Natural Hazards Research Australia

Biennial Research Plan 2026–28

Natural Hazards Research Australia

Our Values

Respect

We value every voice and treat all people with dignity, courtesy and professionally.

Excellence

We commit to leading rigorous, evidence-informed outcomes for purposeful impact.

Independent

We maintain autonomy in our research and decision making for public value.

Innovative

We explore new approaches to provide creative solutions to complex issues.

Collaborative

We enable knowledge sharing and foster connections for mutual goals.

Integrity

We are honest and uphold the highest ethical standards in everything we do.

Australian Government

Natural Hazards Research Australia's staff work from Burramattagal, Dharawal, Dharug, Dja Dja Wurrung, Gadigal, Turrbal/Yuggera, Wadawurrung, Wangal and Wurundjeri Countries. We thank and acknowledge the Traditional Custodians of these lands and all the lands where we work, live and walk and pay our respects to Elders past, present and emerging. We recognise that these lands and waters have always been places of teaching, research and learning and that sovereignty has not been ceded. We are committed to strengthening reconciliation and building resilience through respectful and empowering relationships with First Nations communities, peoples and partners.

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CONNECT.
DISCOVER.
ACT.

Life changing research
for today and tomorrow.

Executive summary

Natural Hazards Research Australia (the Centre) delivers and translates worldclass research into real-world impact. The Centre's mission-driven portfolio delivers evidence-based insights, tools and capabilities that directly inform policy, operational decision making and community resilience.

Our work supports governments, emergency management agencies, industry and communities to reduce risk, save lives and minimise economic and social harm in an increasingly complex hazard environment.

We are progressing our mission working with our partners and the community on research that is useful, useable and used to support better decision making to save lives and protect communities.

Centre investments span funded research through to knowledge sharing and capability development in the research ecosystem, from end-users to researchers.

Our mission is enacted through the Centre's philosophy of an end-user driven approach to strategy and its implementation, which is unique, agile and powerful in addressing critical and emergent issues in disaster risk reduction.

We collaborate with end-users to identify, scope and on-board research that helps tackle a range of research opportunities, from practical frontline problems to more forward-looking, visionary thinking and thought leadership.

880 REFERENCES TO NHRA & CRC RESEARCH IN POLICY DOCS WORLDWIDE

INFORMED 17+ NATIONAL, STATE AND TERRITORY POLICIES AND STRATEGIC PLANS

176 YOUTUBE VIDEOS WITH 28,996 VIEWS

12,000+ SOCIAL MEDIA FOLLOWERS

64,000+ SOCIAL MEDIA ENGAGEMENTS

2 MILLION+ WEBSITE IMPRESSIONS

280+ EVENTS AND WEBINARS

3147 MEDIA MENTIONS

546,000+ WEBSITE USERS

772,000+ WEBSITE PAGE VIEWS

MEMBERSHIP OF 10 INDUSTRY BODIES

11,000 DOWNLOADS OF 11 DISASTER RESILIENCE HANDBOOKS

18,847 EVENT REGISTRANTS

The Centre's research strategy

Our research has had nationwide impact, helping all those in Australia in diverse ways and strengthening communities, governments, and emergency management agencies to prepare for emerging natural hazard challenges.

Increased community resilience to natural hazards

Our research has touched all in Australia in some way, and ensured the public, governments and emergency management agencies are better prepared for what's to come.

Driven sector transformation

We have changed the narrative in the emergency management sector, creating a space for discussion, innovation and big picture thinking.

Mobilised the research ecosystem

We have provided the infrastructure and funding to bring researchers together with end user practitioners, putting critical findings directly into the hands of decision makers.

Contributed to the international knowledge base

We have developed, coordinated and consolidated natural hazards science in Australia and ensured research efforts are focused on work that is timely, relevant and useful.

Increased capability

We have supported hundreds of researchers; our communications and research translation have built knowledge and skills in our partners and the community.

This Biennial Research Plan 2026–28 (the Plan) outlines the Centre's research activities for the next two years. It frames how the Centre plans to invest in research projects and build its research capabilities and highlights key questions for end-users to consider.

The Plan has been developed within the context of a range of policy questions under discussion at various levels of government and industry, including mitigation investment, insurance affordability and land use, national response capability, community resilience, infrastructure resilience and environmental resilience.

It is also mindful of a range of drivers that are influencing measures to reduce disaster risks in Australia, spanning environmental, social and built environment changes through to capability and workforce trends and political, regulatory and economic change. These changes have significant implications for the two-year outlook, including:

- → continued rising impacts of natural hazards and increased demands on scarce disaster management capability and resilience investments
- → increased number of people living in recovery and increased demands on government funding
- → increased complexity of natural hazards due to increased interconnectedness of systems
- → rising insurance unaffordability in high-risk areas
- → species and habitat loss
- → greater capability to manage natural hazards through technological change.

Our research is also applicable to other fields including national security, supply chain disruption, biosecurity, climate adaptation and others.

Research priorities for 2026–28

The Centre's established core research portfolio continues to invest in new projects across prevention, preparedness, response and recovery. Its six research key focus areas and five key capability areas continue to provide guidance to end-user-driven research concept submissions. Illustrative questions are provided for:

- Key research focus areas, comprising understanding and mitigating risk, land-use planning and urban design, resilient recovery, environmental solutions, next generation capability, and social equity.
- Key research capability areas, comprising First Nations knowledges, data management and science, future workforce, community-led, place-based resilience, and interoperability.

The Centre also prioritises initiatives focused on emerging and responsive needs, as well as foresight, innovation and thought leadership.

Research utilisation

The Centre recognises research utilisation as a key objective throughout the conduct of research. As our research portfolio continues to mature, further research translation and utilisation opportunities will emerge across its end-user driven research portfolio. To support research utilisation, we maintain a key focus on monitoring and evaluation.

Responsive disaster research

The Centre's investment strategy provides flexibility to initiate or co-invest in projects in response to specific natural hazards and other changes that affect vulnerability, exposure or resilience to disasters caused or contributed to by natural hazards.

We encourage learning between active projects and connection or building on past projects where appropriate. This includes ensuring that research data created during projects is made available in accordance with the Centre's Data Management Framework.

Education and Capability Program

The Centre delivers an established Education and Capability Program consisting of Postgraduate Scholarships, support for Associate Students, Early Career Researcher Fellowships, First Nations scholarships and fellowships, internships, research networks and the annual Disaster Challenge.

Research-informed knowledge transfer

The Centre will, as appropriate, use the knowledge and outcomes from its research program to develop knowledge transfer opportunities including delivery of workshops and webinars based on research findings and outcomes, and support professional development of the emergency management and disaster resilience workforce. Amongst these activities the Centre will continue to run an annual Natural Hazards Research Forum, to share research findings and expand knowledge networks.

Life-changing research for today and tomorrow

Natural Hazards Research Australia is the nation's leading research capability for natural hazards and disaster risk reduction.

Through interdisciplinary, end-user driven research into the social, physical and socioeconomic impacts of natural hazards and disasters, Natural Hazards Research Australia (the Centre) delivers evidence that makes a difference – research that informs policy, strengthens critical systems and improves national resilience.

Our research translates into practical resources and decision-support that help governments, emergency services and communities prepare for, withstand and recover from disasters.

Established by the Australian Government in 2021 following the catastrophic 2019–20 Black Summer bushfire. As respected stewards of more than 20 years of cutting-edge natural hazards knowledge, we deliver world class end-user driven research with a proven record of informing policy and practice.

We facilitate interdisciplinary research into the social, physical and socioeconomic impacts of natural hazards and disasters that strengthens systems and communities.

We provide education and foster connections between researchers, practitioners and policymakers locally and worldwide. We bring the best expertise and experience together to elevate the design and delivery of research and optimise research impact.

Our mission-driven research portfolio provides innovative solutions to equip Australians with the best evidence to mitigate, respond to and recover from natural hazard events. Our agile, multidisciplinary and innovative model for funding responds to the needs of end-user industry partners with a focus on research utilisation.

The Centre's **10-year Strategic Plan 2021 to 2031** sets clear strategic goals aligned with national priorities and stakeholder needs, ensuring research efforts are purposeful and impactful.

The Centre's **10-year Strategic Research Plan** translates these organisational priorities into a coherent and robust research program, informed by ongoing engagement with Centre Participants, end-users and researchers, as well as recent natural hazards, government policy directions and relevant inquiries and post-event reviews.

The **Biennial Research Plan** supports the10-Year Strategic Research Plan by guiding research investment across the Centre's research portfolio. It defines targeted milestones and maintains a rolling two-year outlook, reviewed annually.

To assist planning, the Centre regularly scans the natural hazards and disaster resilience research ecosystem to identify active research projects. The Centre's Strategic Research Planning Framework is illustrated in Figure 1.

Vision

That communities will be safer, more resilient and sustainable in the face of natural hazards.

Purpose

To work with partners and the community on research that is useful, actionable and supportive of better decision-making to save lives and protect communities.

Purposeful research investment

Biennial Research Plans are an important element of the Centre's research governance.

This Plan outlines the Centre's research activities, a framing for the Centre's research investment for its research portfolio and target milestones.
It provides a two-year outlook which is updated annually to ensure the Centre offers continued and sustained value to Participants and more broadly:

- → enabling national collaborations
- → increasing investment in natural hazards research
- → providing evidence to inform policy and capability
- → delivering a responsive end-user driven approach
- → responding directly to recent disasters and emerging risks
- → embedding and elevating First Nations sciences, knowledges and approaches.

The Biennial Research Plan 2026–28 outlines the Centre's research activities and how they will deliver outcomes identified in the Centre's 10-Year Strategic Research Plan and Strategic Plan (refer to Resource list).

Figure 1: Strategic Research Planning Framework

Research context and strategic environment

The context in which the Centre operates influences its research directions.

Australia is susceptible to a diverse range of natural hazards. The 2025–26 higher risk weather season saw damaging natural hazards around Australia including floods, severe storms, cyclones, bushfires and heatwaves. Globally, extreme natural hazards caused significant damage and loss of life.

Many communities impacted were still recovering from previous recent natural hazard events and other stressors.

The financial costs of natural hazards continue to grow, placing even greater pressure on communities' resilience and sustainability. Rising insurance prices linked to natural hazard losses are contributing to the increased cost of living across Australia and the world.

Our planet is warming with 2025 the the third hottest year on record. Natural hazard emergencies are expected to become more frequent, complex, unpredictable and difficult to manage. This will reshape the way risk is assessed, managed and evaluated.

Sector awareness of artificial intelligence (AI) application, changing energy sources and expanding hazards-based technological innovation leads to increased interest in emerging technologies and data to solve complex problems.

The Centre continues to engage with its Participants to ensure its research program is driven by and meets the needs of government, emergency services, industry and the community to maximise relevance and value. User-driven investment rounds are open to Centre Participants, or those end-users approved by the Centre's Board to submit research project ideas for funding.

Our research is also applicable to other fields including national security, supply chain disruption, biosecurity, climate adaptation and others.

Australian Government's strategic plans

In 2023, the National Emergency Management Agency (NEMA) released The Second National Action Plan to implement the National Disaster Risk Reduction Framework (refer to References). The aim of the Plan is to reduce systemic disaster risk in order to create stronger, more secure and more resilient communities before, during and after disasters. It is essential that the work of the Centre aligns with this Plan and contributes to its objectives. Importantly, mapping against each of the plan's 24 national actions demonstrates the Centre's contributions across each of the actions.

In 2025, the Australian Government completed a National Climate Risk Assessment with key findings including:

- More frequent and severe extreme events like floods, bushfires and cyclones
- Sea level rise could put 1.5 million more people in high risk coastal areas by 2050
- Climate change will increase costs, reduce productivity and worsen inequalities
- Heatwaves could lead to more heat-related deaths, especially in northern Australia
- Australia's unique ecosystems are under threat. By 2050, up to 70% of native plant species could face conditions outside their current climate range, risking species loss and ecosystem collapse.

The Australian Government has also released the National Adaptation Plan providing a framework for adapting to the nationally significant physical climate risks identified in the National Climate Risk Assessment.

The Australian Government is a signatory to relevant international agreements:

- Sendai Framework of Disaster Risk Reduction 2015–2030
- Kananaskis Wildfire Charter, 2025
- Joint Declaration of Intent between the National Emergency Management Agency and the Department of Public Safety and Emergency Preparedness of Canada, 2026.

The Australian Government is considering recommendations from previous reviews including:

- Review of National Natural Disaster Governance Arrangements (Glasser, 2023)
- Disaster Recovery Funding Arrangements Review (NEMA, 2024)
- Independent Review of Commonwealth Disaster Funding (Colvin, 2024).

Key policy questions under discussion

International, national and local policy continues to evolve to focus on disaster risk reduction.

Key policy questions currently under discussion at various levels of government and industry include:

- **Mitigation investment:** How much mitigation investment is required? What are the highest priority risks? Where are these mitigation priorities? What solutions are most effective? How can investment in mitigation be incentivised?
- **Insurance affordability and land use:** How can insurance be made more affordable? What is the most appropriate land-use planning/ urban design policy framework to accommodate natural hazard risk?
- **National response capability:** What is the role of the Australian Defence Force and what broader role could non-government organisations and businesses play in disaster management? Does Australia need a national disaster and recovery response force, or are there ways in which existing state and territory capability can be leveraged to enhance national response and recovery capability?
- **Community resilience:** How best is resilience built before, during and after a disaster? Should communities be re-built? What is the future of communities faced with increased frequency of extremes?
- **First Nations peoples:** How can First Nations communities' needs be better supported during prevention, preparedness, response and recovery? How can we address social equity?
- **Infrastructure resilience:** How can infrastructure resilience be enhanced to reduce community disruption? How can design and construction standards include resilience and future risk considerations?
- **Environmental resilience:** How can environmental resilience be achieved? How can First Nations people be better empowered to strengthen and protect landscapes and communities to achieve their cultural aspirations and to lead and inspire other sections of the community? What should a global standard for measuring nature, its condition, its social and economic contribution and its role in mitigating natural hazard events be?

Influencing factors

A range of factors influence natural hazard risk in Australia:

- Environmental change, inclusive of:
  - warming planet and rising sea levels
  - changes in the future frequency and severity of natural hazards
  - biodiversity loss
  - environmental degradation.
- Societal change, inclusive of:
  - population increases in at-risk areas
  - increases in population diversity
  - urbanisation of population
  - ageing population
  - increases in social isolation with more people living alone
  - increased use of digital devices and the internet, including the meshing of the digital and physical world
  - housing shortages placing pressure for further development
  - migration into areas where people are not aware of natural hazard risks
  - increasing rates of chronic diseases
  - decline in social cohesion (for example, the newly established Royal Commission on Antisemitism and Social Cohesion)
  - growing disinformation in disasters
  - decreased level of community trust in government and other authorities.

- → Built environment change, inclusive of:
  - increasing complexity and interdependence of infrastructure networks and systems
  - increased use of renewable energy technologies such as lithium-ion batteries, hydrogen, electric vehicles, etc. and decentralised energy systems such as microgrids
  - ageing infrastructure impacting the reliability of services
  - population increases and ageing building stock demanding significant maintenance and growth of supply
  - increasing use of highly flammable and combustible materials.
- → Capability change, inclusive of:
  - technological change, including the potential of quantum computing
  - widespread adoption of artificial intelligence
  - next-generation communications (for example, 5G and satellite)
  - sensors and growth in their deployment (including satellite technologies)
  - robotics
  - augmented reality and digital twins
  - hypersonic transport
  - autonomous vehicles
  - next generation building materials
  - embedding of First Nations management practices
  - advanced climate projections to inform risk assessment and planning.
- → Workforce trends, inclusive of:
  - declining rates of formal volunteering
  - increasing workforce diversity
  - increasing flexible working
  - changes in the nature of work driven by technology.
- → Political, regulatory and economic change, inclusive of:
  - the impact of the global economy on Australia's economic circumstances
  - geo-political stressors and global conflict
  - shifting civil preparedness strategies
  - growing risk of cyber attacks
  - increases in Australians' wealth
  - increases in socio-economic gap
  - rising insurance premiums
  - legislated Nature Repair Market
  - climate and nature disclosures.

Implications

Many possible implications of these drivers exist, with significant implications including:

- → ongoing increased impacts of natural hazards and demand on scarce disaster management capability and resilience investment
- → increased number of people living in recovery and demand on government funding
- → increased complexity of natural hazards due to the interconnectedness of systems
- → increased unaffordability of insurance in high-risk areas
- → climate change negatively impacting Country in ways that deeply affect the mental health and overall wellbeing of First Nations communities
- → species and habitat loss
- → greater capability to manage natural hazards through technology.

Research priorities for 2026–28

Research priorities across key natural hazard risk reduction phases are informed by environmental analysis, research findings and stakeholder feedback.

Based on an environmental scan of current risk, capability and policy trends; learnings from current research; and feedback from Participants and other subject matter experts, the Centre proposes a series of research key focus areas and key capability areas addressing research questions across prevention, preparedness, response and recovery (figures 2 and 3).

The Centre encourages forward-looking and innovative approaches across these areas with the view of leading research which will be useful, useable and used.

These research focus and capability areas act as a prospectus to guide the submission of user-driven research concepts through the Centre's investment processes (also referred to as funding rounds).

The research questions listed under each focus and capability area help illustrate the types of research that would be considered relevant.

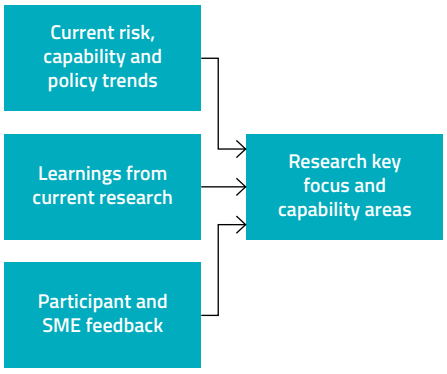

Figure 2: Inputs to research key focus and capability areas

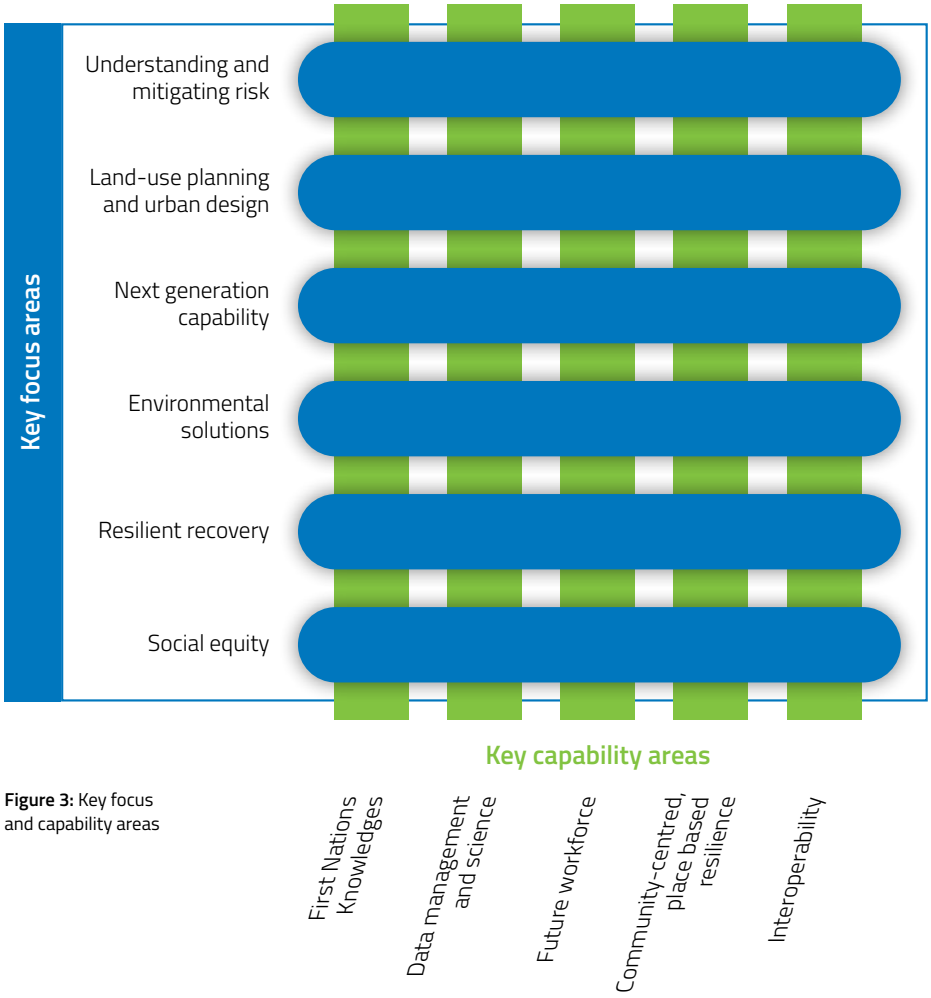

Figure 3: Key focus and capability areas

Research key focus areas

Understanding and mitigating risk

The National Disaster Risk Reduction Framework and its supporting Second National Action Plan focuses the nation's attention on building resilience by reducing risk, including through the ability to resist, accommodate, adapt to, transform and recover from the impacts of natural hazards. The Framework establishes a vision that all sectors of society:

- → make disaster risk-informed decisions
- → are accountable for reducing risks within their control
- → invest in reducing disaster risk to limit the cost of disasters when they occur.

Jurisdictions are currently improving understanding and management of natural hazard risk in consultation with stakeholders including Natural Hazards Research Australia. Industry and communities have called for further investments in mitigation infrastructure.

Research under this focus area will support decisions to better allocate mitigation investment to reduce risk.

Research questions and projects that could be captured in this focus area include:

- → What are the true costs of natural hazards now and in the future?
- → What are the drivers and science of current and future natural hazard risk (including compounding and cascading events) and what are the management implications?
- → How does infrastructure network design determine systemic vulnerability to natural hazard impacts?
- → What are the barriers, challenges and opportunities to achieving adaptation and transformation?
- → What are the highest priorities for natural hazard mitigation? How should mitigation be optimised across a landscape?
- → What hazard mitigation solutions are most effective, and will effectiveness change under future climate change?
- → How can effectiveness best be measured?
- → How can investment in natural hazard mitigation be encouraged?
- → How can governance arrangements enable disaster risk reduction?
- → How can hazard treatments be managed to minimise impact on environmental, cultural and historical assets?
- → What are the opportunities to enhance landholder stewardship in relation to natural hazard mitigation?
- → What smarter and more affordable ways exist to ensure hazard maps are up to date and available to communities, to support improved preparations and increased resilience?

Land-use planning and urban design

Land-use planning and urban design (inclusive of building materials) are critical to the reduction of future natural hazard risk. Recent floods, cyclones and bushfires highlight opportunities to consider developments in high-risk areas.

Industry continues to call for further government consideration of land use planning systems, assisted relocation strategies and reforms to building codes.

Research under this focus area will improve the design of current and future communities to reduce natural hazard risk.

Research questions and projects that could be captured in this focus area include:

- → How effective are existing land-use planning and urban design controls at managing current and future natural hazard risk?
- → How can current and future natural hazard risk, societal changes and resilience considerations be best accommodated in land-use planning and urban design in an affordable way? (i.e. What are the land use planning and urban design controls required today for tomorrow?)
- → How can risk-informed planning be encouraged and supported?
- → How should essential infrastructure be managed to ensure resilience?
- → How can physical risks associated with energy transition (e.g. lithium-ion batteries) and evolving urban design be managed?
- → How can future building materials, designs and standards enhance asset resilience?
- → How should evacuation constraints (e.g. road capacity and evacuation time estimates) be best considered in future planning?
- → What are the specific risks to heritage buildings?

Environmental solutions

The Australian Government's Australia State of the Environment 2021 report highlighted the significant risks natural hazards pose to the natural environment. There is growing interest in understanding how to improve environmental resilience and the efficacy of environmental solutions to reduce natural hazard risk.

Research under this focus area will inform the use of environmental solutions to reduce natural hazard risk and improve environmental sustainability.

Research questions and projects that could be captured in this focus area include:

- → Where are the greatest risks posed to the environment by natural hazards?
- → What are the opportunities to deploy nature-based solutions?
- → What is the efficacy of nature-based solutions to reduce natural hazard risk?
- → How can nature-based solutions be incentivised?
- → What are the environmental impacts of natural hazards and how does the environment recover?
- → How are natural hazard risks altered by future environmental changes?
- → How is environmental resilience supported and engendered?

Next generation capability

Increases in the frequency and severity of natural hazards currently and will continue to lead to increased demand on disaster management capabilities. There is a need to develop the next generation of disaster management capability that considers workforce across the prevention, preparedness, response and recovery cycle (including volunteers), training systems, technology, equipment, processes and ways of working to ensure Australia's disaster management capabilities are a step ahead in the coming decades.

Research under this focus area will enhance future capability to enhance safety, resilience and sustainability.

Research questions and projects that could be captured in this focus area include:

- → What are the key foundational enablers and barriers of innovation in disaster management?
- → How can challenges to collective action and decision-making be addressed and the opportunities amplified across agencies and jurisdictions?
- → What capacities, values and capabilities are needed for a future-facing disaster and emergency workforce (including volunteers) and how can institutions cultivate and protect them?
- → What is the effectiveness and efficiency of existing capabilities and how could they be optimised?
- → What are the requirements for the next generation of emergency management capability and how is this built?
- → How can new technologies such as artificial intelligence, augmented reality, sensing and robotics be adopted and deployed to improve resilience?
- → How can better decision making be enabled for first responders and community members?
- → How will enhancements in technologies alter community attitudes, decision-making, communication and resilience? How can predictive risk simulation, decision-support and communication be enhanced?
- → What is the next generation of warning systems?
- → How can first-responders be more effectively protected?
- → How can resilience to technological disruption be maximised?

The Centre welcomes opportunities to engage in technology demonstration research.

Resilient recovery

Recovery from disasters caused by natural hazards is a long-term and complex endeavour for any community reflecting a long-term policy and systems challenge, particularly for communities experiencing compound events with communities effectively living in a state of recovery.

The Sendai Framework for Disaster Risk Reduction 2015–2030 recognises opportunities to emerge stronger from natural hazards by embracing practices that build resilience and reduce natural hazard risk.

In communities experiencing compound and cascading natural hazard events, there is a sense that recovery never ends. There is a need for collaborative research into the systemic changes needed to build resilience.

Research under this focus area will inform approaches to achieving resilient recovery.

Research questions and projects that could be captured in this focus area include:

- → What is the effectiveness of recovery practices?
- → What systemic change is needed to build resilience?
- → How are communities best re-built and transformed during recovery to build resilience and reduce natural hazard risk?

Social equity

Natural hazard risk is underpinned by vulnerabilities including underlying social disadvantage which presents barriers for people and communities to prepare for, respond to and recover from natural hazards.

Significant knowledge gaps remain, particularly regarding the social impacts of natural hazards on people living in Australia. The Sendai Framework for Disaster Risk Reduction 2015–2030 calls for dedicated action to address underlying risk drivers including inequality.

Research under this focus area will inform policy to enhance community resilience to natural hazards.

Research questions and projects that could be captured in this focus area include:

- → Considering the term 'community resilience', what are the roles of community preparedness, social capital and social cohesion?
- → Considering the term 'First Nations Resilience', what are the roles of community preparedness, health of Country, social capital and social cohesion?
- → What are the systemic causes of risk for vulnerable communities exposed to natural hazards in Australia?
- → What are the impacts of collective trauma, focusing on lessons learned in collaboration with those with lived experience?
- → What constitutes critical social infrastructure?
- → How can disaster risk reduction strategies best address the needs of diverse communities? For example, First Nations, people with disability and multicultural communities.
- → How can social cohesion, diversity and inclusion be promoted?
- → How can resilience-building initiatives address pre-existing social inequalities?
- → Will technological innovation improve or reinforce social inequalities?
- → How can resilience-building initiatives be made more affordable and consider social equity?

Key capability areas

To support research key focus areas, key capability areas have been identified. Key capability areas each cut across multiple research focus areas. These include:

First Nations knowledges

What is the enabling environment that will better embrace First Nations Knowledges to build resilience and heal and manage land and improve First Nations peoples' involvement in disaster management?

How can meaningful partnerships between agencies, recovery organisations and First Nations communities be supported?

The Centre continues to strengthen partnerships with First Nations people and organisations to ensure its research program empowers and strengthens reconciliation, with First Nations' involvement in the Centre's 10-Year research strategy review via its First Nations Pathways Working Group.

Data management and science

How can information, communications, data management practices and the application of data science, sensing and monitoring support enhanced decision making and service delivery?

There is significant emerging interest to understand opportunities regarding emerging data, existing national datasets and the application of AI to disaster resilience and risk reduction, including limitations and ethical, economic, operational and social considerations.

Research questions and projects that could be captured by the capability area include:

- → What does a national natural hazards data eco system best look like?
- → What standards are needed for interoperability between jurisdictions?
- → What are the error margins, currency issues and completeness gaps in existing national hazard datasets?

The Centre developed a Research Data Management Framework (refer to References) to guide the Centre's research data management, detailing best-practice data collection, identification, collation, curation, access and sector leadership. The Centre will collaborate with others where opportunities exist to maximise value.

Future workforce

As the nature of natural hazards, technology and society evolves, so too must the future workforce.

Research questions and projects that could be captured in this capability area include:

- → What does the nature of the workforce look like in future decades?
- → What is the influence of new technologies on the future workforce?
- → How can emergency services partner with other government agencies, not-for-profits, civil society and industry to effectively leverage emerging technologies?
- → What strategies can be implemented to attract new recruits into disaster resilience and risk reduction and retain them over the long term?
- → How can volunteering be encouraged amongst diverse communities and how will volunteering differ between rural and urban areas?
- → How can workforce health and safety be enhanced (physical and psychosocial)? How will strategies differ between volunteer and career workforces?
- → What capability and capacity is needed? How is local risk, local workforce needs and surge capacity best considered?

Community-centred, place-based resilience

Community-centred initiatives for adaptation, preparedness, response and recovery are critical for disaster resilience and risk reduction.

Research questions and projects that could be captured in this capability area include:

- → What are community expectations of emergency management and government agencies, and what do they need? How can agencies best partner with community to support effective and enduring community-centred approaches to resilience building? What capabilities do agencies need to achieve this? What capacities, values and capabilities are needed in the community to prepare them and augment/reduce the need for the emergency workforce?
- → How can investment in social capital best be targeted to have meaningful impact in building more resilient communities?
- → What is the community's understanding of natural hazard risk? What are the most effective approaches to community engagement, including in preparing for risks they have not previously experienced?
- → What is the best way to measure the effectiveness of community engagement and resilience programs?
- → What does a decline in social cohesion and trust in government look like in a disaster management context? How is community trust in government and emergency services evolving/changing and how can trust be increased?
- → What is the state of disaster preparedness nationally?
- → What are community expectations of public information and warnings?
- → How can disinformation and misinformation be effectively managed?

Interoperability

It is critical for various components of disaster management systems to be able to work with each other, supporting improved community outcomes across disaster mitigation, preparation, response and recovery. How can the development of national systems and capabilities be best identified and supported, when and where required?

Systems and capabilities with known research needs identified as an important focus in this research plan include:

- → Australian Warning System
- → National Heatwave Warning Service
- → Australian Tsunami Warning System
- → Australian Fire Danger Ratings System
- → Fire simulation/ fire prediction systems
- → Aerial firefighting
- → Extreme weather impact prediction
- → AusAlert
- → Get Ready
- → Critical communications capabilities.

Figure 4: Research development and co-delivery model

Current and growing research portfolio

Research proposals should be mindful of potential connections with, or amplification of, the Centre's current and past research projects. Further details of these projects, including project outputs are published on the Centre's website.

A dynamic research portfolio

The Centre has committed more than $36 million in funding to its end-user driven core research portfolio. This approach means projects are explicitly nominated by end-users to benefit research utilisation by Participants and others.

This portfolio includes short (tactical), medium (applied) and long-term (strategic) multi-disciplinary projects.

The ongoing research portfolio continues to be developed and managed through strong engagement with Participants and leadership from the Centre.

To ensure the portfolio remains relevant and invests in timely research, two formal end-user driven investment rounds take place each financial year, assessed in the first and second half of the year. Each round's funding is agreed by the Centre's Board.

New project development and co-delivery

The Centre's research design process aims to answer research questions posed by Participants.

User-driven investment rounds are open to Participants and end-users approved by the Centre's Board. Project ideas are evaluated using a published set of criteria and reviewed by the Research and Implementation Committee and endorsed by the Centre's Board. Project budgets are assigned based on the Centre's commercial judgement and expertise.

Once approved, project research teams are onboarded via expression of interest, and a collaborative co-design process undertaken to develop the project plan. This plan is endorsed by the governing project management committee, comprising end-users, researchers and Centre representatives.

Identified translation and implementation pathways co-developed and agreed with relevant end-users are embedded in the project plan. These pathways are regularly reviewed and updated to ensure shared understanding of desired research outcomes and project governance.

Specific themes may be assigned to individual investment rounds following analysis of the research portfolio.

This process is illustrated in Figure 4.

Opportunistic and responsive activities

The Centre retains the ability to invest in projects that are developed:

- → by research users in response to significant emerging needs
- → to respond to significant disasters, or new natural hazard risks, as they occur
- → to respond to strategic research gaps
- → to respond to novel emerging research ideas with modest levels of seed funding to explore early-stage innovative ideas
- → to promote the utilisation of the Centre's research.

These projects should align with the Centre's current research focus and capability areas but may be funded or otherwise supported outside the published funding rounds.

Investment in opportunistic projects is guided by the Centre's Research and Implementation Committee, based upon emerging needs, with support from end-users, identified by the Centre.

Commissioned research

The Centre undertakes independently funded commissioned research that leverages Centre and research providers' project management capabilities. These projects align with the Centre's objectives and are entirely funded by the commissioning entity.

Commissioned projects add to the Centre's available knowledge catalogue and closely linked to Centre and Participant research and priorities.

Project governance

Centre's projects are managed using a formal governance structure and associated systems. All projects have:

- → an agreed and documented project plan
- → identified research and end-user project leaders
- → clear end-user expectations and performance measures
- → a timeline that includes performance review stage gates
- → a project management group
- → a link with a Translation and Implementation Panel
- → regular reporting obligations.

The aim of these structures ensures research is conducted collaboratively to meet the mutually desired outcomes.

Actively engaging with other research initiatives

The Centre actively engages with other research and industry-led research initiatives across Australia and expects this to grow as new initiatives emerge. It also engages with research collectives and initiatives in the university sector undertaking research relevant to the Centre's strategic priorities.

Open access data

The Centre requires data collected through this program be made available to the Centre and released publicly in line with its Research Data Management Framework principles. This is to ensure the data contributes to national natural hazards data and knowledge collection.

This will contribute to building national datasets and identifying significant insights and research questions arising from major natural hazards, providing a context for the development of more extensive research proposals and influence of research priorities.

The Centre is committed to the development of an online data catalogue to promote and support research data accessibility. The data catalogue aims to increase visibility to all Centre project data holdings and facilitate sound research data curation and governance practices for all Centre projects.

Where financially and strategically appropriate, the Centre supports open access publication of its research findings.

Responsive disaster research

The complex nature of disasters caused by natural hazards lends itself to the use of post-disaster research to gain insights that can make a significant contribution to disaster risk reduction and strengthening of disaster resilience.

Responsive disaster research is one of the Centre's major research programs. Investments are made outside of formal investment rounds providing flexibility to initiate or co-invest in projects in response to specific natural hazards and other changes that affect vulnerability, exposure or resilience to disasters caused or contributed to by natural hazards.

Funding is available through two research programs:

- → Rapid Disaster Research Program available to Participants
- → Quick Response Program available to researchers for the immediate collection of perishable data

The Centre accepts funding applications through these programs following any significant disaster caused by a natural hazard.

The program's focus is to collect time-critical, perishable data following disasters caused by natural hazards.

Rapid Disaster Research Program

The Rapid Disaster Research Program enables the Centre to actively engage with Participants to identify essential research needed following a disaster caused by natural hazards. This could be through projects established by the Centre or through co-investment with Participants or industry stakeholders.

This Program is designed to address significant unresolved questions after a disaster and collects information that will be used to provide insights into the event and its outcomes. This will help understand disasters to support disaster risk reduction and strengthen disaster resilience.

The Centre prioritises funding to projects:

- → with benefits to multiple states and territories
- → supports the directions outlined in this plan,
- → identifies a clear critical research need or gap in knowledge and practice,
- → and likely result in utilised outputs that enhance safety, resilience or sustainability of communities in the context of natural hazards.

Quick Response Program

The Quick Response Program provides funding for research data collection and can be used to directly support researchers for out-of-pocket expenses, including travel to disaster-affected areas to collect time-critical, perishable data following disasters caused by natural hazards. The Quick Response Program assists in gaining understanding of the impacts of a disaster.

From findings to learnings

To receive the benefits of projects supported through these responsive disaster research programs, the Centre will work with the research teams and relevant end-users following project completion, to communicate and share learnings in the most appropriate ways.

Post disaster perishable data

Perishable data is data that must be gathered quickly after a disaster to ensure it is not lost and that its quality and relevance is not degraded. This can include, for example, an assessment of debris in the aftermath of a storm, before clean-up has started, or water quality in waterways following a bushfire, flood or landslide.

Research utilisation

Growing research utilisation

With the ongoing maturation of the Centre's research portfolio further research translation and utilisation opportunities continue to emerge. Maximising the utilisation of research outputs within an evolving operational landscape includes:

- → Prioritisation of resource allocation based on potential project impact in alignment with the Plan, value to Participants and the Centre's ability to resource. Achieving utilisation potential requires planning with, and engagement from, end-users.
- → Fostering of utilisation activities related to the Centre's previous iterations where value to end-users and appropriate resourcing is available.

Elements of research utilisation

Research utilisation is complex, dynamic and non-linear, with the following process in use:

Design by objectives – Identify priority knowledge users and objectives, and define utilisation pathways, desired outputs, and outcomes, ensuring all elements are aligned with a clear problem statement.

Translation, dissemination and engagement – Timely, effective distribution of research findings and outputs through publications, conferences, workshops, annual research forum, briefing notes and other culturally appropriate means tailored to specific audiences as resources allow.

Application – Adaptation of research findings into practical applications, products, policies or interventions tailored to the needs of end-users. This includes prototype software tools, data sharing platforms and portals, guidelines, practice briefs, frameworks, training and education products, strategic policy advice, networking opportunities and standard operating procedures.

Implementation – Implementation activities specific to putting research findings into practice, integrating research findings into real-world systems and processes often involving adaption of materials to local contexts and operating environments.

Centre research outputs feed into end-user plans for 'the next step' of implementation, with associated resourcing costs. This includes doctrine development such as legislation, policy, safety notes, standard operating procedures, planning documents and frameworks and delivering programs using the research outputs.

Three types of research utilisation are considered:

- → **Knowledge mobilisation:** Supported planning (handover from researchers to end-users), end-user training to ensure necessary skills transfer (train the trainer), guidelines and doctrine development and small-scale pilot testing to refine the implementation process.
- → **Methodological evolution:** Continuous improvement of research methods and process to ensure they meet end-user needs in a community-sensitive way. Utilisation may create additional research opportunities to provide further evidence to support desired outcomes.
- → **Embedding research into organisational or community practice:** End-user-led whole-of-system research output integration in organisations and communities.

Monitoring and evaluation – Assessment of impact and effectiveness of implemented research findings to ensure achievement of desired outcomes.

Research utilisation principles

The following principles guide decision making around research utilisation:

- → **Research utilisation is a key objective** throughout the conduct of research.
- → **Research utilisation is a continuum,** occurring at multiple levels (e.g. projects, programs, organisational) and involving multiple stakeholders including end-users, researchers, the Centre and others.
- → **Utilisation pathways are project specific,** recognising the need for solutions that meet the needs of the end-user/s and connected community/ies.
- → **Research utilisation is dynamic and can evolve,** with planning commencing at the project concept phase and continually reviewed and updated throughout the design and conduct of research collaboratively between researchers and end-users.
- → **End-user driven research is key** to ensuring effective buy-in to research and its utilisation and impact amongst research beneficiaries.
- → **A collective approach is required,** drawing on existing capability and capacity across end-user and researcher organisations, communities of practice and networks.
- → **A pragmatic approach is necessary,** considering end-users' current and planned capability and capacity to support implementation.
- → **Strong research proposals embed utilisation pathways** within research scoping and methods, based on clear research problem identification.
- → **Programs of Centre research enhance utilisation outcomes,** connecting projects thematically.
- → **Research utilisation outputs are best vested with end-users** to facilitate the robust and reliable hosting of knowledge, tools and applications amidst rapidly changing technology and the evolution of responsibilities across all tiers of government.
- → **Utilisation risks are monitored** at project levels to ensure they can be effectively mitigated.

Roles and responsibilities

The Centre assists in building and enhancing end-users' and researchers' research utilisation capability. The research utilisation responsibilities central to this include:

- → Support and funding of research dissemination and engagement including knowledge mobilisation and methodological evolution.
- → Transferral of ownership and/or stewardship of research products to the end-users for implementation.
- → Advocate for end-user utilisation support to fulfil the desired research outcomes, where appropriate.
- → Promotion of relationships between end-users and researchers, acknowledging their importance research that is useful, useable and used.
- → Translation and Implementation Panels and Project Management Committees provide utilisation guidance advice including continuous improvement opportunities.

Attachment 3: Research projects

Communities and workforces of the future

A national framework and toolkit for multicultural inclusion in emergency management

Best practice for tracking and responding to potentially traumatic event exposure

Colonial load and cultural conflict

Community risk assessment

Community-led recovery: evidence, dimensions and supports for Community Recovery Committees

Community messaging – timing and frequency

Connecting Indigenous people and the emergency management sector – effective partnerships

Culturally safe emergency sheltering for First Nations communities

Emergency management volunteering: more than just words

Foundations in Indigenous disaster resilience

Managing first responders' heat stress risk

Managing smoke impacts on firefighter eye surface health

Schools in Fire Country

SES Fit for task

Strengthening and supporting disaster recovery workers: Evidence-based tools for recovery workforce sustainability

Utilisation of transformative scenarios in a climate-challenged world

Resilient built environment

Communicating flood risk

Evaluating the Resilient Homes Fund

Fire coalescence and mass spotfire dynamics

Heatwave resilience and impacts

Insights into temporary and emergency accommodation

Integrated solutions for bushfire-adaptive homes

Modelling impacts of natural hazards on interconnected infrastructure networks

Multi-hazard resilient buildings

Natural hazards and resilience in complex urban systems

Roads, bushfire and landslides: how to mitigate potential compounding natural hazards

Safety of alternative and renewable energy technologies

Strengthening energy networks to withstand severe wind and storms

Understanding the resilience of lifelines for regional and remote communities

Sustainable, safe and healthy natural landscapes

Conserving and reconnecting floodplains to mitigate flood risk

Cultural land management research and governance in south-east Australia

Fire mosaics in landscape fire planning

First Nations women, cultural fire knowledge, wellbeing and memory

Healing Country through Wolgalu and Wiradjuri-led land management

Operationalising Aboriginal land and sea management

Quantifying the risk of First Nations' planned burning

Quantifying and predicting bushfire risk following large-scale drought-induced vegetation die-off

Operational response and innovation

Developing an integrated predictive capability for extreme rainfall and inundation

Evaluating and monitoring for impact: developing a framework for risk prevention programs

Fit for Fire

Fire plumes in the atmospheric boundary layer

Hazard workshops for evacuation modelling

Long-range flood outlook for strategic preparedness

Maintenance of the Australian Flammability Monitoring System Extension

Measuring success for fire and rescue services

National SES Fitness for Role assessment review – phase 1

Predicting prescribed burn and low intensity forest fire behaviour

Why fly? How do we know that aerial firefighting operations are effective and efficient?

Resilient communities

Awareness, education and communication for compound natural hazards

Bushfire risk at the rural–urban interface

Effectiveness of land-use planning flood controls on buildings

Evolution of community fire units

Increasing disaster resilience – creating the next version of the Australian Disaster Resilience Index

Predictions in public: understanding the design, communication and dissemination of predictive maps to the public

Support integration of Recovery Capitals in service plans for communities with different levels of social disruption

Testing AS3959 construction and exposure assumptions

The role of AI in translating emergency warnings for culturally and linguistically diverse communities

Understanding intangible flood costs and impacts

Understanding the effectiveness of current communication mediums and messaging used to communicate information on planning, preparing/responding and recovering from an emergency event to remote First Nations communities

Situational awareness

Capturing uncertainty in bushfire spread prediction

Detecting fire plumes with mobile radar

Developing flood preparedness archetypes

Enhancing decision making in emergency management

Fire case studies

Fire ember transport

Flash flooding case studies to improve predictions and the communication of uncertainty

Identifying and defining landscape dryness thresholds for fires

Identifying water sources for aerial firefighting

Managing earthquake risk: unreinforced masonry building database

Multi-hazard public information and warning platforms for the future

Remote sensing of grass condition

Sector partner engagement to enhance severe weather impact predictions

Streamlining SWIRLnet data acquisition, analysis, storage and dissemination procedures

Translation of observed and modelled extreme bushfire behaviours to improve fire prediction and fireground safety

Understanding tsunami risk to Australia from volcanic sources

What makes a good fire simulator?

Evidence-informed policy, strategy and foresight

Analysis of inquiry recommendations on natural hazards and disaster risk reduction

Assisted relocations after flood

Australian emergency law blog

Be Ahead of Ready

Building resilient leadership: A study of leadership development within emergency services

Bushfire information database – scoping study

Improving the accuracy of the fire behaviour metric 'fireline intensity' for Australian fuels

Nature positive disaster ready solutions

Research data management

State of natural hazards research in Australia

Storing and sharing qualitative social data

Systemic risk and systems thinking

Understanding conflagration fires

Unlocking risk: Enhancing hazard risk assessment through historical archival reanalysis

Learning from disasters

Community experiences of the 2022 Australian floods – Queensland and New South Wales

Community experiences of the 2022 Australian floods – South Australia, Victoria and southwestern New South Wales

Community experiences of the 2022 Australian floods – Tasmania

Floodwater contaminants and effective mitigation techniques

Flood contamination sampling and analysis – regional Victoria

Gender insights into post-incident reviews

Understanding community risk perception and evacuation behaviours

Social media in community experiences of Tropical Cyclone Alfred

Structural and inundation impacts of tropical cyclones

SCAN ME

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