Research Update

April 2010

Joint Centre for Disaster Research

GNS Science – Massey University, School of Psychology

Welcome to the latest of the research updates from the Joint Centre for Disaster Research. The centre opened in December 2006 and is a joint venture between Massey University and GNS Science within the School of Psychology, based at the Massey University campus in Wellington.

The centre undertakes multi-disciplinary applied teaching and research aimed at:

- gaining a better understanding of the impacts of natural, man-made, and environmental disasters on communities;
- improving the way society manages risk;
- enhancing community preparedness, response to and recovery from the consequences of natural, man-made and environmental hazard events.

Disastrous Doctorates – Year 3

This year the Centre hosted the 3rd Disastrous Doctorates workshop, bring together PhD students research disaster related topics from six institutions. Front from left to right: Shabana Khan (Victoria), Charlotte Brown (Cantebury), Ali Rasheed (AUT) and Abdur Rehman Cheema (Massey). Back row from left to right: Temetope Egbelakin (Auckland), Heather Taylor (Massey), Amy Stephanson (Canterbury), Wendy Saunders (Massey), Caroline Orchiston (Otago) and Julia Becker (Massey).

Visit our updated website: http://disasters.massey.ac.nz/

Helping Haiti

Sarb Johal (Research Associate) based in the UK, is running in a series of race events for a worldwide charity involved in psychosocial support after emergency events. On the 14th of March he ran a 10km race in Regent's Park to raise money for the international humanitarian medical aid charity, Médecins Sans Frontières. This year there will be around of 250 people running - university students and members of the public from in and around London. But that is just the start. Sarb will be running a series of races for MSF this year, culminating with the Berlin Marathon in September this year - his first marathon.

Médecins Sans Frontières is an international humanitarian medical aid charity which is currently working in around 60 countries around the globe. Some of their recent efforts have been directed towards the devastating earthquake in Haiti, the ongoing unrest in Sudan and the so-called 'neglected diseases' such as Chagas. There's information about MSF widely available – please have a read or visit http://www.msf.org.uk/ourwork_where_work.aspx for more information. MSF's YouTube video (http://www.youtube.com/watch?v=73zMcdGfXGE) also gives a great overview of the organization.

Regular readers will know of Sarb's involvement with the JCDR and psychosocial support after emergency management. In the case of Haiti, MSF's emergency wards are still treating large numbers of patients but the nature of their injuries is gradually changing. Fewer people are appearing with wounds directly caused by the earthquake, but now the indirect consequences of the disaster are beginning to manifest themselves, with more children suffering from diarrhoea and more people coming forward with physical symptoms of mental trauma. Feel free to get in touch with Sarb with any questions - sarb@equanimity.co.nz . If you'd like to sponsor Sarb - any amount will be gratefully received, and it will all help us raise money for a very deserving cause. The link is http://www.justgiving.com/SarbJohal, or you can follow him on twitter (@sarb) for regular updates on his training plan.

About Médecins sans Frontières

Médecins Sans Frontières (www.msf.org) is an independent international medical humanitarian organisation that delivers emergency aid in around 60 countries to people affected by armed conflict; epidemics; natural or man-made disasters; or exclusion from health care.
In emergencies and their aftermath, MSF rehabilitates and runs hospitals and clinics, performs surgery, battles epidemics, carries out vaccination campaigns, operates feeding centres for malnourished children and offers mental health care. When needed, MSF also constructs wells, dispenses clean drinking water, and provides shelter materials like blankets and plastic sheeting. (Phone above: Psychologist Marie Lafortune assesses patients in Martissant for psychological needs.)

Through longer-term programmes, MSF treats patients with infectious diseases such as tuberculosis, sleeping sickness, and HIV/AIDS and provides medical and psychological care to marginalised groups such as street children. MSF was born in the early 1970s out of the exasperation of a group of French doctors who worked in desperate conditions in the Biafra War (1967-1970). They were determined to create a movement to deliver independent humanitarian aid wherever it was needed, and one that would speak out about the plight of the victims it helped. In order to fulfil these goals, MSF was created in complete independence of any political, religious or economic powers. The organisation remains fiercely protective of these core values today. In recognition of its humanitarian actions in such areas as Afghanistan, Ethiopia and Rwanda, the MSF movement was awarded the 1999 Nobel Peace Prize.

The UK office was established in London in 1993. It supports MSF's field work by recruiting volunteers, collecting donations and raising awareness of humanitarian crises through the media. A specialist medical team works directly with the field projects to help solve urgent clinical problems.

The Centre's New Building

In February 2010 the Centre moved into a new building on the Massey campus, in Wellington. The building was officially opened on the 17th March by Professor Nigel Long (Massey) and Dr Alex Malahoff (speaking in the photo below). The new building houses our new EoC Research lab (see page 16-17 of this newsletter for more information).

Istanbul conference

Istanbul International Conference on Seismic Risk Mitigation, December 8-10, 2009

The August 17 and November 12, 1999 earthquakes in Turkey caused great loss in human life and severe social and economic impacts. A number of actions and programmes were initiated following these events. Istanbul is one of the most vulnerable of cities due to its seismic-prone location nearby the North Anatolian Fault, as well as its high population and high density of commercial/industrial facilities. Istanbul Seismic Risk Mitigation and Emergency Preparedness Project (ISMEP) is a leading activity to implement the basic principles of comprehensive disaster management. With the loan allocated from the World Bank and the European Investment Bank, the project is financed by the Prime Ministry Undersecretariat of Treasury and is implemented by Istanbul Project Coordination Unit (IPCU) established under Istanbul Special Provincial Administration.

Within this context, to mark the 10th year of 1999 earthquakes, Istanbul International Conference on Seismic Risk Mitigation, organised by the Prime Ministry Disaster and Emergency Management Presidency and the Governorship of Istanbul in collaboration with the World Bank is dedicated to exploring national/international experiences in the broader area of seismic risk mitigation. The program was planned to provide a forum for the presentation and exchange of information on what has been achieved in Turkey, specifically in Istanbul in seismic risk mitigation after the 1999 earthquakes; how this and similar experiences from other earthquake-prone countries can be shared and disseminated and how consensus among various stakeholders can be built for future steps in seismic risk mitigation in urban areas. The program also included field visits to various implementation sites of Istanbul Seismic Risk Mitigation and Emergency Preparedness Project (ISMEP).

David Johnston (JCDR Director) was an invited speaker and was supported by the World Bank to attend the conference. He co-presented a paper with Professor Nuray Karanci from the Department of Psychology, Middle East Technical University, Ankara, Turkey on " Overcoming social and economic barriers to seismic retrofitting of residential buildings in Turkey and New Zealand"

The BRCSS Network

BRCSS, the Building Research Capability in the Social Sciences network - Hui Rangahau Tahi, is a virtual research community, which spans New Zealand's eight universities. The purpose of BRCSS is to support capability building and the development of new research in the social sciences through collaborative, networked initiatives that involve: (1) Funding new social science research projects / initiatives in Aotearoa New Zealand; (2) Building capacity by contributing to the development of new and emerging researchers through awards and workshops; (3) Developing the profile of social science through seminars, distinguished visitors and network building; (4) Establishing researcher collaboration and communication through enhanced linkages amongst social scientists; (5) Encouraging networking via the Access Grid Nodes.

Four targeted networks already exist and will undertake a program of Access Grid based seminars and workshops during the year. Membership of the networks and participation in the Access Grid events is open to anyone who has an interest in the topics under discussion. Seminars are advertised on the website and through new and existing email lists. The new and existing networks are the Maori network; Pasifika Talanoa network; New Settlers network; Emerging and early career researcher's network. Awards for masters Students and PhD students who are within 6-8 months of completion will be advertised on the BRCSS network shortly. For more information visit http://www.brcss.net.nz/

New book contracts

Climate change and the coast: building resilient communities

Edited book. Bruce C. Glavovic, Robert Kay, Mick Kelly, Ailbhe Travers
Published by Taylor & Francis

Climate change and its impact on coastal zones is a topic of increasingly urgent importance. This clear and practical guide explores the challenges and opportunities for building sustainable, resilient coastal communities in the light of present-day social, economic and environmental trends and the multiple threats posed by climate change, including global warming and sea-level rise. This book is distinctive because of its global scope, with detailed case studies from coastal regions around the world. The authors have firsthand experience working in these regions and draw on scholarly and practitioner experience in providing best practice guidance to enable coastal communities to adapt to climate change.

Climate Change and the Coast integrates theory and analysis of current practice from around the world. The theoretical analysis includes administrative, legislative, policy and technical approaches. This sets the framework for in-depth case studies of climate change issues and adaptation challenges and opportunities from the world's coasts, including Europe, North and South America, Asia, Australasia, Africa and the Polar regions, as well as case studies from small island developing states and coastal megacities. The authors provide guidance on addressing both current and future coastal vulnerability, including resilience and adaptation assessment. They focus on building resilience and adaptive capacity with a strong emphasis on translating theory into principles and working practice, drawing on experience in a number of coastal contexts worldwide. (Photo above: Haumanoa by Warren Meldrum)

This book is written for a diverse audience. It draws on the expertise of a wide range of contributors with backgrounds in diverse fields and experience in coastal issues on all continents. The book will be of particular interest to professionals working in the public and private sectors of coastal communities, including coastal planners and managers, consultants, and scientists, as well as those who work for a range of international bodies. It provides practical guidance for coastal decision-makers, including elected and appointed government officials, business leaders and leaders of non-governmental and community based organisations. The book will be relevant to students and scholars in fields ranging from environmental science to geography, planning, development studies, politics, public administration, policy analysis, emergency management, and emerging interdisciplinary fields such as sustainability studies and adaptive management. The book will be of special interest to people in coastal communities who are searching for innovative and practical ways to achieve more sustainable outcomes, especially those elected or appointed to make community decisions and those who advise them.

Australasian Journal of Disaster and Trauma Studies, Special Issue out

Special Issue of the Australasian Journal of Disaster and Trauma Studies has recently been published on the role of land-use planning in disaster risk reduction in Australasia. Edited by Bruce Glavovic (Associate Director of the Centre), it addresses proactive natural hazards planning to enable communities to understand disaster risk and make decisions that promote their safety, resilience and sustainability.

Free access to the contents of Volume 2010-1, can be found at URL: http://trauma.massey.ac.nz/issues/2010-1/contents.htm. Papers include:

The role of land-use planning in disaster risk reduction: an introduction to perspectives from Australasia by Bruce C. Glavovic

Abstract This introductory article sets the scene for this Special Issue about the role of land-use planning in disaster risk reduction in Australasia. Proactive natural hazards planning enables communities to understand disaster risk and make decisions that promote their safety, resilience and sustainability. Despite the prevalence of natural hazards in Australasia, and efforts to institutionalise natural hazards planning, the promise of natural hazards planning remains elusive. Moreover, there is a paucity of scholarly research on this subject in this region. Synthesising key findings from natural hazards planning scholarship, primarily from the United States of America, this paper describes the nature of disaster risk, the role that land-use planning can play in building more sustainable, hazard-resilient communities, and introduces the papers in this Special Issue.

Lessons from the United States: Planning for post-disaster recovery and reconstruction by Gavin Smith

Abstract The failure of federal, state and local governments in the United States to engage in pre-event planning for post-disaster recovery has several negative consequences: 1) following a disaster it is unclear who is in charge of community recovery; 2) land use planning tools and collaborative techniques are underutilized; 3) the collection and analysis of data is not effectively linked to the creation of policy options; and 4) the nexus between hazard mitigation, sustainable development and disaster resilience remains uncertain. While these problems are endemic to the United States, a critique of the existing disaster recovery process is intended to provide important lessons for others so that similar mistakes can be avoided and planning for post-disaster recovery is more widely recognized and embraced by others, including the professional land use planner.

Realising the potential of land-use planning to reduce hazard risks in New Zealand by Bruce C. Glavovic, Becker, J.S. & Saunders, W.S.A

Abstract The New Zealand policy and legal setting for land-use planning provides a robust foundation for reducing hazard risks. But much remains to be done to improve hazards planning policy and practice in New Zealand. This article starts by describing the setting within which natural hazards planning takes place. Five critical issues are identified and priority actions are recommended for realising the potential of land-use planning to reduce hazard risks: (i) Improve understanding about the nature of hazards; (ii) Prioritise Reduction measures; (iii) Provide national guidance for communities exposed to repeat events and confront the relocation issue; (iv) Mainstream climate change adaptation; and (v) Facilitate cooperative hazards governance.

A synthesis of challenges and opportunities for reducing volcanic risk through land use planning in New Zealand by Becker, J.S., Saunders, W.S.A., Robertson, C.M., Leonard, G.S., & Johnston, D.M.

Abstract In the North Island of New Zealand a number of active volcanoes exist that could reawaken or erupt at any time. The location of urban areas within and near these volcanic areas constitutes a significant peril. Given the close proximity of settlements to active volcanoes, it is essential that communities and governing authorities understand the nature of volcanic hazards and make plans for mitigating the associated risk. Mitigation can occur in a variety of ways including employing structural measures (e.g., by employing engineering solutions), emergency management processes, or land use planning. Currently land use planning is an underutilised approach for mitigating volcanic risk. The purpose of this paper is to provide an overview of the hazards posed by New Zealand's volcanic landscape, and to highlight the important role that land use planning can play in reducing volcanic risk. New Zealand and international case studies are presented and the paper concludes with a synthesis of challenges and opportunities for reducing volcanic hazard risk through land use planning.

Exploring the social context of coastal erosion management in New Zealand: What factors drive particular environmental outcomes? by Paula Blackett, Terry Hume & Jim Dahm

Abstract Coastal erosion and its associated hazards to property and infrastructure and the debates that emerge over remedial measures cause conflict that requires negotiated solutions involving all key stakeholders. A series of New Zealand case studies is presented and indicates that positive or negative environmental outcomes are largely the result of how the negotiation proceeds, who is involved, how resource management agencies behave and the nature of the physical environment. Positive outcomes emerge when: Cooperative relationships are established, learning and trust are developed, risks are addressed, scientific input is managed, lobby groups are defused, contending interests are reconciled, and records are kept of the negotiation process and agreements reached.

Community-based civil defence emergency management planning in Northland, New Zealand by Antoinette Mitchell, Bruce C. Glavovic, Bill Hutchinson, Graeme MacDonald, Melanie Roberts & Jim Goodland

Abstract Building sustainable, hazard-resilient communities is a challenging imperative. Meaningful community involvement in planning for and managing hazard risks is the starting point for meeting this challenge. This research presents lessons learned from community-based emergency management experiences in the Northland region of New Zealand. The Northland experience is described through a case study of the Kaitaia Community Response Plan process. This experience and the lessons learned are discussed in the context of international experience in community involvement in natural hazards planning and collaborative planning more generally.

An overview of natural hazard planning in the Pacific Island region by John Campbell

Abstract Pacific Island Countries are exposed to a wide range of natural hazards. Despite this it appears that traditionally communities coped relatively well and in many ways Pacific community remain remarkably resilient, especially in rural areas. Nevertheless, colonialism resulted in the decline of many activities that contributed to resilience. This was reinforced by the provision of disaster relief which has intensified in the post-colonial era. In this same period regional activities and steps by newly independent countries have seen the development of solid institutional arrangements for disaster management (mostly in the form of preparedness planning). However, measures to reduce disaster losses by incorporating risk reduction into national planning activities and decision-making have received little support to date from national governments. At the same time urbanisation is increasing rapidly in many PICs, but there has been a low level of implementation of effective urban planning and management, let alone disaster risk management. Moves are being made at the regional level to address these problems but are at an early stage.

Samoa Tsunami 6:50 AM, Tuesday 29 September, 2009

Lalomanu looking east 10 December, 2005

Lalomanu looking east 2 October, 2009

Photos: Beca

Realising the promise of natural hazards planning: An Australasian perspective
by Bruce C. Glavovic

Abstract The papers in this Special Issue explore different aspects of natural hazards planning in Australasia. This concluding paper synthesises from these papers four strategic issues for realising the promise of natural hazards planning in Australasia, namely (i) undertake pre-event planning for sustainability, disaster risk reduction and post-disaster recovery; (ii) mainstream natural hazards planning to address low probability events and climate change in day-to-day land-use planning and management; (iii) focus more attention on the social dimensions of natural hazards; and (iv) increase the emphasis on natural hazards governance.

Helping children and schools prepare for disasters

Continuing research at the centre is focussing on helping children and schools prepare for and understand disasters. Work by PhD student Heather Taylor is exploring children's drawings to express their experiences of flooding in Solo, Indonesia; September 2009.

A new research report on preparing schools in New Zealand for future earthquakes has recently been published. The purpose of the most recent study was to observe and evaluate an earthquake response and evacuation exercise in a Wellington primary school (Years 1-8). Key lessons learnt include the following: (1) frequent, well-learned emergency practices are likely to increase the probability that in a real emergency at school, staff and pupils will respond in an informed and predictable manner, and engage in behaviours that are recognised as best practice, and; (2) schools that have well developed and regularly practised emergency preparedness plans in place send a message to pupils and caregivers alike that in the case of an emergency, the school is prepared to protect the safety of the children.

Johnston, D. M., Tarrant, R. A. C., Tipler, K., Coomer, M. A., Pedersen, S., Garside, R. 2010. An earthquake emergency response and evacuation exercise in a New Zealand school: A case study report, GNS Science Report 2010/01 11 p. (available free http://disasters.massey.ac.nz)

Streamlining institutions, policy, law and practice for disaster risk reduction and community resilience

Promoting disaster risk reduction and community resilience through the '4R' approach is a laudable but challenging ideal. New Zealand has developed a robust institutional, policy and legal framework for this purpose, built on the CDEM Act and complemented by provisions in the RMA, LGA and many other laws. However, much remains to be done to ensure alignment and coordination of these provisions, and effective translation of these intentions into practical reality. There are gaps, overlaps and redundancies in the law that need to be addressed and form the key component of a recently funded EQC Biennial Research Grant involving Bruce Glavovic (Resource & Environmental Planning, Massey), Gavin Smith (UNC at Chapel Hill, USA), Wendy Saunders (GNS Science) and Jeff McNeill (Resource & Environmental Planning, Massey University)

For example, climate change and coastal policy for addressing sea-level rise will have direct influences on managing tsunami risk. Furthermore, there are examples of 'bad practice' that result in unnecessary community exposure to hazard risks and in some cases vulnerability to repeat events (e.g., slope instability, landslides and flooding) and potentially devastating impacts (e.g., locating development in tsunami prone areas). Consequently, there is a compelling need to streamline institutions, policy, law and practice for disaster risk reduction and community resilience.

The fundamental aim of this research is to better understand how to improve natural hazards governance in New Zealand, with a particular focus on streamlining non-hazard specific institutions, policies and laws to promote disaster risk reduction and community resilience; and to provide guidance for translating policy rhetoric into 'best practice.' This research addresses the following questions: (i) What are the 'non-hazards' related institutions, policies, laws and practices that impinge on disaster risk and community resilience? (ii) What needs to be done to streamline these policies and laws to reduce disaster risks and build more resilient communities? (iii) What institutional changes need to be made to turn policy and legal rhetoric into 'best practice' reality? (iv) What practical steps need to be taken by 'hazards professionals and practitioners' (i.e., those whose roles and interventions shape disaster risk and community resilience) to ensure that future practice promotes disaster risk reduction and community resilience?

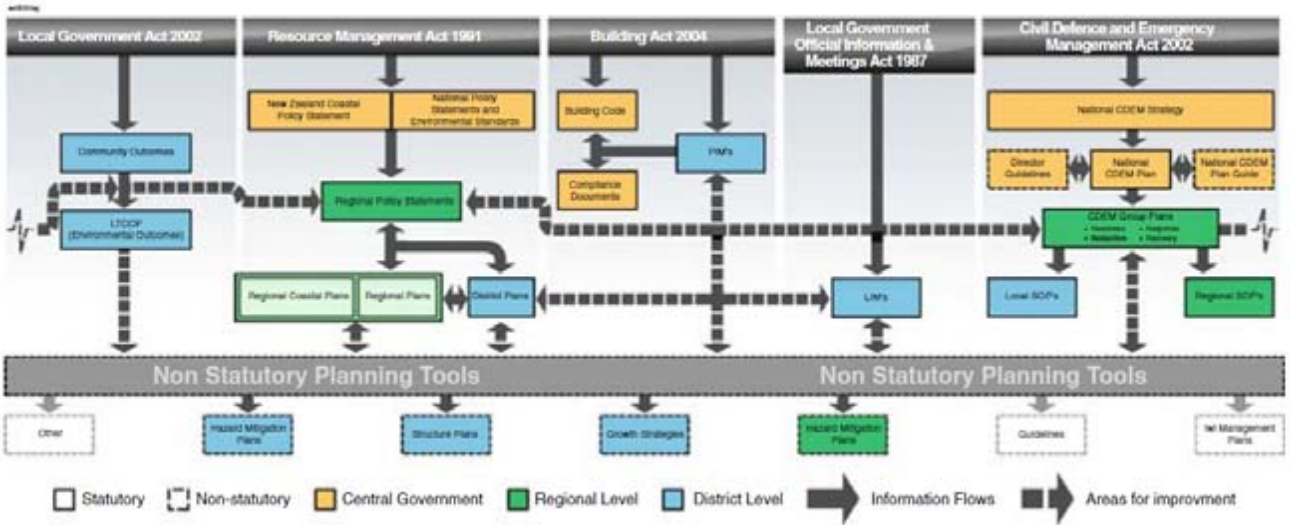

Figure above: Primary natural hazard responsibilities and relationships for natural hazard planning in New Zealand: Opportunities for building synergies (Drawn by: GNS Science). Key: LTCCP = Long-Term Council Community Plan; PIM = Project Information Memorandum; LIM = Land Information Memorandum; SOP = Standard Operating Procedure (from Glavovic et al. in press),

This research will contribute to improved planning for public safety by providing new insights about and recommendations for improving the effectiveness of disaster risk reduction and hazard mitigation provisions and practice. It will help to reduce community vulnerability and build resilience by identifying opportunities for streamlining emergency management and 'non-hazards' institutions, policies, laws and practice. In essence, this research aims to better understand and improve natural hazards governance in New Zealand.

Response in New Zealand and the USA to the February 2010 tsunami

Researchers from the JCDR (Wendy Saunders, Graham Leonard and David Johnston) were fortunate to be at the coast in Washington State on Saturday the 27th of February (Sunday New Zealand time) and observed the emergency and public response to the tsunami advisory there.

We are working with Washington State Emergency Management, Natural Hazards Centre Boulder, University of Hawaii, East Tennessee State University and USGS to develop rapid surveys of both public and emergency responders about the Chile event. These surveys plan to look at warnings, responses and actions, and are being finalised now.

Surveys were underway in New Zealand following the Samoa tsunami, so we are trying to use as many common questions as possible to be able to compare to that dataset. The survey is currently planned for Hawaii, the Pacific Coast of the mainland USA, and New Zealand.

In addition, Belinda Beets is undertaking a Masters project within JCDR, looking at tsunami organisational response to the Samoa event, and her research will now be extended to the Chile event.

Photos: Volunteering fire (above) and County Sheriffs (left) at beach access points warning of the Tsunami Advisory in place.

Tsunami survey in Samoa and American Samoa

At 6:48 a.m. local American Samoan time on the 29th September 2009 a shallow earthquake (18km depth) of moment magnitude MW 8.0 occurred approximately 200 km offshore (15.56 S, 172.07 E) of Samoa (USGS, 2009). It generated a tsunami that caused, amongst others, damage and casualties in American Samoa and Samoa. Early reports suggest that there were about 250 deaths. The earthquake was felt widely throughout the country but didn't cause significant damage; therefore, damage and casualties were mainly due to tsunami. With timber framed, as well as masonry and concrete block houses the building structure of American Samoa and to a lesser degree also Samoa shows some similarities to New Zealand. Hence, it was decided to deploy a joint NIWA / GNS team to collect information about the level of damage and the nature of the event. The reported shoreline wave height of 3 to 5 m above sea level also appeared highly relevant to New Zealand, as these are estimated 500-year wave heights for the most populated parts of New Zealand.The NIWA / GNS team spend nearly two weeks in the field, 6 days in American Samoa and 7 days in Samoa. In Samoa the NIWA / GNS delegation was part of an UNESCO-IOC International Tsunami Survey Team. The primary aim of the survey was: (1) to measure ground profiles and water (inundation) depths along multiple transects across representative affected areas, using specialised GPS-based surveying equipment,; (2) to observe levels of damage to buildings for various water depths, and (3) to collect data on the course of the event.

The data analysis has just commenced but here are some of the preliminary findings:

- The tsunami consisted of 2 to 3 waves and the second wave was often said to be the largest.
- There was no warning due to the arrival time of the first wave ~10 minutes (in Samoa, ~20 min in American Samoa) after the earthquake and according to eyewitnesses the initial wave was often preceded by receding water
- Many people expected a tsunami warning will be issued before people react
- Most people only reacted when the saw the wave approaching the coast
- High variability in run-up, flow depths and inundation distances due to site specific influences of near-shore bathymetry (reef morphology), coastal topography and the existence of offshore islands.
- Maximum run-up exceeded 14 metres in Samoa and 10 metres above sea-level in American Samoa
- Maximum inundation around buildings was up to 5-6m in both countries
- Maximum inundation distance (inland) exceeded 700 metres
- Buildings sustained varying degrees of damage
- The importance of reinforcement was very clear – traditional light timber buildings were essentially totally destroyed at an inundation depth of 1.5m or higher, whereas adding minimal reinforced-concrete columns reduced the damage levels significantly.

- Building damage was correlated with depth of tsunami flow, velocity, structural strength, width of reef, shielding, amount of debris, condition of foundations, quality of building materials used, quality of workmanship, and adherence to the building code
- Buildings raised even half- to one metre above the surrounding land surface suffered much less damage and so did shielded buildings (damage was often 3-5 times lower)
- Plants, trees and mangroves reduced flow velocity and flow depth - leading to greater chances of human survival and lower levels of building damage

By Stefan Reese, Brendon Bradley, Jochen Bind, Graeme Smart, William Power

Seeking post-disaster indirect and intangible loss indicators: the UNESCO – International Tsunami Survey Team Samoa damage and loss assessment

Within hours of the international community acknowledging the 29th September 2009 tsunami's impact upon Samoa's coastal villages, team leaders began to organise the UNESCO-IOC International Tsunami Survey Team Samoa (ITST Samoa) to undertake the first research scientist-driven tsunami reconnaissance fieldwork team. This team would focus on: a) documenting the impact of the tsunami upon the built environment, socio-economic landscape, ecosystems and biodiversity; b) articulating the changing geological, geophysical, and bathymetric landscape; and c) providing an analysis of the success of past and present national and international disaster risk reduction programmes.

During its Oct 2009 field mission, the response operations socio-economic impact assessment research team had two general purposes to fulfill. The first purpose was to participate in the first International Tsunami Survey Team (ITST) using standard IOC protocols and procedures. Shona van Zijll de Jong (National Institute of Water & Atmospheric Research Ltd, New Zealand) led the socio-economic impact assessment research team: Latu Afioga (Ministry of Women, Community and Social Development, Samoa), and Dawn Tuiloma-Sua (Disaster Management Office, Samoa).

The second purpose was to advance post disaster loss assessment research. We initiated a scoping study to identify indirect and intangible loss indicators during the response operations phase. Our intention was to develop a list of indicators that could be monitored in three phases: a) response operations, b) the short period of transition and c) early to middle period of recovery. Indirect losses occur *as a consequence of a disaster*, reflecting losses to economic activity in a specific area. An intangible or non-market impact is a catch-all term. This term identifies direct and indirect impacts for which there no market value. Our focus was on short term quality of life issues (i.e. livelihoods affected and income loss) to long term quality of life losses (e.g. economic marginalisation, stress induced ill health and mortality, etc).

Figure 1a: Shona van Zijll de Jong, Dawn Tuiloma-Sua and Latu Afioga worked with the Social Impact Assessment Team. We interviewed tsunami survivors from Lalomanu, Saleapaga, Lepa, Ulutogia and Satitoa (October 15 – 17, 2009 (see Figure 1b)). Our rigorous post disaster methodological discussion and culturally sensitive interview process provided the backdrop for the Socio-Economic Impact Assessment Team to develop Samoa-specific, tsunami-specific loss indicators.

Figure 1b: Tsunami affected villages we selected: Lalomanu, Saleapaga, Lepa, Ulutogia and Satitoa

Our reconnaissance work focused on socio-economic and cultural damage and loss issues. We completed the following tasks: 1) assessed the sources of information used in the Government of Samoa damage + loss assessment process; 2) classified effects of disaster by order of magnitude, based on our own findings; 3) sought empirical evidence that allowed us to detect major damage, loss or needs; 4) identified gaps in other impact assessment data sets for basic needs; 5) looked for patterns and indicators of potential problems; 6) identified damage done to social and cultural structures; 7) and generally identified when economic development might resume. We applied location, gender and age sensitive methodology, and used cultural and context sensitive field methods to collect empirical evidence which could be used to inform early recovery planning.Our successful field mission broke new ground for the disaster loss assessment research community. We advanced the science of preliminary damage and loss assessments by focusing on five key concepts: 1) Context; 2) Cultural and context sensitive field methods; 3) Specific consequences of a tsunami; 4) A microeconomic viewpoint; 5) Challenge the conventional six month starting point. By Shona van Zijll de Jong, Dawn Tuiloma-Sua, Latu Afioga and Stefan Reese

Disaster waste management

Without proper planning, natural disaster debris and waste has the potential to become a significant public health, environmental and social hazard with significant direct and indirect costs. Integrated planning and management of the collection, resource recovery and disposal processes following a disaster could save significant time and money, have environmental and public health benefits, and the recovered materials could become a valuable resource in a community re-build. The aim of the research is to develop a decision making framework designed for collaborative use by disaster waste management decision-makers. The research will look at three international case studies in order to gain a holistic understanding of how disaster waste management impacts on the disaster recovery. The approach will look at social, environmental and economic decision-drivers as well as the financial, organisational and legal frameworks that govern disaster waste management. The framework developed, as part of Charlotte Brown's PhD project, will guide decision-makers through assessment of effects and aid in the development of robust, flexible legal, financial and organisational structures. The framework will be tested through the development of a waste management plan for Wellington, New Zealand. The research and final framework will consider the management of debris and waste will be disaster type independent within a spectrum of geographical, developmental, social, regulatory and organisational contexts. **Contact: Charlotte Brown,** University of Canterbury, Private Bag 4800, Christchurch 8140, New Zealand, cob15@student.canterbury.ac.nz

A geographical analysis of the Hazardscape of Wellington Region: Influences on intra-regional response

A recently completed PhD by Shabana Khan undertook an analysis of the Hazardscape of Wellington. Despite having a tradition of using ecological approach to study natural hazards in Geography, its holistic approach has been compromised for various reasons. Behavioural, Perception, Vulnerability and Resilience models though covering significant aspects of the problem, present a partial reality. A skewed focus on humans, although a popular emphasis, also detracts from the ability of hazard geography to attain a truly holistic view. Even though it has been recognized that natural hazards result from interaction of human and natural systems, the separation of the two fails to explain many complexities that result through ecosystem functioning. Further, the studies on hazards and disasters are predominantly focused on single hazard assessment of an area, and there is a gap in the literature which deals with multiple hazards assessment. The research focused on these issues and looked at the concept of 'hazardscape' for a more holistic framework to study various aspects of hazards at a place. The study aimed to define and evaluate the hazardscape of the Wellington Region and to ascertain associated variations in the intra-regional hazard response. The study adopted a mixed method approach and used both qualitative and quantitative methods. The secondary data was collected from pre-existing literature, census, newspaper and research institutes. Schedules and questionnaire surveys were conducted with local administration i.e. with civil defence officers and resource planners along with the residents of all eight local territorial authorities in Wellington Region. The sample was selected through stratified purposeful sampling method in order to compare the local response with various characteristics of hazardscape. On theoretical side, the research defined 'hazardscape' and its various components. Hazardscape is described as a dynamic scape which reflects the physical susceptibility of a place and vulnerability of human life and assets to various hazards in a given human ecological system. For its practical validity, the research explored the hazardscape of the Wellington Region and local response to hazards. It portrayed varied characteristics of the hazardscape of Wellington Region including its excessive physical susceptibility to a wide range of hazards, varied human vulnerability and history of extreme events. It highlighted that the nature and magnitude of hazards varied over space, and loss is heavily tilted towards the urban areas in the western section of the Region. It drew attention to the various influences of hazard's characteristics, physical susceptibility and human vulnerability in producing variations in the hazard response throughout the Region. It is therefore concluded that a detailed analysis of hazardscape can contribute to effective hazard and response management. Shabana Khan: Shabana.khan@vuw.ac.nz

New Zealand's Next Top Model: integrating tsunami inundation modelling into land use planning

Currently the emphasis for managing tsunami hazards is on emergency management readiness and response. However, there is growing recognition of the potential effectiveness of risk reduction, especially when integrating modelling with land-use planning and urban design. To date there has been little progress in implementing such measures in New Zealand because of the infrequency of damaging tsunamis in the recent past; the relatively low population density; and a lack of understanding between planners and modellers. Few territorial and regional authorities in New Zealand have plan provisions that specifically address tsunami hazards, but the opportunity is provided at this time with plan reviews (CDEM Group plans, regional policy statements, district/city plans) being underway. Recent tsunami modelling undertaken for Gisborne District and Whitianga (Thames-Coromandel) has highlighted the disconnect between the information tsunami modellers produce, and how the results can be translated into a form which can be incorporated into land use planning. For example, the nature of time frames required for modelling and land use planning differ (i.e. 800+ years for modelling, versus 100 years for coastal planning), and require careful interpretation to transfer into a format for planning purposes.

Photo: Wainui Beach (above photo from Gisborne Museum)

This research will seek to understand and document the competing information requirements by planners and modellers, and make recommendations on how, within the context of tsunami, modelling can be incorporated into land use planning at a district and regional level. In particular, it will seek to address:

•How hazard and risk can be effectively communicated into land use planning;
•How this understanding can be integrated into modelling;
•What tools could be effective in assisting this transfer of knowledge.

For more details contact Wendy Saunders (w.saunders@gns.cri.nz)

The EOC Lab
@ The Joint Centre for Disaster Research
Massey University/GNS science, Wellington

The *Emergency Operations Centre Research Laboratory (EOC Lab)*, housed within the Joint Centre for Disaster Research at Massey University, Wellington (Building T20), is a new research facility that has been established to investigate the response processes and improve the decision making conducted within Emergency Operations Centres (EOCs).

2008 ECC wide simulation - *Canterbury CDEM Group*

During rapidly evolving events, Emergency Management Officers (EMOs) have to frequently make decisions with incomplete or inaccurate information derived from unfamiliar data, under considerable time pressures, and in complex situations involving atypical inter-agency circumstances. The laboratory will be used to investigate the wide range of challenges faced by these EMOs, using data, technology and software as found in typical EOCs, to replicate the actual conditions.

Current and future projects will explore the many aspects of the EMOs' needs, including their systems and technology requirements, the information and scientific advice they receive, the disparate sources of that advice, their interagency communication, technological warning systems, and the rapidly evolving, complex and uncertain conditions inherent to these hazard events. A series of simulation studies will be conducted to investigate how various factors, such as the technologies and decision-making models, affect the situational awareness of EOC staff and the critical decisions they make.

The research aims to build new models for group and organisational decision making in emergencies, guidelines for the improvement of decision support systems, and a framework for the effective provision of advice to EOCs from scientific groups and other agencies. The laboratory will also be a useful training facility to increase the response capacity emergency management sector in New Zealand and internationally.

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Current Projects

"Effective integration of science into emergency decision-making processes"

This research is associated with Dr. Emma Doyle's FRST Post-Doctoral Fellowship, and will involve assessing the scientific information needs of decision makers during a natural hazard event. Investigations will be conducted into how the presentation style of the scientific information, it's volume, and wording, affect the situational awareness of EMOs and effectiveness of the critical decisions they make. Data from two national disaster exercises, Capital Quake and Exercise Ruaumoko, and recent real world events such as the Samoan and Vanuatu tsunami, are being used in these investigations, with an aim to establish guidelines and future pathways for the effective presentation of scientific opinions and model outputs during hazardous events.

"Fundamental design principles for emergency decision support systems with special reference to mass evacuation"

Yasir Javed as a PhD student will investigate the information needs of emergency managers following recognition of a risk of volcanic eruption. These needs will include types of information, and methods of collection, integration, synthesis, presentation, and sharing. This information will identify and model the processes underpinning the design of the Emergency Decision Support System. Factors affecting the Situation Awareness (SA) of decision makers will be identified and considered in the design of a prototype. Evaluating the use of an Ontology to improve SA is also under consideration. The information attributes, decision model and flows leading to the development of a prototype system will also be evaluated to test and refine the concepts.

"Effective management of a volcanic crisis at New Zealand calderas"

As part of Sally Grant's PhD research, the EOC lab will be used to investigate the management of a reawakening New Zealand caldera. Reawakening volcanoes can have long periods of unrest that require careful management as they may or may not result in an eruption. Sally's work will focus on the Taupo caldera and the relationship between the identification of volcanic precursors and the application of emergency management procedures. Data from historical periods of unrest, and other calderas worldwide, will be used to simulate scenarios at Taupo. The research will contribute to the understanding of the relationships between group decision making, the application of scientific data from volcano monitoring networks, and the provision of science advice. From this, effective emergency management plans and response arrangements required for the size and complexity of such an event will be developed.

"Organisational responses to warnings of impending hazards: what can be learned from the September 2009 and February 2010 tsunami warnings in New Zealand?"

Belinda Beets (Masters Student) will investigate pathways for improvement of the organisational response to tsunami warnings, as part of her Masters of Philosophy in Emergency Management. During this study, Belinda will identify the concerns regarding organisational responses following the issuance of the tsunami warning on 30th September, 2009 and 28th February 2010. This will involve surveying and interviewing various community organisations to develop a sense of what they perceive as their roles and responsibilities when a tsunami warning occurs. The aim of this research will be to identify areas for improvement in the communication pathways between emergency service organisations and their respective communication centres. Ultimately, this improved methodology will be investigated and tested in the EOC Lab.

Campus EOC

The EOC laboratory is also being used in the development of an operational EOC on Massey University's Wellington Campus. If a crisis event was to occur on campus, in Wellington City, or nationwide, this laboratory will provide a vital facility for the university's emergency response. Using this EOC, we will also investigate the effectiveness of various training and development programs for EMOs.

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Teaching and Outreach

Staff and associates of the centre currently contribute to elements of the Graduate Diploma in Emergency Services Management and MA, MPhil and PhDs in Psychology, Emergency Management and other related disciplines. The Centre also plans to work with other organisations in the provision of training within the CDEM sectors. A series of Emergency Management short courses are organised by the centre in Summer and Spring.

Graduate Students – linked to the Centre

Debra Ellis (PhD student, School of Psychology, Massey University)
"Health sector emergency management roles in New Zealand"

Julia Becker (PhD student, School of Psychology, Massey University)
"Increasing Community Resilience: Understanding how individuals make meaning of hazard information and how this relates to preparing for hazards"

Wendy Saunders (PhD student with School of People, Environment & Planning, Massey University)
"Effective land-use planning for natural hazard management"

Ian de Terte (PhD student, School of Psychology, Massey University)
"Resilience and the prevention of work related traumatic stress: testing an ecological model"

James Hudson (PhD student, School of Psychology and Te mata o te Tau, Massey University)
"The Quantification of Iwi Development: A Framework for Iwi Development & Resilience"

Heather Taylor (PhD student, School of Psychology, Massey University)
"Children in Disasters: Children's Experiences of Flooding in Surakarta, Indonesia"

Chris Raine (PhD student, School of Psychology, Massey University)
"Complexities of volunteerism associated with New Zealand Emergency Management"

Yasir Javed (PhD student, Institute of Information and Mathematical Sciences, Massey University)
"Design, Implementation and Evaluation of Web-based Integrated Incident Resource Management System for decision support in Emergency Operation Centres"

Sally Grant (PhD student, School of Psychology, Massey University)
"Effective management of a volcanic crisis at New Zealand calderas"

Erle Busby (MSc student, School of Psychology, Massey University)
"Flood Recovery Management: A comparative benefit analysis between CIMS and ECM using an examination of the Eastern Bay of Plenty Flood event of July 2004 recovery process as a case study."

Belinda Beets (MSc student, School of Psychology, Massey University)
"Organisational responses to warnings of impending hazards: What can be learned from the September 2009 tsunami warning in New Zealand?"

Helen Sinclair (MPhil student, School of Psychology, Massey University)
"Decision making styles and processes within a functioning 'emergency operations centre' or 'emergency coordination centre.'"

Abdur Rehman Cheema (PhD student, Institute of Development Studies School of People, Environment and Planning, Massey University)
"Role of good governance in addressing vulnerabilities in disaster management in Pakistan"

Paul Schneider (Masters student, Institute of Development Studies School of People, Environment and Planning, Massey University) "Climate change, adaptive capacity and vulnerability – a coastal communities assessment for the Coromandel Peninsula"

David McIvor (PhD student, School of Psychology, University of Tasmania)
"Means-end chain modelling of natural hazard preparedness."

Mai Frandsen (PhD student, School of Psychology, University of Tasmania)
"Community predictors of effective adaptation to bushfire risk"

Briony Towers (PhD student, School of Psychology, University of Tasmania)
"Children's perception of bushfire risk and mitigation: A developmental perspective."

Dean Podolsky (PhD student, Department of Geological Sciences, University of Canterbury)
"Time-variant multi-hazard and risk communication analysis of the northern Whakatane District, Bay of Plenty, New Zealand"

Charlotte Brown (PhD student, Department of Civil Engineering, University of Canterbury)
"Disaster debris management."

Monica Gowan (PhD student, Health Sciences Centre, University of Canterbury)
"Self-management of disaster risk and uncertainty: evaluating a personal health-based wellness paradigm for building disaster resistance."

Jennifer DuBois (PhD student, Department of Geological Sciences, University of Canterbury)
"The plausiblity of a submarine landslide generated tsunami at Kaikoura Canyon."

Johnny Wardman (PhD student, Department of Geological Sciences, University of Canterbury)
"Quantitative analysis of "flashover" potential for high voltage transmission equipment exposed to volcanic ash."

Grant Wilson (MSc student, Department of Geological Sciences, University of Canterbury)
"The effects of volcanic ash and gas on modern laptop computers and materials used for volcano monitoring".

Julian Idle (MSc student, Department of Geological Sciences, University of Canterbury)
"Multi-hazard risk analysis of Lyttelton, New Zealand".

Zachary Whitman (MSc student, Department of Geological Sciences, University of Canterbury)
"Business risk perception and resiliency in an all-hazard environment: an analysis of the relationship between the public and private sectors in New Zealand".

Victoria Sword-Daniels (EngD student, Department of Civil, Environmental and Geomatic Engineering, University College London) "Evaluating impacts on community infrastructure following recent volcanic eruptions."

Caroline Orchiston (PhD student, Departments of Tourism and Geology, University of Otago)
"Tourism and earthquakes in the zone of the Alpine Fault: risk perceptions and business resilience in the tourism industry"

Sultan Al-Shaqsi (PhD student, Preventive and Social Medicine Department, University of Otago)
"National audit of emergency preparedness of acute care in Oman and New Zealand"

Kelvin Zuo (PhD student, Department of Civil and Environmental Engineering, University of Auckland)
"Procurement and contractual framework for disaster reconstruction."

Alice Yan Chang (PhD student, Department of Civil and Environmental Engineering, University of Auckland)
"Resourcing for Post-disaster Reconstruction."

John Hewitt (PhD student, Department of Civil and Environmental Engineering, University of Auckland) "Understand priority reconstruction needs of a community during response and recover stage."

James Rotimi (PhD student, Department of Civil and Environmental Engineering, University of Auckland)
"Legislation Post-disaster".

Fei Ying (PhD student, Department of Civil and Environmental Engineering, University of Auckland) "Applying Decision Analysis in Seismic Mitigation Implementation."

Temitope Egbelakin (Department PhD student, Department of Civil and Environmental Engineering, University of Auckland) "Incentives and Motivators to Enhance Seismic Retrofit Implementation."

Mohammad Reza Zare (PhD student, Department of Civil and Environmental Engineering, University of Auckland)
"Earthquake effects on wastewater systems with particular emphasis on pipelines."

Tingting Liu (PhD student, Department of Civil and Environmental Engineering, University of Auckland)
"Managing government exposure to public-private partnerships project risk."

Naseem Ali (PhD student, Department of Civil and Environmental Engineering, University of Auckland) "Dispute Resolution."

New Publications

Becker, J. 2009. Observations from the Great Southern California Earthquake ShakeOut, GNS Science Report 2009/31. 24 p. (available free from http://disasters.massey.ac.nz/)

Becker, J.S., Saunders, W.S.A., Robertson, C.M. Leonard, G.S., & Johnston, D.M. 2010. A synthesis of challenges and opportunities for reducing volcanic risk through land use planning in New Zealand. *Australasian Journal of Disaster and Trauma Studies*, 2010-01. online journal.

Blackett, P., Hume, T. Dahm, J. 2010. Exploring the social context of coastal erosion management in New Zealand: What factors drive particular environmental outcomes? *Australasian Journal of Disaster and Trauma Studies* 2010-01. online journal.

Coomer, M. A.; Johnston, D. M.; Wilson, T.; Becker, J. S.; Orchiston, C.;Page, S. 2009. West Coast ShakeOut exercise September 18th 2009:Observation of the exercise on the West Coast, South Island, New Zealand, GNS Science Report 2009/65 13 p. (available free from http://disasters.massey.ac.nz/)

Campbell, J. 2010. An overview of natural hazards planning in the Pacific Island Region. *Australasian Journal of Disaster and Trauma Studies* 2010-01. online journal.

Daly, M., Poutasi, N., Nelson, F., Kohlhase, J. 2010 Reducing climate vulnerability of coastal communities in Samoa. *Journal of International Development* 22:265-281.

Doyle, E.E., Hogg, A.J., Mader, H.M., Sparks, R.S.J. 2010. A two-layer model for the evolution and propagation of dense and dilute regions of pyroclastic currents. *Journal of Volcanology and Geothermal Research*, 190: 365-378

Glavovic, B.C., W. Saunders & J. Becker (in press). Land-use planning for natural hazards in New Zealand: The setting, barriers, 'burning issues' and priority actions. *Natural Hazards*.

Glavovic, B.C. (in press). A framework for ocean and coastal governance: New Zealand's Fiordland experience, Proceedings of 7th Open Meeting of the International Human Dimensions of Global Environmental Change, 'Social Challenges of Global Change', held in Bonn, Germany, in April 2009.

Glavovic, B.C. 2010. The role of land-use planning in disaster risk reduction: An Australasian perspective, Special Issue of *Australasian Journal of Disaster and Trauma Studies* 2010-01. online journal..

Glavovic, B.C. 2010. Future challenges and opportunities for natural hazards planning in Australasia, Special Issue of *Australasian Journal of Disaster and Trauma Studies* 2010-01. online journal..

Glavovic, B.C., W. Saunders & J. Becker 2010. Realising the potential of land-use planning to reduce hazard risks in New Zealand, Special Issue of *Australasian Journal of Disaster and Trauma Studies* 2010-01. online journal..

Houghton, R. 2009. Domestic violence reporting and disasters in New Zealand. *Regional Development Dialogue* 30(1):79-90.

Houghton, R. 2009. '*Everything became a struggle, absolute struggle': Post-flood increases in domestic violence in New Zealand*. P.99-111. In: Enarson, E., Dhar Chakrabarti, P.G. (eds.) 2009. Women, gender and disaster: Global issues and initiatives. Sage, New Delhi.

Horan, J., Ritchie,L., Meinhold, S., Gill, D., Gregg, C., Houghton, B., Matheson, T., Paton, D., Johnston, D. (in press). Evaluating Disaster Education: NOAA's TsunamiReady™ Community Program and Risk Awareness Education Efforts in New Hanover County, North Carolina *New Directions for Evaluation*

Johal, S.S. (in press). Assessing the impact of workshops promoting concepts of psychosocial support in emergency events: A New Zealand experience. *Australian Journal of Emergency Management*

Johnston, D.; Dolan, L.; Saunders, W.; van Schalkwyk, R.; Killeen, C.; Cousins, J.; Glavovic, B., Brown, C.; McIntyre, I. 2009. Disposal of debris following urban earthquakes: Guiding the development of comprehensive pre-event plans, GNS Science Report 2009/33 30 p.

Mitchell, A., Glavovic, B.C., Hutchinson, B. MacDonald, G. M. Roberts & J. Goodland 2010. Community-based Civil Defence Emergency Management Planning in Northland, New Zealand, Special Issue of *Australasian Journal of Disaster and Trauma Studies* 2010-01. online journal.

McIvor, D., Paton, D., Johnston, D.M. 2009. Modelling community preparation for natural hazards: Understanding hazard cognitions. *Journal of Pacific Rim Psychology*: 3(2); 39-46.

Paton, D., Jang, L. 2010. Disaster Resilience: Exploring All-hazards and Cross Cultural Perspectives. In D. Miller and J. Rivera (Eds), Community Disaster Recovery and Resiliency: Exploring Global Opportunities and Challenges. London: Taylor & Francis.

Ronan, K.R., Crellin, K. Johnston. D. (in press). Correlates of hazards education for youth: a replication study. *Natural Hazard*s.

Sagala, S., Okada, N., & Paton, D. 2009. Predictors of Intention to Prepare for Volcanic Risks in Mt. Merapi, Indonesia. *Journal of Pacific Rim Psychology:* 3(2); 47-54.

Smith, G. 2010. Lessons from the United States: Planning for Post-Disaster Recovery and Reconstruction. *Australasian Journal of Disaster and Trauma Studies.* 2010-01. online journal.

Wilson, T., Stewart, C., Cole, J., Johnston, D., Cronin, S. *(in press*). Vulnerability of farm water supply systems to volcanic ash fall. *Environmental Earth Sciences*

Wright, K., Johnston, D.M. 2010. Post-earthquake sheltering needs; how loss of structures and services affects decision making for evacuation. Proceedings of the New Zealand Earthquake Engineering Conference. Paper Number 31.

Photo: Wellington fault - Wairy fault rupture hazard zone, GNS Science Photo Library

Te Papa, Wellington, New Zealand
11–12 August 2010
Optional Workshops 10 & 13 August 2010

The conference will provide a forum to discuss the integration of hazard information into effective risk management, including:

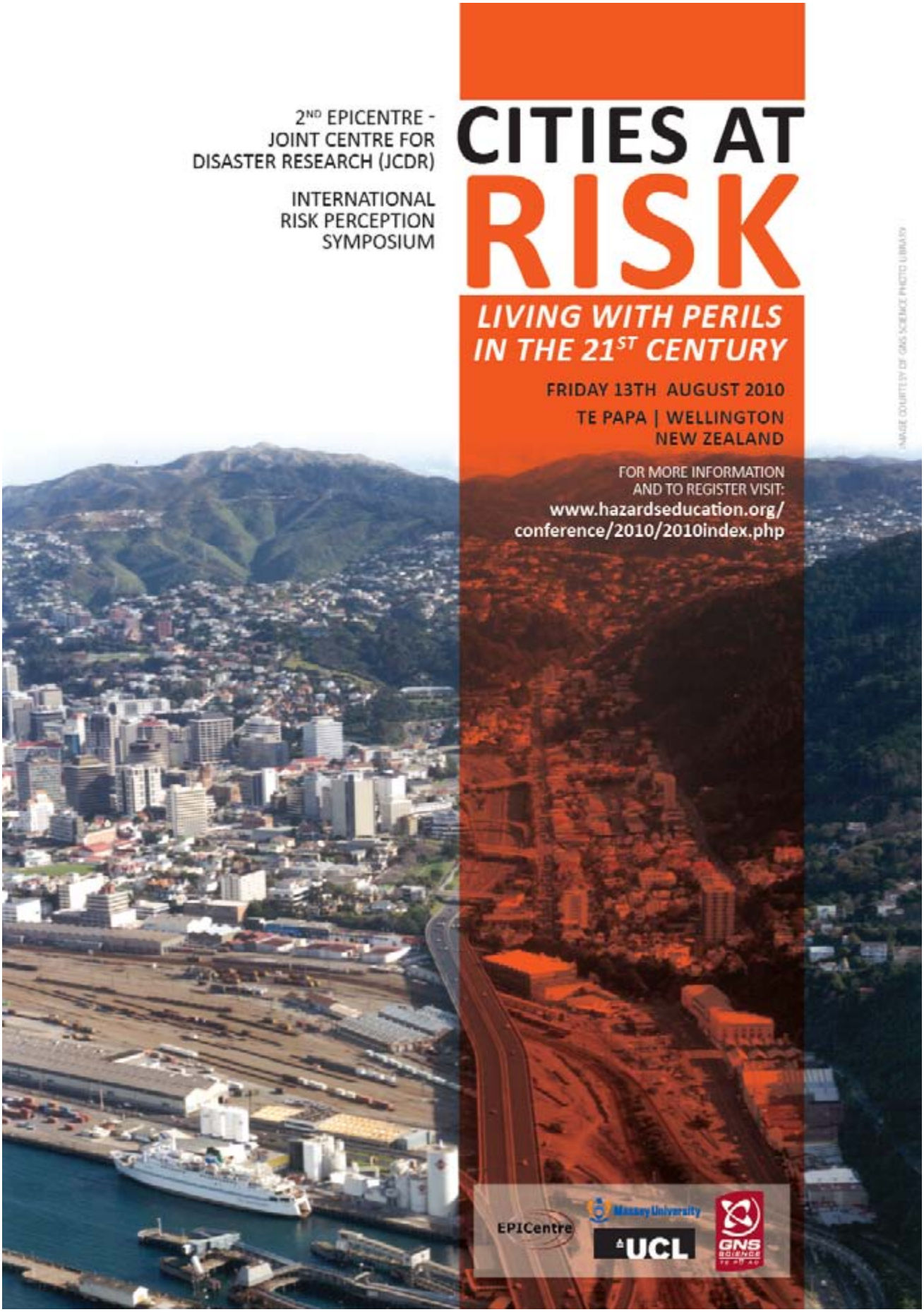
- Applying hazard information to best practice planning
- Developing effective warning systems
- Improved response and recovery from events
- Creating resilient communities through integrating science into practice

Our target audience is: Emergency managers, planners, risk assessors, asset and utility managers, natural hazards researchers and scientists.

Key dates:

October 2009	Call for papers, workshops and trade displays
March 2010	Registration details on the web and printed final circular available
1 April 2010	Deadline for abstract submissions
1 May 2010	Confirmation of programme
10–13 August 2010	Conference and workshops

Contact: ahmc@hazards-education.org
www.hazards-education.org/ahmc/2010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Location

The centre is part of the School of Psychology, in the College of Humanities & Social Sciences. The centre Director, staff and students are based at the Massey University campus in Wellington (Building T20). However, the centre draws on staff from other Massey campuses, GNS Science and other collaborating organisations. Visits to the centre are welcomed but by appointment only please.

Contact Details

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