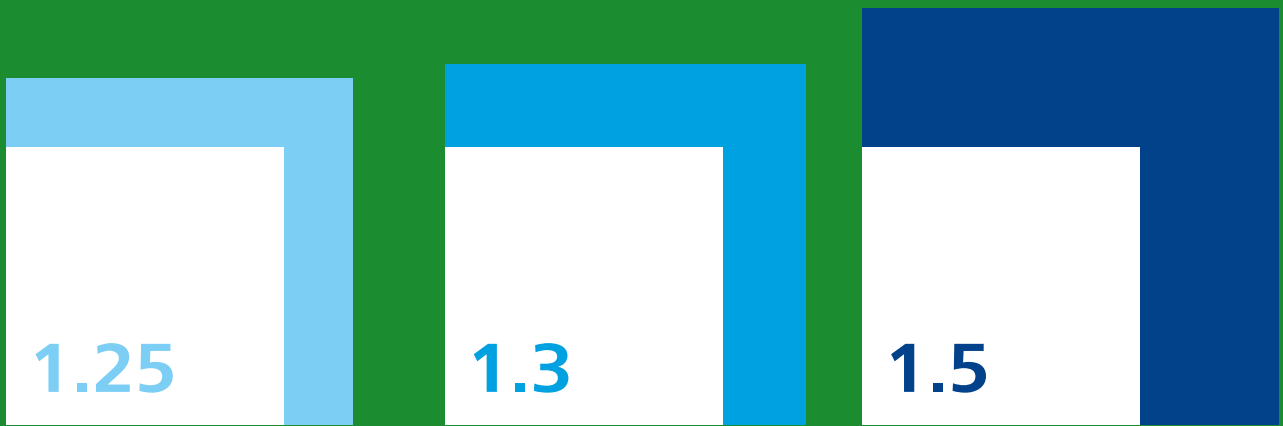


Carefully targeted investment



can deliver additional savings



2. The decision-making challenge

Key points

As natural disaster resilience is an interdisciplinary issue, there are multiple agencies involved in collecting data and undertaking research – imposing **high search costs** to accessing information.

This challenge is faced by a **broad range of end users** across communities, businesses and governments, whose roles, responsibilities and objectives vary significantly.

The importance of data and research is well recognised in Australian policy. The Government has committed to providing **useable and accessible information** and has recognised resilience as an Australian Strategic Research Priority.

However, there is greater scope to **improve practical implementation** of these policies.

Additional savings for government of **between \$500 million and \$2.4 billion** over the period to 2050 could be achieved through improvements in the efficiency, transparency and effectiveness of data and research.

A broad range of data and research inputs are required to understand the best way to build the resilience of a community against natural disasters. This chapter describes the framework used to assess these information inputs, reviews current government policy positions and highlights the economic justification for promoting efficient, transparent, and effective data and research.

2.1 Data and research as inputs for optimal decisions

Optimal decision-making on resilience investments, by communities, businesses and governments, depends on a range of factors. For instance, decision-makers must have the appropriate incentives within governance and legal frameworks to conduct thorough, accurate cost-benefit analysis before investing funds.

The focus of this report, however, is the ability of decision-makers to leverage natural disaster data and research to make informed decisions for the creation of safer, resilient, and productive communities.

As illustrated in Figure 2.1 on page 24, the key set of inputs required by end users consists of:

- **Foundational data** – data that provides standard layers of locational information. This includes information on the characteristics of assets at risk, community demographics, geology, topography and weather and is also used for a range of other purposes
- **Hazard data** – hazard specific information on the risks of different disaster types, providing contextual data about the history of events and the risk profile for Australian locations
- **Impact data** – data on the potential and actual impacts associated with natural disasters, including information on historical costs and damage and the current and predicted future value at risk
- **Research activities** – activities that draw on data and seek to answer specific research questions across a range of areas. This includes questions on approaches to risk management, value at risk, vulnerability, the effect of mitigation, hazard detection, disaster impacts and recovery, decision support tools and strategy issues. There is often also feedback from research to data, where research outputs build on the existing stock of data that is available.

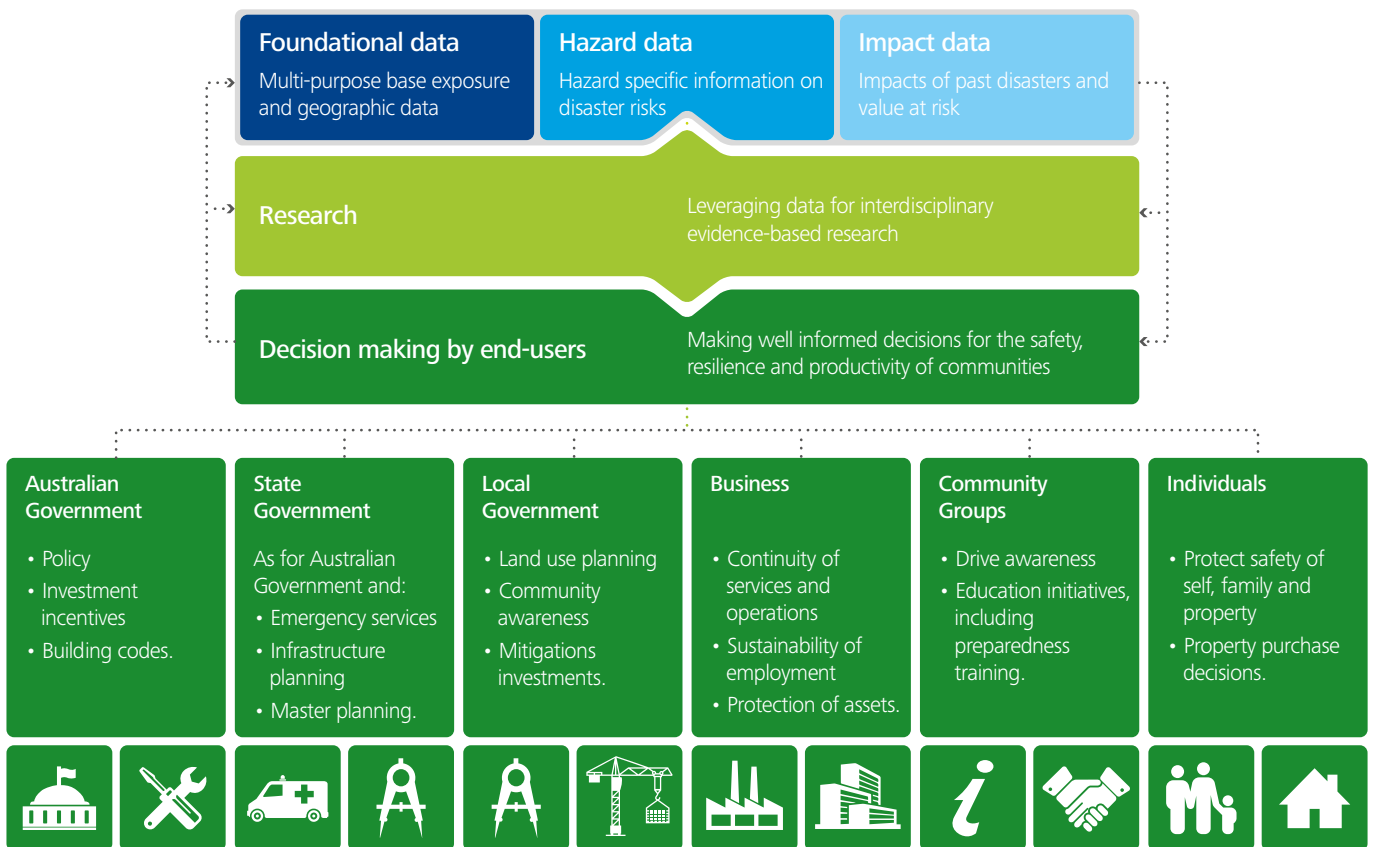
The process of linking data and research to end users for optimal decision-making is, however, practically very difficult. Natural disaster resilience is an interdisciplinary issue and multiple agencies collect data and undertake research – across governments, businesses and the community. This has resulted in many platforms to access the range of necessary information, imposing high search costs and disparate information sets.

The information needs of a broad range of end users across communities, businesses and governments vary significantly, increasing the challenge.

For example:

- The Australian Government requires information to ensure that policy and strategy supports incentives for best practice investments and to help shape building codes and disaster risk management
- State governments require information to develop and implement policy within their jurisdictions to improve disaster risk management, including through emergency management services, and to help guide infrastructure and master planning
- Local governments require information to guide land use planning decisions, community awareness and mitigation investments within their jurisdictions

Figure 2.1: Data and research inputs for optimal decision-making on resilience investments



Source: Deloitte Access Economics, *Australian Business Roundtable for Disaster Resilience and Safer Communities* (2014)

- Businesses require information to ensure sustainability of employment and to protect their assets, including critical infrastructure to enable business continuity and delivery of services to the public during and post natural disaster events and to improve business continuity management for future events
- Community groups require information to drive awareness, undertake education initiatives – such as preparedness training – implement risk management activities and to support their clients where appropriate
- Individuals require information to take action that protects the safety of their families, property, livelihoods, neighbourhoods and communities.

In order to realise the full potential of decisions to increase the safety, resilience and productivity of Australian communities, it is imperative that data and research is efficient, open, transparent and available in consistent formats that are fit for this variety of purposes.

To the extent that the benefits for the full range of end users exceed the costs of providing data and research, the current arrangement is inefficient and fails to deliver the best outcome for Australian communities and taxpayers.

2.2 Policy positions

All levels of government in Australia recognise the importance of building open information sets to aid decision-making around resilience. This section describes the current policy in relation to responsibilities for information in the context of natural disasters and resilience, as well as policy for data and research more generally in Australia.

2.2.1 Responsibilities for natural disaster information

The National Strategy for Disaster Resilience, the core Australian Government policy on natural disaster management, has called for a whole-of-nation approach to disaster resilience and management (COAG, 2009). It is widely accepted that governments, businesses, community organisations and individuals need to work together to successfully build resilience against natural disasters in Australia.

The responsibility for efficient, open and transparent provision of risk information lies primarily with government. This is outlined explicitly in the 'statement of common understanding' produced by the COAG Select Council on Climate Change (SCCC), as shown in Box 2.

Box 2: Guiding principles for allocation of roles and responsibilities for climate change risk

The COAG Select Council on Climate Change 'statement of common understanding' highlights the need for different stakeholders to share responsibility for climate change risks. In particular, the statement notes that:

"Governments should respond to market failures and regulatory failures that prevent effective and efficient natural disaster risk management, focusing on... providing best available information about risks to facilitate adaptation by the private sector and making information accessible and useable."

The statement also highlights that decision-making should:

- Be based on the best available research
- Be cost-effective
- Be regularly reviewed to meet changing circumstances
- Enhance social inclusion.

Source: SCCC (2012)

As holders of valuable data sets, supporters of research activities and end users of information, the private sector is capable and willing to support government in this role. For example, the Australian Sustainable Built Environment Council (ASBEC) has called for engagement between government and industry to co-sponsor research into the impacts of climate change and appropriate adaptation strategies (ASBEC 2013).

The following two sections describe current Australian government policy in relation to data and research more broadly, highlighting the key principles that apply to natural disaster information.

2.2.2 Data policy

Through the 2010 Declaration of Open Government, the Australian Government publically committed to providing public sector information that is open and transparent (Department of Finance, 2010). This is consistent with the increasing international recognition of open access to information for public accountability and engagement. Through the international Open Government Partnership, 64 countries have committed to making their governments more open, accountable and responsive to citizens through open government reforms (Open Government Partnership, 2014).

Table 2.1: Principles on open public sector information

Principle	Summary
1. Open access to information – a default position	Providing open access to information using information technology, where there is no legal need to protect that information.
2. Engaging the community	Engaging the community on decisions around what information to publish, the method and format of publication, and welcoming feedback on quality, completeness, usefulness and accuracy.
3. Effective information governance	A senior executive ‘information champion’ or knowledge officer in the agency should be responsible for information management and governance. The senior officer should be supported by an information governance body that may include people from outside the agency.
4. Robust information asset management	Maintaining asset inventories / information registers, which identify information custodians and their responsibilities, known limitations on quality, legislative and legal requirements. Establishing clear procedures for decisions on publication and release of information, to begin at the time of creation. Protecting against inappropriate, unauthorised use, access or disclosure.
5. Discoverable and useable information	Publishing up to date information asset registers. Publishing information in open and standards-based formats which are machine readable with high quality metadata attached.
6. Clear reuse rights	Making information available for reuse on open licensing terms, with the Creative Commons BY standard ³ as the default.
7. Appropriate charging for access	Facilitating public access to information at the lowest reasonable cost. Charges that may be imposed by an agency for providing access should be clearly explained in an agency policy that is published and regularly reviewed.
8. Transparent enquiry and complaints process	Agencies should have a transparent enquiry and complaints procedure for the public to raise issues about agency publication and access decisions.

Source: Adapted from Office of the Australian Information Commissioner (2011)

³ Creative Commons Australia provide simple, standardised licensing arrangements to allow the sharing of information. The Creative Commons BY standard allows users to distribute, remix and build upon a work, and create derivative works – even for commercial use – provided they credit the original creator/s.

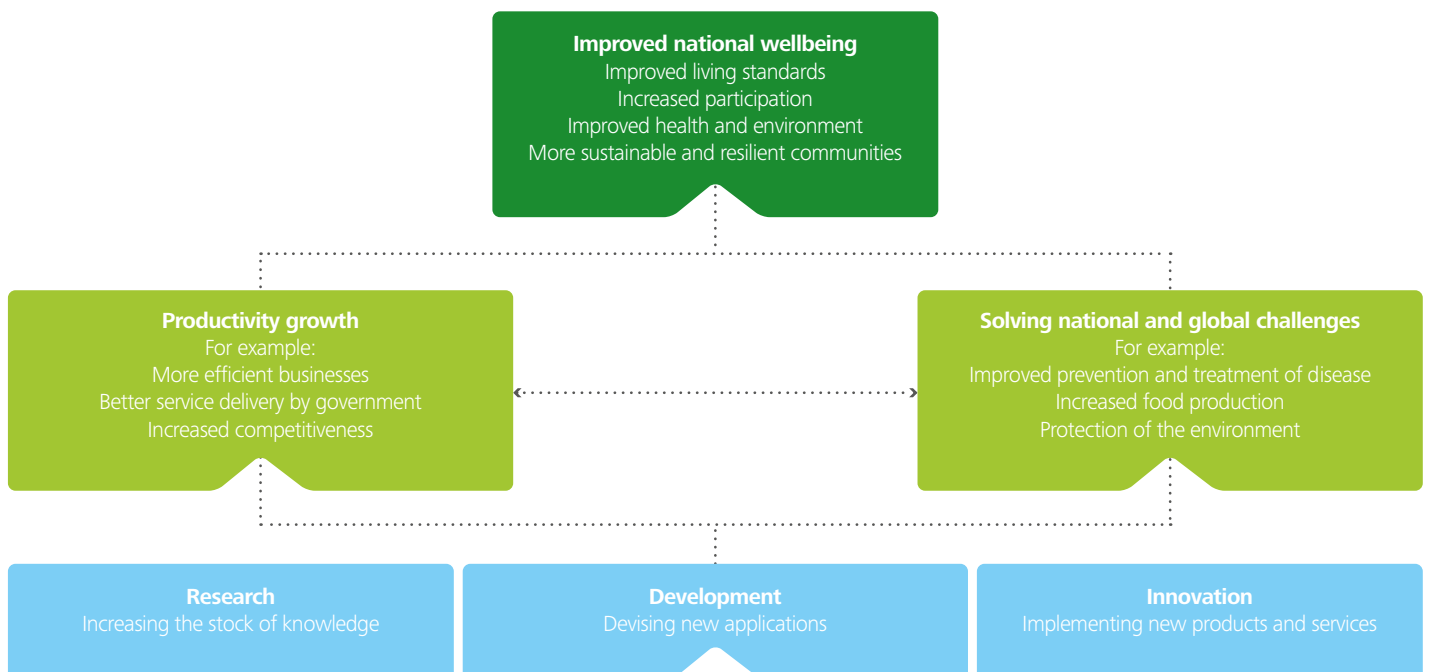
Following this declaration, the Office of the Australian Information Commissioner (OAIC) developed a set of principles to promote best practice information management in 2011, drawing from both Australian and international literature and a public consultation process. These principles are described in Table 2.1. The principles sit alongside legal requirements for information management, including the *Freedom of Information Act 1982*, *Privacy Act 1988* and *Archives Act 1983*.

Currently, NSW, QLD, SA VIC and the ACT governments have reflected these principles through their own open data policies, strategies or declarations (Department of Finance, 2013). Some local governments, such as the City of Gold Coast, are also involved in open data projects and planning for their jurisdictions (City of Gold Coast, 2013).

Data.gov.au is one of the key initiatives focused on implementation of this policy at the national level. This website provides free access to almost 3,500 government data sets, primarily under a Creative Commons licence, and allows users to publically submit requests for additional information. The data sets are drawn from over 100 government departments and agencies, encompassing a very broad range of topics, from the location of Medicare offices through to energy ratings for household appliances.

These policy principles are particularly relevant in the context of natural disaster information in Australia. Data and research on natural disaster risks and the effectiveness of resilience options should be, in principle, publically available to maximise the positive externalities achieved through informed decision-making. That said, there remains a challenge for compliance with privacy and confidentiality requirements. The extent to which current foundational, hazard and impact data sets comply with these principles is examined in Chapter 3.

Figure 2.2: Australian Government framework for the benefits of research



Source: DIISRTE (2012:5)

2.2.3 Research policy

In 2012, the Australian Government released a National Research Investment Plan to guide a co-ordinated, whole-of-government approach to research investment (Department of Industry, 2012). As illustrated in Figure 2.2 on page 27, the plan highlighted the importance of research for improving the wellbeing of Australia by driving productivity growth and addressing national and global challenges.

This plan was prepared by the Australian Research Committee (ARCom), consisting of officials from government departments and representatives from the Australian Research Council, the National Health and Medical Research Council, CSIRO, the Defence Science and Technology Organisation, the Innovation Australia Board and Universities Australia.

ARCom was established in response to the 2011 *'Focusing Australia's Publicly Funded Research Review'*.

Some of the key findings of that review were that while there are no significant shortfalls or duplication across the spectrum of publically funded research activities, the system would benefit from:

- A more co-ordinated, coherent approach to maximise returns from investment
- A revision of the national research priorities
- Development of a rigorous, transparent, system-wide research impact assessment mechanism, to evaluate the wider benefits of research
- Stronger incentives for universities to engage more effectively with industry and other end users, so that businesses are driven by leading edge thinking to achieve productivity gains (Department of Innovation, Industry, Science and Research, 2011).

To assist with the implementation of the National Research Investment Plan, ARCom developed a set of Strategic Research Priorities to replace the National Research Priorities, which were first released in 2002. The fifteen Strategic Research Priorities are categorised into five societal challenges, the first of which has a clear focus on resilience. The three priorities to respond to the challenge of 'living in a changing environment' are outlined in Box 3. These Strategic Research Priorities were announced by the Australian Government in June 2013.

Box 3: Living in a changing environment – strategic research priorities

In response to the challenge of living in a changing environment, research should:

Identify vulnerabilities and boundaries to the adaptability of changing natural and human systems

Research will identify the level of environmental change human and natural systems can tolerate before fundamental ecological processes are irreversibly changed. This includes understanding complex systems, especially human–natural linked systems, and interpreting and predicting their behaviour.

Manage risk and capture opportunities for sustainable natural and human systems

Research will identify behavioural, economic, technological, institutional and design options for managing change in the linked human and natural environment including climate change, extreme events, population growth, consumption and biodiversity.

Enable societal transformation to enhance sustainability and wellbeing

Research will identify the areas of highest risk and develop options for the change required to mitigate and/or adapt to environmental change. This priority will focus on urban design, governance systems, decision frameworks and industry policies.

Source: Australian Government (2013)

Table 2.2: National research policy co-ordination responsibilities

Department of Education	Department of Industry
<ul style="list-style-type: none"> • Co-ordination of research policy in relation to universities • Creation and development of research infrastructure • Policy, co-ordination and support for international education and research engagement • Research grants and fellowships 	<ul style="list-style-type: none"> • Co-ordination of science research policy • Collaborative research in science and technology • Commercialisation and utilisation of public sector research • Geoscience research and information services including geodesy, mapping, remote sensing, groundwater and spatial data co-ordination. • Industrial research and development, and commercialisation • Science engagement and awareness • Science policy

Source: Department of the Prime Minister and Cabinet (2013)

The transition process from the National Research Priorities to the Strategic Research Priorities has been taking place over the 2013-14 financial year. While the objectives of the Strategic Research Priorities and the National Research Investment Plan have been clearly stated, it is not currently evident how they will be implemented in practice. For example, while research activities are undertaken by a range of government departments and agencies, the core responsibilities for the co-ordination of research policy have been split between the Department of Education and the Department of Industry, as illustrated in Table 2.2.

Nevertheless, government policy clearly recognises the importance of research to help respond to the national challenge of building resilience. However, as identified in Chapter 4, beyond the Bushfire and Natural Hazards Cooperative Research Centre, links between research and the end user for practical implementation are limited.

2.3 Benefits of access to information

Getting the approach to natural disaster data and research right in Australia has significant financial consequences. *'Building our Nation's Resilience to Natural Disasters'* demonstrated that the economic cost of natural disasters borne by Australian communities is around \$6.3 billion per year, on average, including \$700 million in costs for government. By 2050, this is forecast to rise to \$23 billion per year, with a government budget impact of around \$2.3 billion in real terms.

It is well established that investments in resilience can reduce these costs. Furthermore, these investments will have the largest impacts where they are informed by the latest research and accurate, consistent data on disaster risks and exposure. For example, research undertaken by the Cyclone Testing Station played a key role in revising building codes in the early 1980s, leading to significant reductions in damage caused by future cyclones, as described in Box 4 on page 30.

By making information on disaster risks and resilience options more accessible, decision-making around resilience investments can be optimised and deliver additional savings for government, as well as reducing the impact of disasters on communities.

For example, *'Building our Nation's Resilience to Natural Disasters'* illustrated how an increase in pre-disaster resilience investments could generate long-term savings for government through gradual reductions in post-disaster response and recovery expenditure. Specifically, it showed how carefully targeted resilience investments of around \$250 million per annum – achieving an overall benefit-cost ratio of around 1.25 – would generate savings for government of around \$12.2 billion over the period to 2050, in present value terms.

Providing wider access to accurate, relevant natural disaster data and research can generate further savings by supporting governments, businesses and the community to prioritise these investments.

This will manifest through the achievement of higher benefit-cost ratios. Conservatively assuming that better informed investments could achieve an overall cost-benefit ratio of between 1.3 and 1.5, the total savings to government could rise to anywhere between \$12.7 and \$14.6 billion in present value terms, with additional savings of between \$500 million and \$2.4 billion over the period to 2050.

While the additional administrative costs associated with this national co-ordination would need to be deducted to estimate the net benefit of the improved approach, it is unlikely that the scale of the savings would be insufficient to offset those costs.

In any case, these figures illustrate the approximate scale of benefits that could be achieved from a more co-ordinated approach to natural disaster data and research that makes these critical information inputs open, transparent and available for governments, businesses and communities.

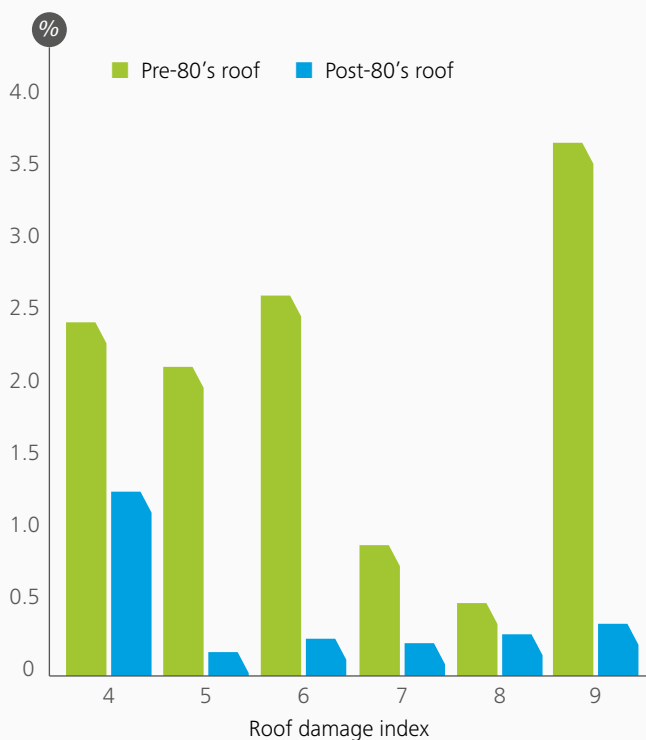
Box 4: James Cook University, Cyclone Testing Station – facilitating safer housing

The Cyclone Testing Station at James Cook University was established in 1977 in response to the devastating impact of Tropical Cyclone Tracy on Darwin in 1974. Cyclone Tracy resulted in 71 deaths, the evacuation of over 35,000 people and the destruction of 80% residential buildings (Geoscience Australia, 2011). Following the cyclone, it was recognised there was a gap in the availability of information on the effect of severe wind on low rise housing and the testing station was established.

Partly as a result of the work of the testing station, building standards in Queensland's cyclone prone areas were significantly strengthened in the 1980s. A post event analysis of Tropical Cyclone Yasi showed that 70% of post-1980s buildings sustained no roof damage compared with just 50% for pre-1980s buildings (Cyclone Testing Station, 2011). As illustrated in Chart 2.1, the examination revealed that pre-1980s buildings sustained a consistently greater frequency of serious roof damage.

Source: Cyclone Testing Station (2011)

Chart 2.1: Percentage by roof damage index





Cyclone Testing Station SWIRLNet anemometer, Cooktown: Portable wind station measuring wind speeds against Cyclone Ita 2014.