

# Chapter One: Introduction



*An inundated farmhouse from flooding of the Hunter River near Hinton, New South Wales, June 2007  
Photo courtesy: NSW SES/Phil Campbell.*

# Introduction

Australia experiences a range of meteorological and geological hazards. Some natural hazards occur only in certain climatic, geological or topographic regions, while others have a high potential of occurring anywhere on the Australian continent.

Natural disasters have helped to shape Australia's history. Notable examples include Cyclone *Mahina* (1899), Cyclone *Tracy* (1974), the Sydney hailstorm (1999) and the floods in New South Wales (1955) and southeast Queensland (1974). Other examples include the Newcastle earthquake (1989) and the Thredbo landslide (1997) in New South Wales, and bushfires such as Black Friday (1939), Ash Wednesday (1983) or the Canberra bushfires (2003).



---

*Devastation to a building caused by Cyclone Larry at Innisfail, Queensland, March 2006*

*Photo courtesy: Geoscience Australia.*

*A flood in Ipswich, Queensland, January 1974*

*Photo courtesy: Hughes Collection/Ipswich Historical Society/A. Wright.*

*State Emergency Service volunteers involved in rescue efforts at a fatal landslide at Thredbo, New South Wales, July 1997*

*Photo courtesy: Geoscience Australia.*

*Remains of a house after the Ash Wednesday fires at Anglessa, Victoria, February 1983*

*Photo courtesy: Emergency Management Australia.*

Smaller events which affect fewer people or are less severe, but occur more frequently, emphasise that the risk posed to the Australian community by natural hazards is real. Two recent smaller events declared natural disasters were Cyclone *Larry* (2006) and the storms and floods in the Hunter and central coast regions of New South Wales (2007).

The impact of natural hazards on both the natural and human environments has been recorded since European arrival through diary entries, newspaper articles and anecdotal accounts. Oral history, Aboriginal Dreaming stories and the geological record also provide some evidence of natural hazards and their impacts in Australia.

Australians have a long history of responding to disasters and can be proud of their successes in managing natural hazards through mitigation. However, recent natural disasters serve as a reminder that there is much more to be done to reduce the risk to communities and minimise losses.

As Australia's population and density of living continue to grow, so does the potential impact of a natural disaster upon the Australian community. Increasing numbers of people, buildings and infrastructure assets are being exposed to natural hazards as the pressures for urban development extend into areas of higher risk.

Australia's ability to deal with a catastrophic disaster which has the potential to exceed the combined resources of all jurisdictions was considered in the 2002 high-level report to the Council of Australian Governments (COAG) *Natural Disasters in Australia. Reforming Mitigation, Relief and Recovery Arrangements* (COAG 2004). The review concluded that although the probability of such an event occurring was low, the consequences of such an event would be extreme; and that the Australian community was not sufficiently prepared.

The need for a new approach to extend beyond existing measures to ensure 'a world-class national framework for natural disaster management' was identified (COAG 2004). As the report states (COAG 2004, p. 13):

*'Central to the new approach is a systematic and widespread national process of disaster risk assessment and, most importantly, a paradigm shift in focus towards cost effective, evidence-based disaster mitigation. This represents an historic move beyond disaster response and reaction, towards anticipation and mitigation.'*

The report includes 64 recommendations and 12 reform commitments aimed at improving existing practice to achieve 'safer, more sustainable communities, and reduced risk, damage and losses.'

This report, *Natural Hazards in Australia: Identifying Risk Analysis Requirements*, is a step towards meeting some of the objectives identified by COAG. In particular, this report relates to the first two reform commitments recommended by COAG (2004, p. 14):

*'1. develop and implement a five-year national programme of systematic and rigorous disaster risk assessments*

*2. establish a nationally consistent system of data collection, research and analysis to ensure a sound knowledge base on natural disasters and disaster mitigation.'*

This report also relates and contributes to the National Risk Assessment Framework (NRAAG 2007) which has been prepared by all levels of government. The framework identifies the need to produce consistent information on risk so that risks can be compared for different locations and for different natural hazards. The framework aims to produce an increasing evidence base for decision making in disaster mitigation.

Accurately modelling the likely impacts of natural hazards on communities provides decision makers with the tools to make more informed decisions aimed at reducing the impact of natural hazards. Minimising the impact of natural disasters must involve a long-term commitment from those in policy and programme areas at all three levels of government. It must also be done in close partnership with industry and with community involvement and support. It is a vital long-term investment in the welfare of the community, requiring significant foresight and planning.

## Scope

The natural hazards selected for inclusion in this report were guided by the definition of a natural disaster stated in the report to COAG (2004, p. 4):

*'a serious disruption to a community or region caused by the impact of a naturally occurring rapid onset event that threatens or causes death, injury or damage to property or the environment and which requires significant and coordinated multi-agency and community response. Such serious disruption can be caused by any one, or a combination, of the following natural hazards: bushfire; earthquake; flood; storm; cyclone; storm surge; landslide; tsunami; meteorite strike; or tornado.'*

These disasters are also eligible for the Natural Disaster Relief and Recovery Arrangements (NDRRA) administered by the Australian Government through the Department of Transport and Regional Services (DOTARS).

Notable omissions from this definition include hazards such as heatwave, drought and frost. Heatwaves have killed more people in Australia than all other natural hazards combined, with the elderly particularly at risk. Severe drought regularly affects some parts of Australia, often with enormous impacts on agriculture and the economy. For example, the drought from 1991 to 1995 is estimated to have cost the Australian economy \$5 billion and had a large social impact.

Frosts also regularly occur in Australia and have the potential to cause significant losses to agriculture. While heatwave, drought and frost are not considered in this report, they are increasingly being recognised as critical issues in Australia.

While the term 'natural hazard' is used throughout this report it is important to note that not all hazards that impact communities are initiated through natural means, and that the potential impact of a hazard is the same regardless of its origin. For example, arson is a common source of ignition for bushfires in Australia, and human activity can exacerbate the occurrence of landslides and floods.

## Report Intent

This report provides an overview of the rapid onset natural hazards which impact on Australian communities. Emphasis is placed on identifying risk analysis requirements for tropical cyclone, flood, severe storm, bushfire, landslide, earthquake and tsunami events, with a particular focus on likelihood and consequence as identified in the risk management standard AS/NZS 4360:2004.

This report will be of value to those who have an interest in, or a responsibility for, the management of natural hazards and the reduction of their impacts. This may include policy makers, emergency managers, land use planners, researchers and members of the general community. The report is targeted at several levels and the reader should be guided by their experience, responsibility and level of interest.

The reader is encouraged to seek out more detailed information in areas of particular interest, using the reference list provided as a starting point. The reader is also encouraged to seek out the most up-to-date information, to consult those with expert knowledge in an area, and to challenge existing practice with the aim of improving it where appropriate.

## Report Structure

The introductory chapter provides the context to the report and outlines the report's scope, intent and structure. Chapter 2 considers the impact of natural disasters in Australia, including their distribution and socioeconomic cost, and the role that policy plays in natural disasters. Chapter 3 provides a brief introduction to risk analysis.

Chapters 4 to 10 are hazard specific. It is acknowledged that many of the hazards do not occur in isolation from each other. Flooding, for example, can result from a tropical cyclone or severe storm. However, to avoid repetition, each phenomenon is outlined in the most appropriate chapter.

The tropical cyclone chapter (Chapter 4) incorporates severe wind, storm tide, heavy rainfall and east coast lows.

Flooding is the most costly natural disaster, and Chapter 5 focuses on flood from rainfall, including riverine flooding and flash flooding.

Severe storms, though very localised, are the most frequent and widespread natural hazard throughout Australia. The severe storm chapter (Chapter 6) focuses on thunderstorms and describes lightning and thunder, hail, wind gusts and tornadoes.

Bushfire also poses a significant threat to the Australian community; grassland fire and forest fire are described in Chapter 7.

Landslide, the first of the non-meteorological hazards examined, is covered in Chapter 8. However, landslides are often triggered by meteorological events such as heavy or prolonged rainfall. The chapter focuses on rockfall, debris flow and deep-seated landslide.

Earthquake is covered in Chapter 9. Although the level of earthquake hazard in Australia is relatively low, the reinsurance cost for

earthquakes is higher than for any other natural hazard in Australia.

The final hazard included in this report is tsunami. The tsunami chapter (Chapter 10) incorporates meteorite strike, along with earthquake, volcano eruption and submarine landslide, because of their potential to trigger a tsunami.

Chapters 4 to 10 follow an identical structure. Each chapter:

- describes the hazard and its occurrence in the Australian setting
- provides an overview of what is known about the cost of the hazard
- summarises the potential influence of climate change (where relevant)
- outlines the factors required in the analysis of risk, with a focus on likelihood analysis and consequence analysis. This includes identifying the broad data and information that are required to undertake a risk analysis
- identifies some of the gaps in information and research, and data constraints relating to risk analysis
- provides an overview of the roles played by different agencies and groups in managing the risk posed by the natural hazard.

The first three sections of each hazard chapter and the overview of roles and responsibilities will be of interest to the general reader. The sections on risk analysis and information gaps will be of more interest to the specialist reader.

A glossary defines some of the non-hazard specific key terms used throughout the report. A reference list is also provided as a basis for further reading.

