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# **Innovative land-use planning for natural hazard risk reduction in New Zealand**

A thesis presented in partial fulfilment of the requirements  
for the degree of

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## ABSTRACT

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New Zealand is susceptible to a number of natural hazards, yet some land-use planning decisions can lead to developments being located in at risk locations. This can lead to an increase in risk rather than risk reduction, which does not promote the principles of sustainable development. The aim of this research is to develop a risk-based framework for innovative land-use planning that allows risks from natural hazards in New Zealand to be reduced, and encourages better decision making for natural hazard risk reduction. Research methods employed included Participatory Action Research, a literature review, use of case studies, qualitative content analysis, interviews, and workshops. The conceptual foundation of this research integrates insights from innovation scholarship, natural hazards planning, participatory planning and risk governance.

The case studies highlighted that an innovative risk governance approach is required to address the shortfalls of existing risk governance arrangements. The state, market and civil society are key to an integrated risk governance approach; however risk creation, bearing and sharing may not be equal between these players, and economic imperatives often override social and environmental concerns. Barriers to and opportunities for innovation for risk reduction included prevailing governance, leadership, legislation, research, second generation plans, cost, liability, skills/experience/resources, awareness and understanding.

There is a variety of guidance available to local government on various natural hazards. But in order to appropriately manage these hazards the risk must first be quantified and qualified – for which there is limited guidance available. This research bridges this gap by outlining an approach to risk governance that is framed around three key steps: 1) articulating and addressing consequences of events; 2) assessing the likelihood of these consequences; and 3) taking a risk-based approach to planning based on Steps 1 and 2. The result is a planning framework that becomes more restrictive as risk increases. With a focus on risk management principles and processes, the framework assists planners by providing policy and resource consent activity status criteria that enable hazard risks to be categorised via risk-based land-use planning. This provides an alternative to the current planning approach that can be used to assess risk implications within the existing planning system.

Planning has a vital role to play in reducing risks from natural hazards, but a new approach is required to ensure that planning decisions do not result in an increase in

risk to people and property. Legislative changes are needed to ensure consistency, integrate legal provisions and provide effective monitoring of risk reduction policies and outcomes. The risk-based framework presented provides a significantly new approach where consequences are the primary concern, rather than likelihood; and it allows for levels of risk to be defined. The result is a framework that can assist decision makers to reduce risks to people and property from natural hazards, and encourages sustainable development.

## PREFACE

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**He aha te mea nui o te ao?  
He tangata! He tangata! He tangata!**

What is the most important thing in the world?  
It is people! It is people! It is people!

*Māori proverb*

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Don't build your house on the sandy land  
Don't build it too near the shore  
Oh it might be kind of nice  
But you'll have to do it twice  
And you'll have to build your house once more  
You better build your house upon the rock  
And put a sure foundation on the solid spot  
And though the storms may come and go  
Peace of God you'll know.

*Children's Sunday School song*



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## ABBREVIATIONS

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2GP	Second generation plans
AEP	Annual exceedance probability
ALARP	As low as reasonably practicable
AR	Action research
AS/NZS	Australian/New Zealand Standard
BOPRC	Bay of Plenty Regional Council
CAENZ	Centre for Advanced Engineering New Zealand
CDEM	Civil Defence & Emergency Management
CDEMA	Civil Defence Emergency Management Act 2002
EQC	Earthquake Commission
EW	Environment Waikato
IAP2	International Association of Public Participation
IBHS	Institute for Business and Home Safety
ICNZ	Insurance Council of New Zealand
LIM	Land information memorandum
LGA	Local Government Act 2002
LGNZ	Local Government New Zealand
LTCCP	Long term council community plan
MCDEM	Ministry of Civil Defence and Emergency Management
MfE	Ministry for the Environment
NZCPS	New Zealand Coastal Policy Statement 2010

ODESC	Office of Domestic and External Security Group
PAR	Participatory action research
RMA	Resource Management Act 1991
RPS	Regional Policy Statement
TCDC	Thames-Coromandel District Council
WRC	Waikato Regional Council