Nature-based solutions to mitigate flood risk

Natural **Hazards Research** Australia

RESEARCH TEAM

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Project duration: 3 years

Background

Flood management is undergoing a critical transformation as traditional engineering solutions like levees and dams prove increasingly ineffective against climate change-induced flooding. Nature-based Solutions (NbS) have emerged as a promising alternative, offering a more holistic approach to flood risk management.These innovative strategies work with natural systems, allowing landscapes to absorb and mitigate flood impacts while maintaining ecological integrity. Unlike conventional hard infrastructure that disrupts riverine environments and reduces biodiversity, NbS represent a paradigm shift towards more adaptive and resilient flood control methods.

Despite their potential, these strategies have seen limited implementation across the country. To advance the adoption of NbS for flood management, a comprehensive understanding of both their direct flood mitigation benefits and broader ecological and societal impacts is essential.

This requires robust scientific assessment of hydrological outcomes, economic analysis of implementation costs and benefits, and quantification and valuation of social and environmental co-benefits. Additionally, understanding the institutional and community contexts that either enable or hinder NBS adoption is crucial for successful implementation.

Project description

The project represents a comprehensive research initiative to advance Nature-based Solutions (NbS) for flood risk management across diverse Australian settings. Central to the research is the development of critical analytical tools through comprehensive reviews of key methodological approaches. This includes in-depth examinations of hydrodynamic modelling tools for assessing flood risk under various NbS scenarios, economic assessment methods, and innovative approaches for quantifying co-benefits of flood mitigation strategies.

The project will critically analyse existing tools, identifying incentives and barriers to floodplain restoration and conservation. By focusing on three specific catchment studies - the Bremer catchment in Southeast Queensland, the Richmond catchment in Northern New South Wales, and an additional catchment - researchers will test and refine these analytical frameworks.

The research aims to improve guidelines that provide technically and socially feasible strategies for NbS implementation, balancing resilience, risk management, and ecological connectivity across different flood scenarios.

Intended outcomes

The research aspires to fundamentally transform floodplain management in Australia by providing actionable, evidence-based strategies for integrating Nature-based Solutions into flood risk mitigation.

By developing sophisticated tools and methodologies, the project aims to empower regional agencies, enhance policy-making, and build flood resilience. Key objectives include expanding understanding of flood risk, identifying cost-effective NbS interventions, and creating professional capacity for implementing nature-inspired flood management strategies.

The research will generate comprehensive guidelines that bridge technical expertise with practical application, demonstrating the potential of ecosystem-based approaches to flood mitigation.

By connecting Australian and international research networks, the project seeks to establish best practices that can be adapted across diverse geographical contexts. Ultimately, the research aims to shift perspectives on flood management, promoting approaches that simultaneously protect communities, restore ecological systems, and create more adaptive, sustainable landscapes

Translation and implementation potential

The project's translation and implementation strategy is robust and multifaceted, designed to ensure widespread adoption of research findings. Through a comprehensive communication approach, the team will disseminate knowledge via online webinars, conference presentations, technical reports, and a dedicated project website. The establishment of a national Nature-based Solutions Communications Hub will facilitate knowledge transfer and expand existing Communities of Practice networks.

By producing detailed discussion papers, updated guidelines, and a final synthesis report, the research will provide actionable insights for policymakers, urban planners, and environmental managers. The project's engagement with diverse stakeholders, including local councils and professional associations, ensures that research outcomes are practical and context-sensitive.

By showcasing successful case studies and providing economic assessment tools, the initiative aims to build confidence in nature-based flood mitigation strategies, ultimately supporting more resilient, adaptive community planning across Australia.

Further information

For full project details head to: https://naturalhazards.com.au/research/research-projects/conserving-and-reconnecting-floodplains-mitigate-flood-risk
Or contact Brendon.mcatee@naturalhazards.com.au