Dams, Fault Scarps and Earthquakes

Proceedings of a conference held by the

Australian Earthquake Engineering Society

Hobart, Tasmania
2000

This work was published by the Australian Earthquake Engineering Society. The views expressed in the papers are those of the author(s) and not necessarily those of the Society.

ISBN 0 7340 2083 x

Editors: V. H. Jensen, B. Butler

Publisher: Australian Earthquake Engineering Society

Cover: Photograph courtesy of V.H. Jensen
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The Lake Edgar Fault Scarp

Cities Project

capabilities

Introduction

The impact of significant disasters in Australia costs the community, on average, $1.25 billion a year. Some individual disasters, such as the 1989 Newcastle earthquake can have a much greater cost. This relatively small earthquake (Richter magnitude 5.6) took 13 lives, seriously injured 106 people and cost the community around $4 billion in both direct and indirect damage.

While the incidence of the impact of hazards such as earthquakes, landslides, floods and cyclones has remained essentially constant over the past century, the magnitude of their impact has continually increased. This is because there are more people, more buildings, more infrastructure and more economic activity in the areas that are prone to hazard impact. Simply, more is at risk. There is a clear need to arrest the rapid increase in risk.

The National Geohazards Vulnerability of Urban Communities Project (better known as the *Cities Project*) has been established to develop and apply the science and techniques by which to gain a better understanding of the risks confronting urban communities from a wide range of geohazards. The *Project's* operational philosophy is to foster, through a process of multi-hazard risk assessment, safer, more sustainable and thus more prosperous communities. It also takes a very broad view of "geohazards" to include all earth surface processes that have the potential to harm communities or the environment.

Car crushed against building by debris flow, Magnetic Island, January 1998

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Assessing community vulnerability – building usage

Services

- the analysis and mapping of a range of acute geohazards including earthquakes, landslides and inundation hazards including flood, storm tide and tsunami;
- the analysis of the elements that are at risk in the community (the people, buildings, infrastructure, etc.) and the features that make them more or less susceptible to hazard impacts;
- the development of specific and multi-hazard risk assessments of urban communities;
- the development and management of the information needed to underpin those assessments;
- the development of GIS-based decision support tools to assist emergency managers, urban planners, engineers and risk managers to prepare their risk treatment strategies and response options;
- the development of databases of historic hazard impacts and the community's response to those events;
- the development and dissemination of a wide range of community awareness and public education material relating to geohazard risks.

Expertise

The *Cities Project* has drawn together a team with expertise and wide experience in:

- seismic hazard microzonation, modelling and risk analysis;
- landslide hazard mapping and risk analysis;
- coastal inundation and erosion hazard mapping and risk analysis;

Critical facilities – earthquake damage to Newcastle Ambulance Station, 1989

urban geography and community vulnerability analysis;

engineering of transport and utility lifelines and the analysis of their vulnerabilities;

information management and the development of information infrastructures;

the development of GIS-based disaster decision support systems;

spatial, process, temporal and multi-dimensional modelling using GIS as a core technology;

public awareness of geohazards and risk.

'he *Project* is also able to draw n AGSO's wealth of expertise in ields such as seismic monitoring nd hazard assessment, geological napping and remote sensing. An xtensive network of collaborators n other government agencies, uch as the Bureau of Meteorology and CSIRO, cademia and the private sector as also been developed to broad- n the *Project's* skills base. This s complemented by a strong etwork of international collabo- ators and contacts, especially n New Zealand and the Pacific slands, the USA, Canada nd Japan.

Achievement Record

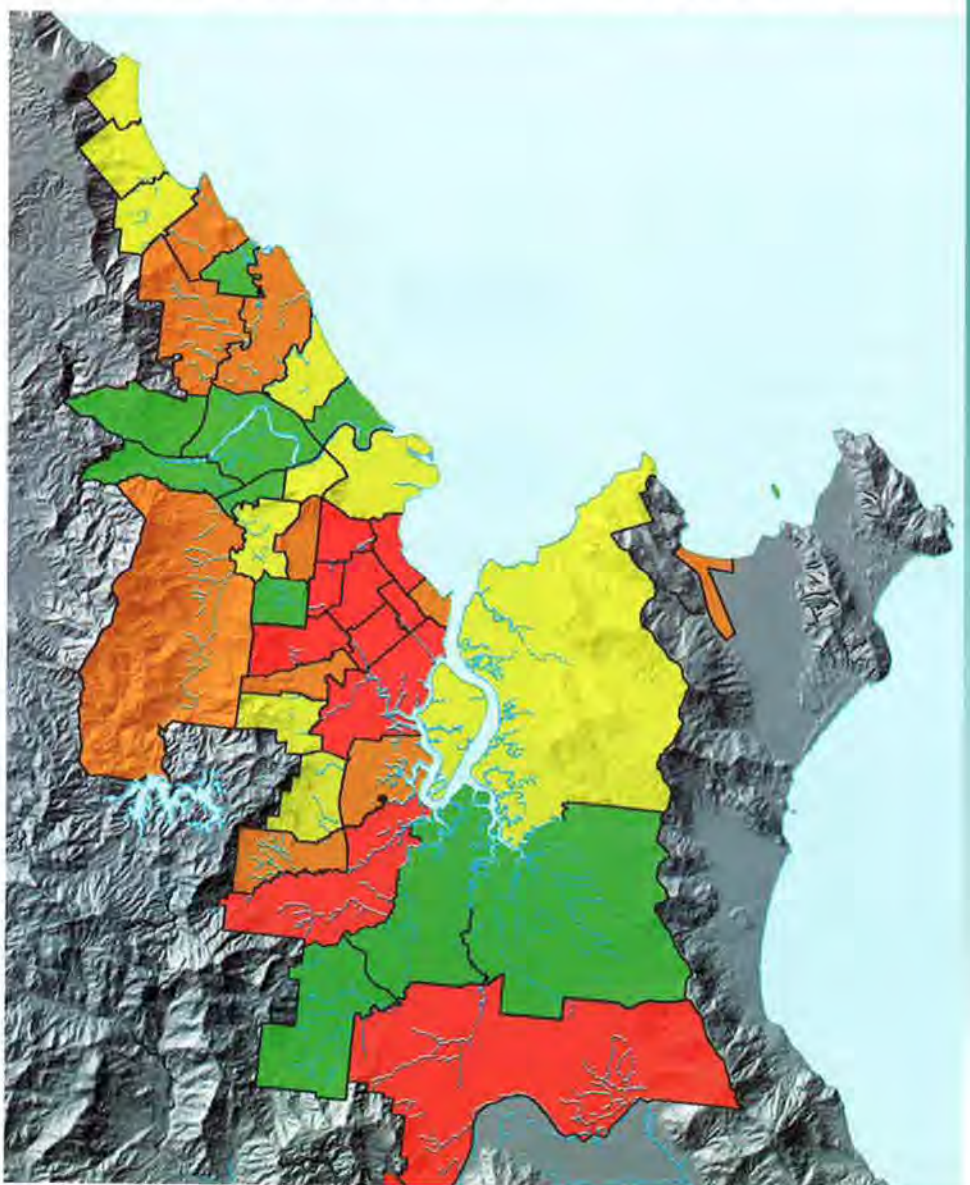
'he *Cities Project* has completed ts first comprehensive study Community Risk in Cairns: a Multi-Hazard Risk Assessment'. 'his study has been published on CD-ROM to take advantage of hat technology's capacity to dis- lay detailed maps and complex raphics, including animations. Work is in progress to complete ompanion reports on smaller Queensland cities including Mackay and Gladstone and on he very large and complex South- East Queensland metropolitan rea, which contains two million people. A detailed technical report on the quantitative landslide risk assessment methodology developed for Cairns has also been published. Significant input was also provided by the Project to a recent study of the risks to utility lifelines in the ACT.

More specific work is continuing on the earthquake risk to major lifelines in the Botany area of Sydney, and the landslide risks in the Wollongong area of NSW in collaboration with the University of Wollongong and the Wollongong City Council. A detailed review of the consequences of the 1989 Newcastle earthquake is also under way to test new hazard analysis techniques and to calibrate risk assessment models.

The Cairns CD-ROM also contains a detailed review of the information used and the issues involved in developing an information infrastructure to support such broadly-based studies. The experience gained in developing information infrastructures has also been applied to the development of guidelines to assist disaster managers in Pacific Island countries.

Project staff provide frequent input to scientific and general conferences, workshops and training programs. They also provide input to a wide range of public education and awareness programs through media interviews, TV documentaries and the production of pamphlets and other printed material.

Cairns suburbs - overall contribution to community vulnerability



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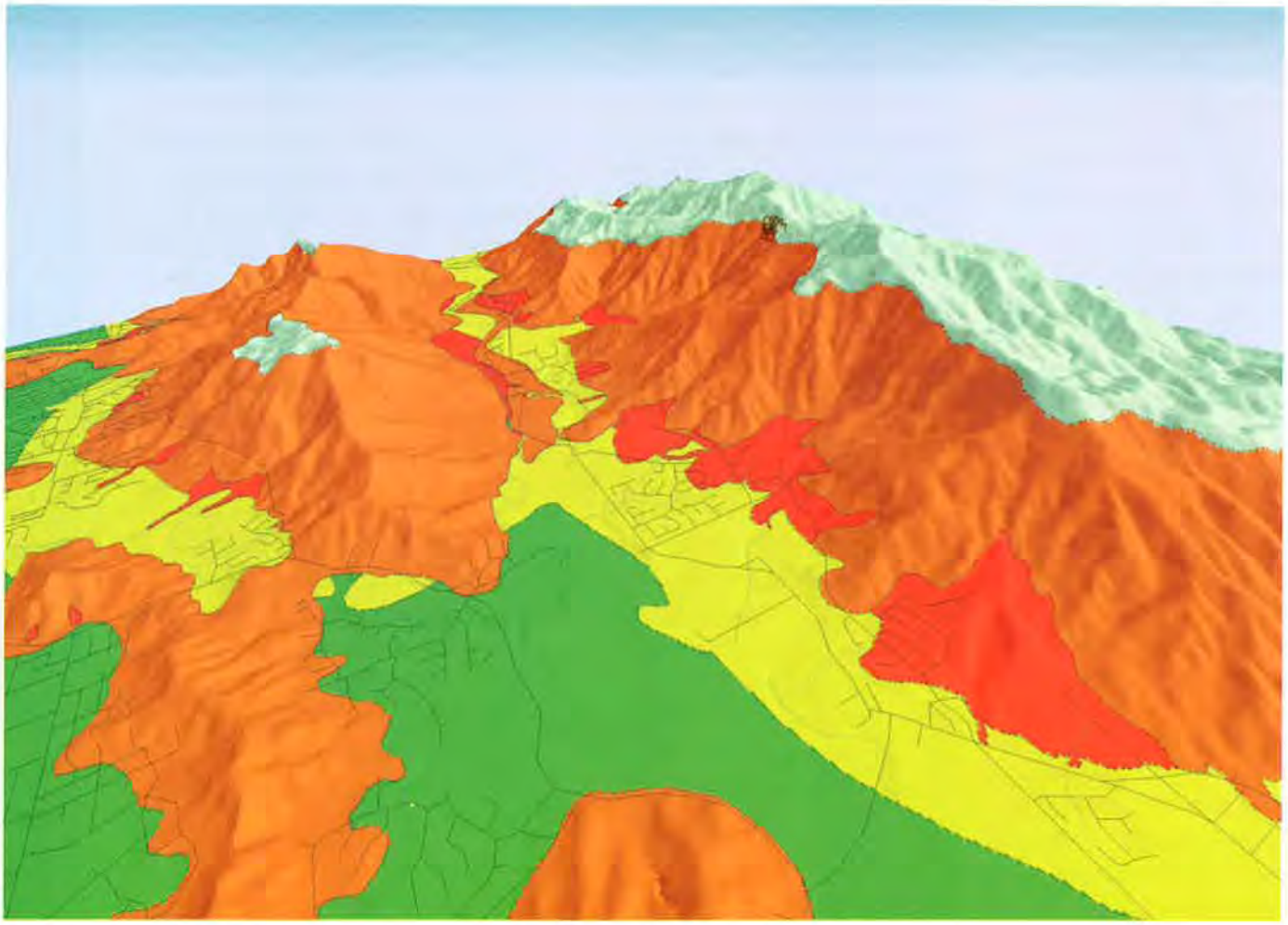
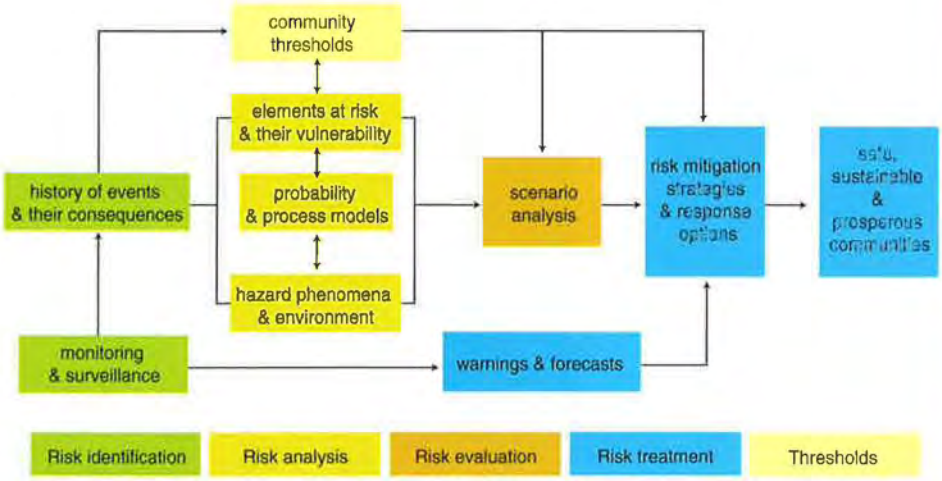


Specific annual risk of building destruction by landslide — Redlynch, Cairns

Philosophy

The *Cities Project* is committed to the process of risk management. It has been one of the key Australian contributors to the United Nations International Decade for Natural Disaster Reduction (IDNDR), both in Australia and the Pacific. It continues to be focused on fostering safe, sustainable and prosperous communities.



Cities Project risk management process

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FOREWORD

The theme of this year's Australian Earthquake Engineering Conference; "Dams, Fault Scarps and Earthquakes," reflects the uniqueness of the island Tasmania, the conference venue. With over 60 large dams and a modern infrastructure, Tasmania is in a vulnerable position should a large earthquake occur under the island or in the oceans nearby. Geological evidence indicates that large earthquakes have happened in the not-so-distant past.

The conference attempts, through the many papers submitted, to address the question as to how to design an infrastructure that will survive major earthquakes, how to assess seismic hazards in Tasmania and how to deal with emergencies. A wide variety of authors have contributed toward a very interesting program. The conclusions drawn and suggestions made are applicable to any community throughout Australia.

We would like to thank Barbara Butler, our Society's Secretary, and everyone else who has contributed toward the successful organisation of the Conference and these Proceedings.

Vagn Jensen
Organising Committee

With thanks to our Major Sponsors:

Seismology Research Centre
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TABLE OF CONTENTS

*Papers marked * were, in accordance with DETYA requirements, subjected to an independent critical review process by two experts from the field in which the material was written.*