

resilience. This trend is assisted by the increasing understanding of the value of ecological systems beyond biodiversity to the broader economy, people's wellbeing, culture and sense of identity (Commonwealth of Australia 2020). Scientific research has a strong focus on ecosystem management, biodiversity and innovation. However, we want to develop and understand the role that ecological disaster risk reduction can play in efforts to support resilient communities.

Current knowledge

Existing documents and guidance relating to the concept focuses on nature-based solutions (IFRC 2022, United States Army Engineer Research and Development Center 2021, World Bank Institute 2019). These documents provide useful background knowledge and ideas. AIDR is consolidating this knowledge with examples of leading contemporary practice and is seeking case studies of best practice in Australia as a basis for knowledge sharing and to draw out the principles of ecological disaster risk reduction and resilience.

How would this look?

A preliminary review of existing guidelines, policies and contemporary research revealed a series of themes. These include balancing the extent to which ecological outcomes are prioritised. Ecosystem interventions are one part of disaster risk reduction and resilience and need to be coupled with other interventions. However, ecological interventions should be integrated with sustainable development at the earliest stages and throughout the development cycle.

Co-benefits were evident in the literature where incorporating ecological outcomes provided benefits beyond disaster risk reduction. These benefits should be considered as part of the 'value' of preserving and enhancing ecological systems, such as:

- greater depth of ecosystems with improved soils, water and multi-layered ecological environments
- preserving habitat
- maintaining ecological processes
- recreation opportunities
- visual and emotional benefits for the community.

It is important to note that best outcomes are achieved by retaining ecosystem functioning rather than trying to re-establish ecosystems.

The role of the community should be promoted as many communities have a strong desire to retain and improve ecological functions. For many people, the definition of 'home' can include 'the landscape and environment, so they have a vested interest in positive outcomes (' Block *et al.* 2019, Reid & Beilin 2015). Additionally, local knowledge can significantly assist with understanding risk from high-risk hazards and how to increase resilience (Kirchhoff *et al.* 2021). The important roles of community in risk reduction is also recognised in the Sendai Framework Guiding Principle of 'Empowerment of local authorities and communities through resources, incentives and decision-making responsibilities as appropriate' (UNDRR 2015).

Other concepts have emerged from the preliminary review:

- Timing – ecological interventions can assist with all phases of the disaster management cycle.
- Goal of biodiversity/ecological outcome – need to identify the goal(s) such as biodiversity protection, improved soil or water quality, flora and fauna long-term management or a combination and these and other goals (see Burrows 2008, Driscoll *et al.* 2010).
- Monitoring – need to identify type and scale of disasters that are sought to be managed. Long-term monitoring prior to a disaster and as part of post-disaster recovery is critical for any ecological intervention (see Chng *et al.* 2022).
- Governance – creating clear governance pathways for pursuing disaster risk reduction projects was identified as a strategy in the National Disaster Risk Reduction Framework (Commonwealth of Australia 2018) and is Priority 2 of the *Sendai Framework for Disaster Risk Reduction 2015-2030* (UNDRR 2015). Governance may include how we oversee emergency management, roles and function of ecological management and integration with engineering controls.

This review is the first step in understanding the concept of ecological disaster risk reduction and opportunities to integrate ecological dimensions into developing resilient communities, land management, building and infrastructure design and land-use planning activities.

AIDR wishes to connect with and learn from subject matter experts, practitioners and stakeholders. We are seeking insights from your experience and understanding of the ecological dimensions of disaster risk reduction and resilience. Interested stakeholders can participate in a brief survey to refine the focus of a future handbook on the theme (see www.aidr.org.au/news/ecological-disaster-risk-reduction-and-resilience-scoping-survey). The survey allows involvement to improve and share knowledge in Ecological Disaster Risk Reduction and Resilience. Additionally, any best practice case studies can be sent to enquiries@aidr.org.au.

About the author

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