

Appendix B: International approaches to natural disaster data and research

To inform the assessment of the Australian approach to natural disaster research, this appendix:

- Describes international involvement in natural disaster data and research, focusing on the roles of the United Nations (UN), The World Bank and the Organisation for Economic Co-operation and Development (OECD)
- Reviews examples of research co-ordination at the national level, considering natural disaster research in New Zealand and the United States.

International approaches

It is useful to understand the international policy frameworks that deal with natural disasters, the role that different international organisations play in natural disaster research and mitigation, and how they interact.

While there are many initiatives operating on a global scale, in this section focuses on the UN, The World Bank and the OECD, taking into consideration their policy frameworks and the nature of their involvement in natural disaster data and research.

United Nations

Policy framework

In December 1999, the UN General Assembly adopted the International Strategy for Disaster Reduction, and established the UN Office for Disaster Risk Reduction (UNISDR) to ensure its implementation. This policy embodied an important shift in management of natural disaster risks, promoting a transition away from 'response' to 'reduction'. As described by the then UN Secretary-General, Kofi Annan at the International Conference Centre of Geneva,

"We must, above all, shift from a culture of reaction to a culture of prevention. Prevention is not only more humane than cure; it is also much cheaper... Above all, let us not forget that disaster prevention is a moral imperative, no less than reducing the risks of war."
(UN, 1999)

Since then, the UNISDR has played a lead role in co-ordinating international efforts to improve the level of resilience to natural disasters globally. Reflecting its mandate for collective action that recognises local needs, the UNISDR has established global, regional and national platforms for disaster risk reduction.

At the 2nd World Conference on Disaster Reduction in 2005, arranged by the UNISDR, the current primary international agreement for disaster reduction, the Hyogo Framework for Action 2005-2015, was adopted by 168 countries.

The Framework, which was endorsed by the UN General Assembly later in 2005 (UN, 2005), sets out a 10-year plan for strengthening resilience to natural disasters and highlighting five priority actions, one of which relates to the identification and monitoring of disaster risks and the role for both ongoing research and accurate underlying data.

This may include the collection and exchange of statistical information on disaster occurrence, impact and losses, the development of common methodologies and research capabilities to analyse natural disasters, assess risk (including the development of risk maps) and forecast natural disasters and the improvement of monitoring and early warning.

This reinforces the argument that successful mitigation action relies on high quality data and research. The continued need for science to form a key part of the post-2015 Hyogo Framework for Action has been highlighted by the UN (Southgate et al., 2013).

Involvement in natural disaster data and research

The critical need for science and technology as an input to implementing the International Strategy for Disaster Reduction has been long recognised by the UNISDR (UNISDR, 2001). In order to facilitate greater involvement of the scientific, technical and academic communities in the formulation and implementation of disaster reduction strategies, the UNISDR established a Scientific and Technical Advisory Group. The group currently consists of representatives from national agencies, including Dr John Schneider from Geoscience Australia, and international organisations such as the World Health Organisation (UNISDR, 2013b).

Given its broad mandate to support disaster risk reduction, the activities that UNISDR undertakes are broad, encompassing roles in co-ordination, campaigning, advocacy and the provision of information (UNISDR, 2014b).

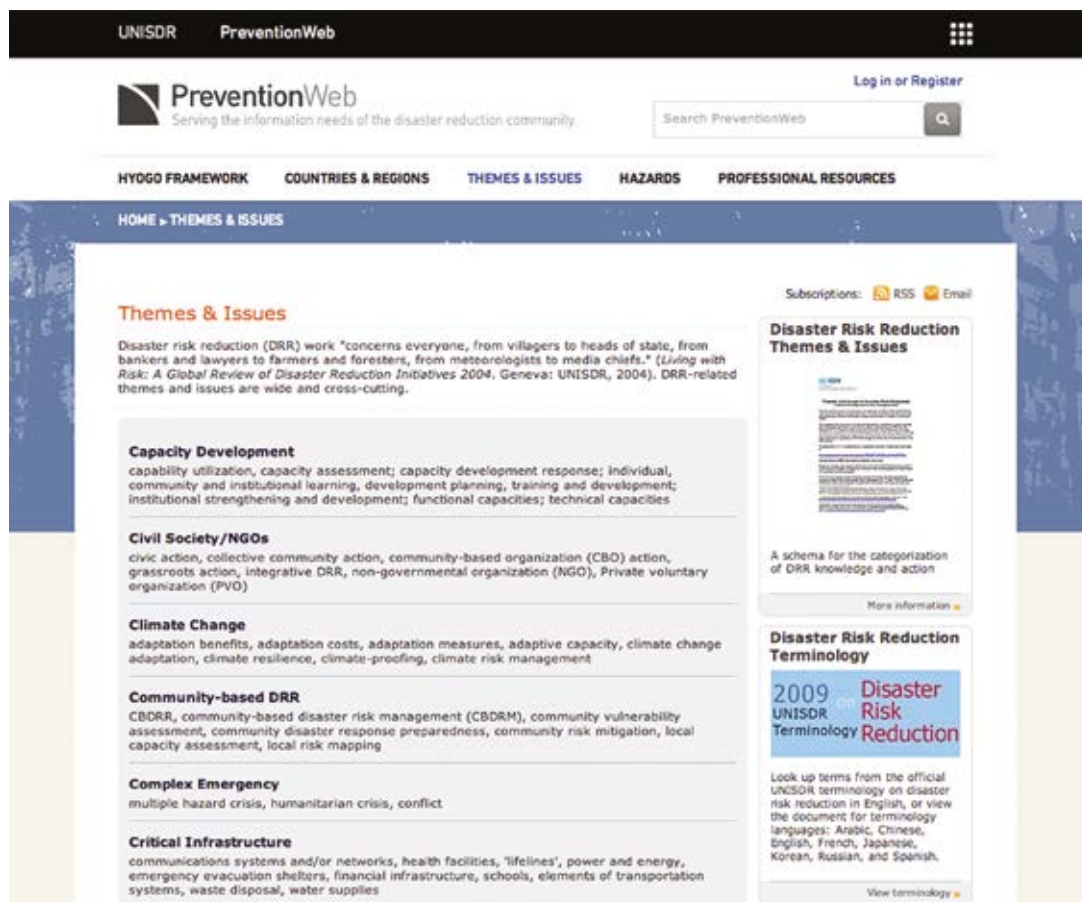
Focusing on data and research, the main areas of involvement for UNISDR, outlined in Table B.2 include:

- **Disaster risk and loss databases:** UNISDR provides support to countries to assist with the development of disaster loss databases, and works with a number of partners to promote data sharing
- **Administration of online platform:** UNISDR administers PreventionWeb, a platform for disaster reduction knowledge management (see Figure B.1)

- **Global Assessment Report:** biennial global assessment of disaster risk reduction; analysis of natural hazards affecting humanity
- **Support for research partnerships and programs:** e.g. through the Integrated Research on Disaster Risk Programme.

These activities largely reflect the responsibilities of international organisations as envisaged in the Hyogo Framework. In particular, the Framework highlights the need for international co-ordination to support globally consistent data collection and forecasting on natural hazards, vulnerabilities, risks and disaster impacts at all scales, leveraging off existing networks and platforms.

Figure B.1: UNISDR's PreventionWeb



Source: UNISDR (2014a)

Table B.2: UNISDR natural disaster data and research initiatives

Areas of UNISDR involvement	Initiative	Organisations involved	Description of initiative & intended outputs	Format of outputs	Level of information sharing
Disaster risk and loss databases	DesInventar	Project of LA RED (the Network of Social Studies on Disaster Prevention in Latin America). UNISDR is the host and main sponsor. Also involves UN, NGOs, Government agencies, universities and private sector.	Database with information on disaster losses in 29 countries across North, Central and South America, the Caribbean, Asia and the South Pacific. Provides access to time series data on types of disaster events, causes, human impacts and economic losses, across geographies.	Data; outputs include tables, graphics, thematic maps	Free, open source
	EM-DAT: The International Disaster Database	Centre for Research on the Epidemiology of Disasters – University of Louvain, Belgium, International Federation of Red Cross and Red Crescent Societies and US Agency for International Development.	Independent database with information on the human impact of disasters, disaster-related economic damage estimates and disaster-specific international aid contributions. Data compiled from various sources, including UN agencies, non-governmental organisations, insurance companies, research institutes and press agencies.	Data	Free, open source
	PREVIEW Global Risk Data Platform	Created and hosted by UNEP/GRID-Geneva. Supported by UNISDR.	Share spatial data on global risk from natural hazards. Users can visualise, download or extract data on past hazardous events, human & economical hazard exposure and risk from natural hazards.	Data	Free, for non-commercial purposes
Online platform	PreventionWeb	UNISDR project, supported by technical and design advisory group consisting of representatives from UNISDR and strategic/visual designers and advisors.	Participatory web platform online platform for disaster reduction knowledge management. Users include representatives from NGOs, government departments, education and research institutions, private sector businesses, independent experts.	Online platform with access to data, research reports, policy documents	Free to access and upload content
Reports	Global Assessment Report	UN agencies, governments, academic and research institutions, donors, technical organisations/specialists. Advisory Board acts as an independent and strategic advisory body.	Biennial global assessment of disaster risk reduction; analysis of natural hazards affecting humanity. Monitors risk patterns/trends and progress in disaster risk reduction and provides strategic policy guidance.	Report on risks and strategic approaches for government	Free to download, including links to data
Support for research partnerships and programs	Integrated Research on Disaster Risk Programme	Sponsored by International Council of Science in partnership with the International Social Science Council and UNISDR. Governed by Working Groups, Scientific Committee.	Interdisciplinary research program seeking to address the challenges brought by natural hazard events, mitigate their impacts, and improve related policy-making mechanisms. Information provision: characterisation of hazards/risk, understanding decision-making in complex and changing risk contexts and reducing risk and curbing losses.	Research projects, annual conference	Somewhat restricted

Source: BNHCRC (2014)

The examples in Table B.2 on page 91 also illustrate the ways in which UNISDR works with a range of stakeholders to support data provision and research. As described at the establishment of the UNISDR Scientific and Technical Advisory Group,

“Successful longer-term prevention strategies must be based on cross-sectoral and interdisciplinary co-operation involving the scientific community, national and local governments, NGO’s, the private sector, as well as the organisations and agencies of the UN system” (UNISDR, 2001).

This notion is reflected in the activities of other UN agencies, such as the UN Environment Programme (UNEP). For example, the Principles for Sustainable Insurance Initiative (part of the United Nations Environment Programme Finance Initiative) is conducting the Global Resilience Project. Including a broad range of insurers across many markets, its aim is to deepen understanding of disaster risk reduction globally, identify the social and economic cost of disasters and use this information to help governments and communities mitigate their risk.

As part of the first phase, the project researched over 300 sources to assess the effectiveness of behavioural, structural and ecosystem risk reduction measures for the hazards of cyclone, earthquake and flood.

Alongside the UNEP, the UN Educational, Scientific and Cultural Organisation (UNESCO) and the UN University (UNU) are involved in the broader Science and Technology Alliance for Global Sustainability. Among other roles, this partnership of international organisation sponsors Future Earth, a collaborative research platform on global sustainability, launched in 2012. Through the platform, research projects are undertaken in relation to sustainability issues, including natural disasters. The platform reflects an international call for an integrative, international and solutions-oriented approach to research that involves a range of stakeholders (Future Earth, n.d.).

The World Bank

Policy framework

As part of its role in providing financial and technical assistance to developing countries, The World Bank supports the International Strategy for Disaster Reduction and participates in the implementation of the Hyogo Framework for Action (The World Bank, 2013).

The Bank’s efforts in this regard are primarily directed through the Global Facility for Disaster Reduction and Recovery (GFDRR), a partnership of 41 countries and eight international organisations, established in 2006. The GFDRR’s mission is to incorporate disaster risk reduction and climate change adaptation within development strategies, by supporting the implementation of the Hyogo Framework for Action at the national level (GFDRR, 2014a).

Involvement in natural disaster data and research

The activities of the GFDRR are categorised into one of three business lines, relating to the development of global and regional partnerships, mainstreaming risk reduction in development and assisting with sustainable recovery (GFDRR, 2014e). Accordingly, the GFDRR has a natural involvement in the development of research inputs necessary for those activities.

Since 2010, the GFDRR has also administered the GFDRR Labs, in order to encourage the use of science, technology and innovation to empower decision-makers in developing countries to improve their resilience (GFDRR, 2014f). The work of the Labs supports the use of open data and open source technology at the local level to improve decision-making. The Labs engage with developing countries through:

- The Open Data for Resilience Initiative (OpenDRI) – facilitating the development of free, open source data and software
- Real-time disaster mapping support and damage assessment validation
- The Understanding Risk Community
- Participation in open development partnerships
- Provision of regional technical assistance.

Beyond these activities, the GFDRR provides free access to documents and details of projects, experts and knowledge events through its online Knowledge Center (GFDRR, 2014b). The GFDRR also supports research activities related to disaster risk management by Bank staff. For example, the GFDRR supported a cost-benefit analysis on disaster risk reduction in developing countries, undertaken by the Bank’s East Asia and Pacific Disaster Risk Management Team (KC, 2013).

Organisation for Economic Co-operation and Development (OECD)

Policy framework

The OECD is a partnership of 34 countries, focused on promoting policies to improve global economic and social well-being. Established in 1961, the activities of the OECD are focused on data collection, analysis, discussions, decision-making, implementation and evaluation, across the full spectrum of economic and social policy (OECD, 2014c).

Involvement in natural disaster data and research

While the OECD is involved in the provision of data and analysis to aid policy development, only a small proportion of its research activities relate to natural disasters. Nevertheless, the online iLibrary database provides access to copies of articles, working papers, chapters and books published by the OECD related to natural disasters (OECD, 2014a).

Perhaps the most significant contribution of the OECD towards natural disaster research is in facilitating discussions between global stakeholders, through its International Network on the Financial Management of Large-scale Catastrophes. This network was established by the OECD in recognition of the substantial costs of natural disasters and the need for a proactive, co-ordinated approach involving both the public and private sector (2014b). It is guided by a High Level Advisory Board of 18 representatives from governments, academia and the private sector. The role of the Board is to provide intellectual leadership through advice on the content of the Network and priorities for research, analysis and public initiatives.

This example again highlights the importance of information sharing and co-ordination among policy makers, researchers and business, and illustrates that forums can be a useful means through which the establishment and prioritisation of research initiatives can take place.

National approaches

In addition to the international initiatives, it is also useful to consider how research models are employed at the national level, to help identify arrangements that might be replicated for the context of natural disaster information in Australia.

This section reviews:

- Natural disaster research in New Zealand
- Natural disaster research in the United States.

Acknowledging the different political structures in place in New Zealand and the United States, these examples begin with a description of the policy framework within which the agenda for greater resilience against natural disasters sits.

Natural disaster research in New Zealand

Policy framework

The guiding policy for improving resilience against natural disasters in New Zealand is the National Civil Defence Emergency Management (CDEM) Strategy. Forming part of a broader CDEM Framework, the National CDEM Strategy requires a comprehensive approach to hazards, encompassing the four key elements of Reduction, Readiness, Response and Recovery (Ministry of Civil Defence and Emergency Management (MCDEM), 2007).

The vision of the strategy is to achieve a 'Resilient New Zealand', in which communities are able to understand and manage their exposure to hazards (2007:1). The responsibility for carrying out the strategy is shared among all New Zealanders, including central government agencies, local authorities, emergency services, lifeline utilities, infrastructure providers, businesses and individuals. Responsibility for CDEM lies with the relevant Ministry, MCDEM.

Approach to data and research

The importance of research is clearly acknowledged within the New Zealand policy framework, with the MCDEM noting that "developing effective CDEM arrangements requires a robust evidence base, derived from sound research" (MCDEM, 2014). Accordingly, MCDEM is involved in clarifying research priorities, encouraging integrated research and improving the accessibility and delivery of research outputs.

To guide and deliver the prioritisation of funding for research into natural disasters, the Natural Hazards Research Platform (NHRP) was established in 2009. Approximately NZ\$17 million in funding each year is invested through the platform by the Ministry of Business, Innovation and Employment (NHRP, 2013). The main objectives of the platform are to provide secure, long-term funding for natural hazard research and to help research providers and end users work more closely together (NHRP, 2013).

The NHRP is led by GNS Science, and is co-anchored by the National Institute of Water and Atmospheric Research (NIWA), both government-owned companies classified as Crown research institutes. Other partners of the NHRP include the University of Canterbury, Massey University, University of Auckland and Opus Research, an independent research facility. Additional research groups from academia, consultancies and overseas bodies are also involved in the NHRP as sub-contractors. The core partners to the Platform form a Management Group, which is also supported by a Strategic Advisory Group consisting of end users, and a Technical Advisory Group comprising of international scientists.

The prioritisation of funding to research projects is guided by a research strategy, the latest of which was published in 2010. While a revised strategy for 2014-2018 is under development, the current strategy identifies six guiding principles, and five themes for research activities, as described in Section 5.3.

While a large proportion of NHRP funding is distributed to its anchor companies and partners for individual research projects, one example of a collaboration that has been funded is Resilient Organisations (Resilient Organisations Research Programme, 2012). This is a research and industry collaboration, involving the University of Canterbury and University of Auckland, among other institutions.

Beyond the Natural Hazards Research Platform, a number of institutions are also involved in collaborative research activities. For example, GNS Science earns 15-20% of its revenue from monitoring geological hazards for the New Zealand Earthquake Commission, and has partnerships with research institutes in Australia, Europe, Asia and the US (GNS Science, 2014). Furthermore, through the Joint Centre for Disaster Research GNS Science has a partnership with Massey University.

The Centre has recently become involved in the Integrated Research on Disaster Risk Programme described in Table B.2 on page 91, co-ordinating the International Centre of Excellence in Community Resilience (Massey University, 2014a).

Natural disaster research in the United States

Policy framework

The US approach to the management of hazards, including natural disasters, is guided by Presidential Policy Directive / PPD-8: National Preparedness, released by President Obama in March 2011 (Department of Homeland Security (DHS), 2011b). The policy sets out a 'whole of community' approach to building resilience, calling for the development of a National Preparedness Goal, and a series of implementation frameworks and plans (Federal Emergency Management Agency (FEMA), 2014b). While there are roles for numerous government agencies in facilitating broader community involvement in the delivery of the policy directive, overall co-ordination is undertaken by the DHS, through FEMA.

The main components of the policy framework developed out of PPD-8 are the:

- National Preparedness Goal – specifies the primary objective of preparedness activities and the core capabilities required to achieve it
- National Preparedness System – outlines a six-part process for achieving the National Preparedness Goal
- National Planning Frameworks – describes the process for whole of community involvement in prevention, protection, mitigation, response and recovery.

This framework recognises the importance of research and information sharing for improved resilience to hazards. In particular, 'research and development' is identified as one of the four ongoing requirements to build and sustain preparedness (FEMA, 2014). In addition, 'intelligence and information sharing', 'risk and disaster resilience assessment' and 'threats and hazard identification' are listed among the 31 core capabilities necessary to achieve the National Preparedness Goal, encompassing the mission areas of prevention, protection and mitigation (DHS, 2011a).

As described in the National Mitigation Framework:

“All levels of public and private entities have a role in community resilience and sustainability ... This is complemented by research, development, and investment—the basis of new and improved long-term vulnerability reduction capabilities—making these investments an increasingly effective, cost-efficient, and sustainable approach to building resilience.” (DHS, 2013)

Approach to data and research

The organisation of natural disaster data and research in the US embodies the principle of shared responsibility for preparedness across the community that is central to the policy context described above. Government agencies, academia and the private sector each participate in the collection of data and research activities, on both an individual and collaborative basis.

Within Government, involvement in natural disaster data and research is distributed broadly across bodies within the Department of Homeland Security, Department of Commerce and the Department of the Interior, as well as independent agencies such as the National Science Foundation and the National Aeronautics and Space Administration. Many of these agencies are involved in the collection and provision of data, undertake research projects, and participate in collaborative partnerships, as summarised in Table B.3.

In addition, academia and, to a lesser extent, businesses in the private sector make a critical contribution to the collection of data and analysis of issues related to natural disasters in the US. While it is not practical to list all of those institutions, a few examples include the Natural Hazards Center hosted by the University of Colorado, the National Earthquake Hazards Reduction Program and the Insurance Institute for Business & Home Safety Research Center.

Table B.3: US Government involvement in natural disaster data and research

Government body	Examples of roles
Department of Homeland Security – Science and Technology Directorate	<ul style="list-style-type: none"> Manages science and technology research for the operational components of the DHS Undertakes research projects through the Resilient Systems Division of the Homeland Security Advanced Research Projects Agency Facilitates research partnerships, e.g. Coastal Hazards Center of Excellence.
Department of Homeland Security – Federal Emergency Management Agency	<ul style="list-style-type: none"> Provision of data – Flood Insurance Rate Maps and Hazus tool for estimating the potential losses. (Hazus is a geographic information system based natural hazard loss estimation software package developed and freely distributed by the FEMA) Involvement in research partnerships, e.g. National Earthquake Hazards Reduction Program.
Department of Commerce – National Institute of Standards and Technology	<ul style="list-style-type: none"> Undertaking and reporting on research projects through the Building and Fire Research Platform Involvement in research partnerships, e.g. Lead agency of the National Earthquake Hazards Reduction Program.
Department of Commerce – National Oceanic and Atmospheric Administration	<ul style="list-style-type: none"> Provision of data – National Environmental Satellite, Data and Information Service Undertaking research, e.g. NOAA Centre for Tsunami Research Involvement in research partnerships, e.g. Coastal and Inland Flooding Observation and Warning Project.
Department of the Interior – US Geological Survey	<ul style="list-style-type: none"> Provision of data and maps Undertaking research, e.g. Landslides Hazards Program Involvement in research partnerships, e.g. National Earthquake Hazards Reduction Program.
Independent agency – National Science Foundation	<ul style="list-style-type: none"> Provision of data and maps Facilitation of research – accounting for around 25% of federal support to academic institutions for basic research Involvement in research partnerships, e.g. National Earthquake Hazards Reduction Program, and support for data infrastructure e.g. DataNet program.
Independent agency – National Aeronautics and Space Administration	<ul style="list-style-type: none"> Provision of data, e.g. Earth Observatory, images and data on hurricanes and tropical cyclones Undertaking research, e.g. Genesis and Rapid Intensification Processes experiment.