Research Update

July 2011

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.

Helping Canterbury

Ongoing inspection inside the Red cordon zone following the 22 February 2011 earthquake (Photo: courtesy of MCDEM)

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

News from the JCDR Team

Heather Gunn has recently joined the Centre as the new administrator (photo right). Heather has extensive experience as a personal assistant, and will be providing administrative support to the Director and Centre staff. Her hours are Monday-Thursday 8.00am-1.00pm, with some flexibility around these times.

Helen Sinclair is leaving the centre at the end of June to take a new position as the planning coordinator for the Integrated Fire Management Plan (IFMP) for County Fire Authority of Victoria. Helen has been working as a research officer for two months after successful completing the Masters in Emergency Management.

Dr. Caroline Orchiston started a two-year Postdoctoral Research Fellowship in June, based at the Department of Tourism, University of Otago. Her fellowship funding is a collaboration between GNS Science (Natural Hazards Platform) and the Division of Commerce at Otago. Her research will focus on the outcomes of the Christchurch earthquakes on the tourism sector, with specific interest in the response of key tourism agencies, and the reaction of key foreign visitor markets. Caroline is a research associate of the Centre.

Prof. Douglas Paton has been invited to join the Civil Society, Citizenship and Third Sector Research Group at the Australian National University, Canberra. At a general level, the research that will be conducted by this group will focus on the contributions of Civil Society to improved human well-being, health, education, environment and gender outcomes for vulnerable populations in both democratic and non-democratic societies. Current projects include:

- Demographic Consequences of Asian Disasters; Mortality, Family Formation, Fertility and Migration Patterns (in China, Taiwan, Indonesia, Iran, Myanmar, and The Philippines)
- Civil Society and Social Inclusion: a comparative study of Health Care Interventions for Improved Maternal and Child Health in Myanmar, Mexico and Argentina

Karlene Tipler and **Zach Whitman**, two PhD candidates in the field of disaster research, were selected by the IRDR (Integrated Research on Disaster Risk) to attend the 22nd Pacific Science Congress in Malaysia as young scientists representing New Zealand. The two discussed the research streams currently underway in New Zealand while engaging leading researchers to further develop emerging research opportunities both domestically and abroad. Ms Tipler is currently working on emergency management in NZ schools while Mr Whitman is studying the impacts natural disasters have on rural organisations. More information regarding their research may be found at http://disasters.massey.ac.nz/index.htm or at http://www.resorgs.org.nz .

Research Partners

Staff and students from the JCDR are pleased to work closely with the research group Resilient Organisations (ResOrgs). Resilient Organisations (ResOrgs) is a multi-disciplinary team of 17 researchers and practitioners that is New Zealand based and with global reach. It is a collaboration between New Zealand research universities and key industry players.
ResOrgs is funded by the Natural Hazards Platform and supported by industry partners and advisors. The research group represents a synthesis of engineering disciplines and business leadership aimed at transforming NZ organisations into those that both survive major events and thrive in the aftermath.

For more information refer to their website:

http://www.resorgs.org.nz

Massey University wishes to congratulate the following 10 graduates of our Graduate Diploma in Emergency Management.

Hayleigh Brereton, Paul Chambers, Lloyd Evan, Stephen Mackle, Jeffrey Maunder, Murray Mills, Gary Pember, Peter Thurston, Aaron Turner and Mandy Ward have just graduated with their Graduate Diplomas. We are very proud of their achievement. These graduates bring our world wide alumni of this programme to now 99. Well done graduates, we hope you will continue your studies with us, including considering moving on to our proposed Master of Emergency Management [subject to academic approval and offering in 2012].

Delegation to Department of Homeland Security

Senior tutor Steve Glassey, from the Joint Centre for Disaster Research, is back from Washington DC having attended a meeting of United States emergency management specialists. Steve was part of a five-person delegation to the Department of Homeland Security Annual Science Summit. He was invited to make a presentation about his observations of the emergency management response to the Christchurch earthquakes. In the aftermath of the February 22 earthquake Steve was part of the urban search and rescue efforts, including working with international specialists like the Taiwanese Special Rescue Group.

Mr Glassey says the visit reconfirmed existing agreements for emergency management teaching programmes, through the use of joint research product fact sheets and access to online guest lectures, with the University of North Carolina. Similar arrangements are also being explored with the University of Maryland University College and the Emergency Management Academy of New York. Programmes providing reciprocal research grants for emergency management students from New Zealand and the United States to study in each other's countries were also being explored. Mr Glassey's trip, accompanied by researchers from the Crown Research sector and Canterbury University, was funded by the Ministry of Science and Innovation as part of the a recent Science and Technology Cooperation agreement between the Ministry and the US Department of Homeland Security. Steve Glassey (centre) with others who attended the department of Homeland Security Annual Science Summit in Washington DC.

Photo: From left, Dr Anne Garland and Dr Lyod Mitchell from the US organisation Applied Research In Environmental Sciences (ARIES), Steve Glassey, Leslie McConnell from the Ministry of Science Innovation and Alan Nicholson from Canterbury University

International Society of Critical Health Psychology Conference Adelaide, 18-20 April 2011 http://www.adelaide.edu.au/ischp/

Robyn Tuohy (PhD student) reports on her participation at the conference.

I recently attended and presented a paper at the International Society of Critical Health Psychology conference in Adelaide. Health psychology aligns with anthropology, social geography and sociology and this diversity and cross-linking of disciplines has provided health psychology with new ways of looking at people and understanding the social world. Critical health psychology is about recognising the context and the situation when applying the analytic lens to topics, methods and theories and is oriented towards being inclusive of other perspectives in order to challenge assumptions and values about health and well-being. The discipline situates health and well being within society at large, the influence of socio-cultural factors such as gender, ethnicity, socio-economic status, and politics are part of the psychology of health.

I presented a disaster related paper, which was part of a four-paper session entitled 'Health and Ageing'. My presentation was based on narratives from older adults who experienced a flood (Kaitaia, NZ, 2007). The oral presentation focused on how each person's story about the flood included biographical accounts about themselves over time that spanned more than seven decades. The flood disaster became a reference point to previous challenging experiences in the participants' lives, which created biographical continuity, coherence and order over time. The disaster stories were about biography and identity, and showed how older adults made sense of the flood from a life-course perspective. The storying of the flood has given further understanding about the resilient nature of older adults in the recovery phase of a disaster. These findings suggest that a lifetime of experience provides resources for psychological resilience and strength rather than vulnerability in the face of disaster, which supports observational findings of increased well-being in older age, given supportive circumstances. Thus older adults' expression of identity and biographical integration, based on a lifetime of experience, are a supportive strategy for older adults during times of disruption and challenge.

The older adults' storied experiences also provide insights into ways in which life experience and biography may be used as a community resource for post-disaster recovery. Although older adults are vulnerable in a disaster, they have the potential to make valuable contributions; one of these is to provide ways for others to make sense of a disaster event. The three-day conference provided a diverse range of health topics, research methodologies and presentation styles, which included a Pecha Kucha session (check this term out on Google). This presentation style required each speaker to present their research topic using the following format: 20 visual images, with a time limit of 20 seconds to talk per slide. The presentations were concise, fast moving, creative and thought provoking. The collegiality among all the attendees was very positive and provided an opportunity to talk and share with others in the field. I appreciated the opportunity to attend, and would like to thank the Joint Centre for Disaster Research for the funding assistance I received.

Developing Sleep/Wake Research

The Joint Centre for Disaster Research and Massey's Sleep/Wake Research Centre (http://sleepwake.massey.ac.nz/) have begun to collaborate on developing a programme of work to improve fatigue risk management for disaster response personnel. Fatigue risk management is a major area of applied research at the Sleep/Wake Research Centre, particularly in aviation operations.

Fatigue refers to a physiological state of reduced mental or physical performance capability resulting from sleep loss or extended wakefulness and/or physical activity that can impair a person's alertness and ability to work safely and efficiently. Degraded decision-making and risk assessment occur with sleep loss, and are particularly relevant in the disaster response context. Advances in sleep science and understanding of the circadian body clock have lead to new approaches to managing fatigue-related impairment, for example, through better rostering and strategies to improve the quality of recovery sleep. However, the unscheduled nature of disaster response work raises particular challenges. Fatigue mitigation strategies need to be primarily tactical, rather than the strategic approaches that are more feasible in scheduled operations.

A programme of work is envisaged that would begin with systematic debriefing of personnel from different groups involved in the response to the Christchurch earthquakes, including Fire Service personnel and civil defence volunteers. These interviews are intended to give a more detailed understanding of the fatigue-related issues that arose and how they were managed. Improved intervention strategies can then be designed and tested in a controlled context. In addition, experiences in Christchurch can be used to illustrate fatigue education and training materials for disaster response personnel. At the community level, there is also a significant need for advice and support for people experiencing ongoing sleep and fatigue problems as the situation in Christchurch continues to evolve.

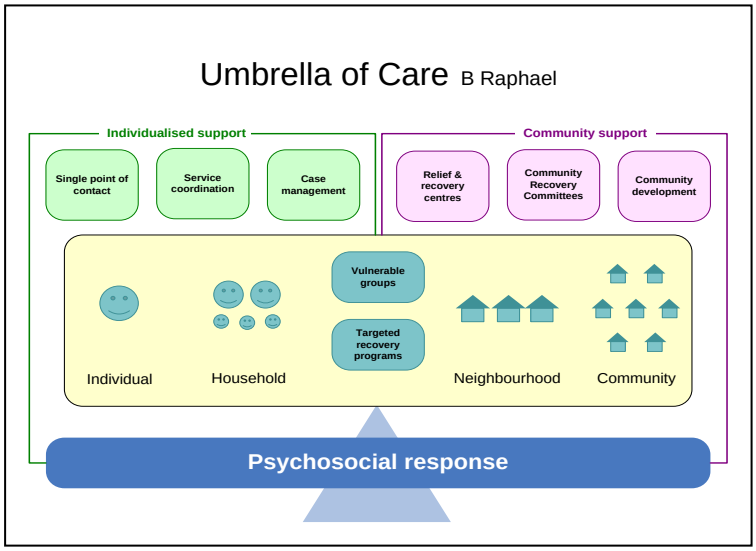
Photo above: Washington State EOC

Photo left: Repair work following the September 2010 Canterbury earthquake (courtesy of MCDEM)

For more information, visit: (http://sleepwake.massey.ac.nz/)

An academic contribution to psychosocial recovery from disasters

Following the Canterbury earthquakes, the Joint Centre for Disaster Research, Massey University/GNS Science, formed a Psychosocial Recovery Advisory Group to help support organisations involved in the recovery process. This advisory group does not make direct interventions; rather, it signposts and summarises relevant evidence-informed research findings to those who make requests for such information. Moreover, extensive practitioner experience within the group adds a frontline dimension to this advice. Advisory group members will discuss relevant research literature, from the viewpoint that psychosocial recovery involves easing psychological difficulties for individuals, families/whānau and communities - as well as building and bolstering social and psychological wellbeing. In addition, psychosocial recovery can include specialised psychological advice and guidance for building individual and wider community wellbeing. All support is situated in the context of many interconnected dimensions of recovery that include cultural, psychological, social, economic, ecological and physical dimensions - all of which are part of community regeneration.



The group **welcomes suggestions for additional membership**. Current members include:

Dr Sarb Johal, JCDR Senior Research officer, Clinical Psychologist, Health Psychologist and Chair of the Psychosocial Recovery Advisory Group. He has research and clinical interests in capability and capacity building for psychological support, before and after disaster events, as well as in disaster mental health.

Ron Chambers, Clinical Psychology Professional Advisor & Consultant Clinical Psychologist, Anxiety Disorders Unit, Specialist Mental Health Services, Canterbury District Health Board.

Dr Dianne Gardner, Industrial/Organisational Psychologist, Massey University. She has research and practical expertise in psychological well-being at work, risk management as applied to occupational health and safety, organisational behavior and occupational stress.

Professor Bruce Glavovic, EQC Chair in Natural Hazards Planning, JCDR Associate Director. His work has focussed on building sustainable communities by facilitating dialogue and collaboration between diverse and often contending interests. His research encompasses natural hazards planning, collaborative planning and consensus building amongst other relevant themes.

Professor Lucy Johnston, Dean of Postgraduate Research, Professor of Psychology, Deputy Vice-Chancellor's Office University of Canterbury**.**

Associate Professor David Johnston, JCDR Director. His research has focussed on reducing the vulnerability of society, the economy and infrastructure to hazard events.

Professor Nuray Karanci, Department of Psychology, Middle East Technical University, Turkey. She has extensive experience in post-earthquake psychosocial dimensions and support, and has researched factors in preparedness for future hazard events.

Maureen Mooney, Research Officer and Psychologist, JCDR. She has spent the last ten years using her skills as a psychologist in psychosocial support response and the Humanitarian field including Haiti, Palestine, Pakistan, Colombia, the Asian and African continents. Her area of interest is resilience and coping of individuals and communities.

Professor Douglas Paton, School of Psychology, University of Tasmania. He has expertise in all-hazards risk communication, assessing and developing community resilience, and community recovery following natural disasters.

Ian de Terte, Clinical Psychologist, School of Psychology, Massey University. He has experience working in the areas of disaster mental health, PTSD, and vicarious trauma. In addition, he is completing a PhD regarding psychological resilience in regards to work-related trauma.

Earthquake information and household preparedness: results of interviews with residents of three New Zealand communities

A recently presented paper by Julia Becker at the 9th Pacific Conference on Earthquake Engineering in Auckland (April 14-16, 2011) explores the links between earthquake information and household preparedness. Forty-eight interviews were undertaken with residents in Timaru, Wanganui and Napier in 2008 to explore how people understand and use information about earthquake hazards and preparedness. Three main sources of information were identified during the interviews: passive information (e.g. brochures, TV); interactive information (e.g. community activities; school activities; workplace activities); and experiential information (e.g. experiencing a hazardous event, responding to an event, working in an organisation that deals with hazards). People tended to either contextualise hazard and preparedness information around any prevailing beliefs they had or form new beliefs on exposure to information. A number of core beliefs were identified as crucial for helping people consider that preparing is an important and motivating actual adjustment adoption.

Society also has an influence on how people interpret information and form intentions to prepare. People are often influenced by the opinions of others, and as preparing for disasters is not seen as a societal norm, this can cause people not to prepare. Feeling a responsibility for others (e.g. children) appears to be a big driver of preparedness. Other societal factors such as trust, leadership and sense of community also influence interpretation, dissemination and use of hazards and preparedness information. Finally, a number of resource issues can help or hinder preparedness.

Becker, J., Johnston, D., Paton, D. 2011. Earthquake information and household preparedness: results of interviews with residents in Timaru, Wanganui and Napier. Proceedings of the 9th Pacific Conference on Earthquake Engineering Building an Earthquake-Resilient Society, April 14-16, 2011, Auckland, New Zealand, Paper No.020. (Available free from http://db.nzsee.org.nz/2011/AuthorI.htm)

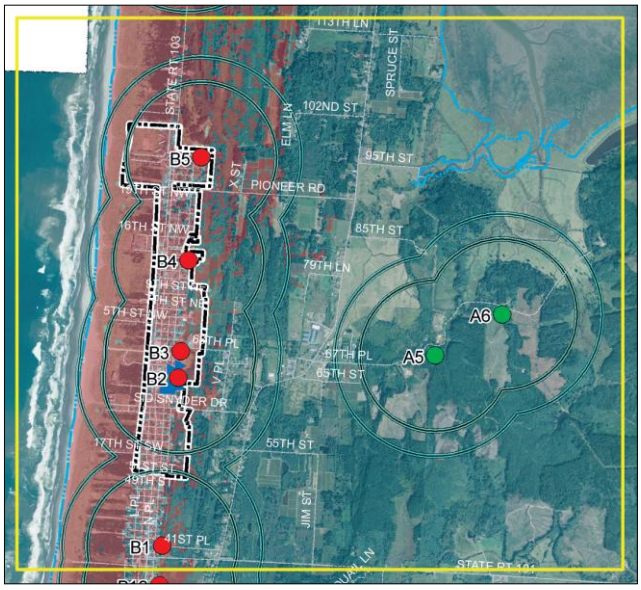
Vertical Evacuation in Washington State, US: Project Safe Haven

In May, David Johnston and Stuart Fraser visited Washington State and met with members of Project Safe Haven, a community-focussed project to define tsunami vertical evacuation strategies in Washington. The project is being conducted by faculty and graduate students at the University Of Washington (UW), under a steering committee that comprises state and local emergency management officials, and staff of Washington Department of Natural Resources, USGS and NOAA. The project uses a community-based approach to determine the most appropriate location and design for vertical evacuation structures in several communities on the Pacific coast of Washington. John Schelling, Earthquake\Volcano\Tsunami Program Manager at State of Washington Emergency Management Division, calls this a "top-down approach, where the community is at the top".

In each community, the process begins with a World Cafe style meeting, at which members of the community are provided with satellite images and maps of their local area that show modelled tsunami inundation from a magnitude 9.1 Cascadia subduction zone event. Using moveable representations of vertical evacuation options (tower, berm and building) and walking circles representing achievable 15-minute walking distances, the community is asked to discuss the options for suitable locations and types of vertical evacuation structures for their community. After consideration by the project team, alternative strategies are outlined and presented to the community at a second meeting, where strengths and weaknesses are discussed, and a preferred strategy is defined.

The project team then conducts site visits to assess location feasibility and obtain further information for the design process. The community also participates in the structure design stage, with designs drawn up during a design charrette (workshop) held within the community. At the design charrette the project design team, led by architect and planner Ron Kasprisin (UW), listens to the community's needs and ideas for design and alternative uses of vertical evacuation structures in the context of their preferred strategy. Over a period of two to three days the design team develops and sketches the designs for that community before presentation and further discussion of the designs. Detailed designs and costing are now being developed, and draft reports of the first design charrettes are now being published by the project team.

The involvement of the community at every stage of this process is admirable and Project Safe Haven is a valuable example of how communities should be engaged by officials in designing local evacuation strategies for any natural hazard. Not only does this engagement increase the level of community ownership in the project and promote interaction within the community on natural hazards education; it is also a vital step in implementing local and cultural knowledge into the strategy to ensure the project fits with the context of that community and in the case of vertical evacuation structures, fulfils the community's needs in times when a facility is not in use for evacuation. This can only serve to increase the chances of successful implementation of evacuation plans and associated facilities.



Further information on Project Safe Haven, including the latest project reports for Pacific County, can be accessed at https://catalyst.uw.edu/workspace/wiserjc/19587/116498 and http://www.facebook.com/ProjectSafeHaven.

Above left: Design for evacuation structure at Seaview Fire District site (Source: Project Safe Haven draft Design Charrette report).
Above right: Conceptual locations for vertical evacuation in Long Beach (Source: Project Safe Haven draft Pacific County report)

Incorporating Social Science into NOAA's Tsunami Program

Large tsunami like those in the Indian Ocean (2004) and in Japan (2011) underscore the need to improve mitigation and preparedness for tsunami well in advance of large earthquakes, in addition to response to warnings once an earthquake occurs. To this end, the US National Oceanic and Atmospheric Administration seeks to integrate social science into its Tsunami Program. In year one, this project focuses on aspects of Tsunami Warning Center messages and the TsunamiReady™ program. Phase One of the project includes an assessment of how people in the USA receive, interpret and respond to tsunami messages disseminated by the Pacific and West Coast/Alaska Tsunami Warning Centers in Hawaii and Alaska. Parallel to this work is the development of a metric to evaluate how well Tsunami Warning Center messages reflect social science research findings on effective warnings. A second phase of the project includes research on community beliefs about mitigation and preparedness activities for tsunami. Data are being collected in six states (HI, AK, WA, OR, CA and NC) and two territories (American Samoa and US Virgin Islands) and combined with research findings from the literature to understand how tsunami warning messages may be improved and how new guidelines for the TsunamiReady™ program can decrease risk to tsunami in the USA.

Project team

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The plausibility of a submarine landslide generated tsunami at Kaikoura Canyon

The head of the Kaikoura Canyon is located in close proximity to shore at Goose Bay in the Kaikoura district. Sediments are deposited regularly into the canyon from rivers to the south via longshore motion. These deposits, which already exhibit tensional fracturing, continue to build up in a tectonically active area. Rupture of the nearby Hope Fault or the more distant Alpine Fault, which is expected to occur every few hundred years, could induce failure on the deposits. The subsequent submarine landslide is expected to produce a tsunami of significant magnitude in the nearby Kaikoura township. Two methodologies were used to determine if failure and a subsequent tsunami have previously occurred; a sedimentary investigation and oral tradition research. The sedimentary investigation was conducted in August of 2009, with five trenches excavated along the Kaikoura coast between South Bay and Oaro. Though deposits were potentially tsunamigenic laboratory confirmation through XFR and diatom analysis is still pending.

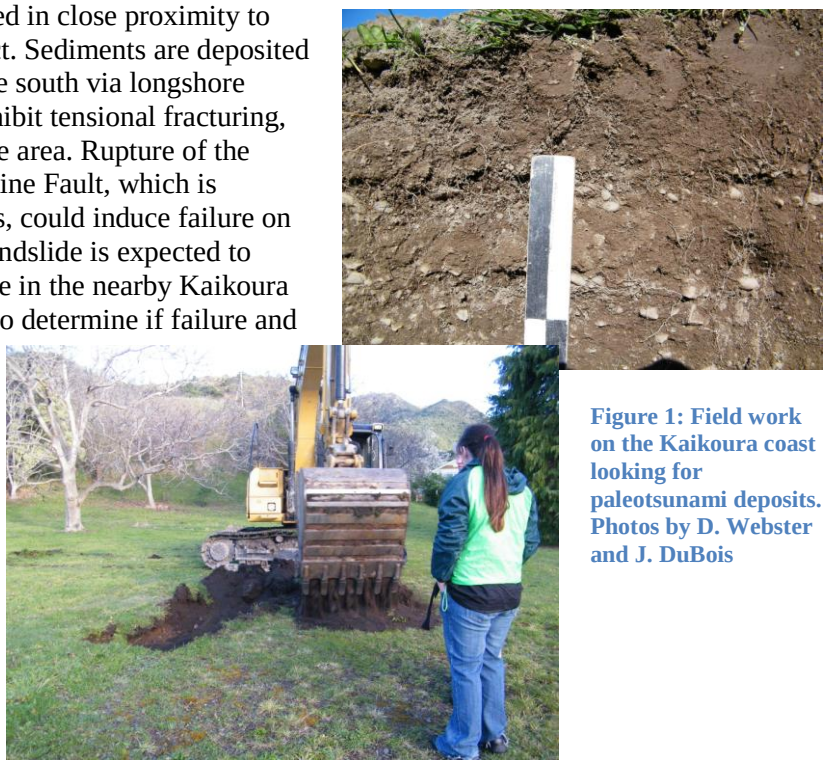

Figure 1: Field work on the Kaikoura coast looking for paleotsunami deposits. Photos by D. Webster and J. DuBois

Additional evidence of paleotsunami was also sought by examining Māori traditions. Oral traditions can be used in hazard management in several ways, including the identification of hazards for a given area, extending the record of events and to help convey warnings to the public. In New Zealand *taniwha* traditions are recognized as potential metaphors of marine hazards that could be indicative of past tsunami.

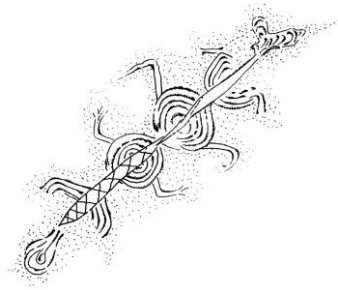

Figure 2: Taniwha rock art (Dunnet, 1988).

In the published literature there are at least three *taniwha* traditions for Kaikoura; the Lyell Creek *taniwha Mata-mata*, and two about the *taniwha* of Oaro. The tale from Lyell Creek can be found in Elvy, 1949; in Carrington, 1934 reprinted in Tau and Anderson, 2008; Orbell, 1995; Reed, 2004; and notes of Sherrard, 1959 folder 100 and relates the story of scaly the long-necked taniwha that used to devour warriors as they crossed the narrow track by the rivers edge until it was slain. The Oaro *taniwha* can be found in Sherrard notes folder 37A; Carrington 1934 reproduced in Tau and Anderson 2008; and Beattie 1994. This story refers to the *taniwha* that "moved like a catapillar – arch back high and spring forward from tail-when moved tail forward scooped water in front in a wave" that surrounded two girls while picking berries, one of which jumped to safety and the other was swallowed whole. The other goals of the project are to survey households and businesses to determine public awareness and preparedness and then make recommendations to the Kaikoura District Council about this serious potential risk.

Sources

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2011 Tohoku earthquake and tsunami vertical evacuation observations

In June 2011, Stuart Fraser (JCDR doctoral student, PhD Emergency Management) participated in a post-tsunami field investigation with the UK-based Earthquake Engineering Field Investigation Team (EEFIT). The team visited numerous tsunami-affected sites along the coast of Fukushima, Miyagi and Iwate prefectures. Stuart's aim was to investigate the performance of vertical evacuation structures in this event and to build these observations into his current research: the potential for using existing buildings as vertical evacuation structures in New Zealand.

Vertical evacuation is defined as evacuation above the tsunami water level within a tsunami-inundated area, whether it be into upper floors of an adequate structure or onto a raised park. This is required as an alternative or additional option where high ground is inaccessible in the time between tsunami warning and wave arrival.

While designated evacuation structures performed well structurally and saved many lives in the 2011 Tohoku event, important lessons have been learned where structures were overtopped, structures were affected by fire, and where evacuees were stranded in such structures for several days following the tsunami. These issues have previously been considered in vertical evacuation planning, and this event further stresses the importance of doing more than just designing a structure to withstand expected tsunami loading.

The field investigation also provided an opportunity to observe the impacts of ground shaking from a large subduction zone event, effectiveness of the warnings and emergency response, and the progress being made in recovery of affected areas. The 2011 Tohoku earthquake and tsunami EEFIT preliminary report is due to be published in mid-July. It will be available at <http://www.istructe.org/knowledge/EEFIT/Pages/reports.aspx>.

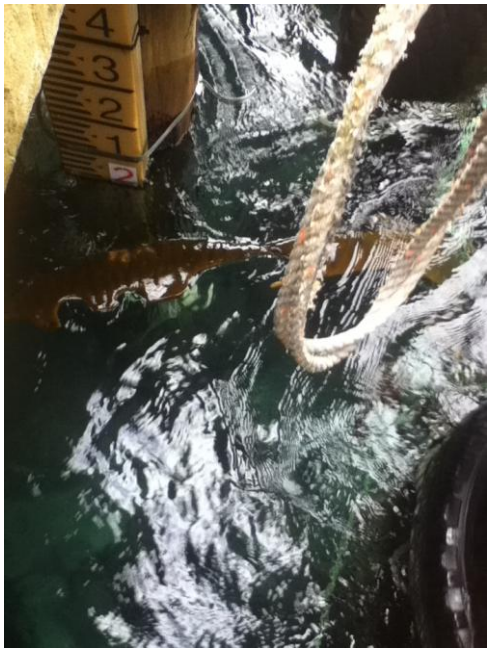
Above: Minamisanriku hospital, which was inundated to the roof by a 20 metre high wave.

Left: Arahama Elementary School, Miyagi prefecture. Located 750m from the coast this building was successfully used in evacuation of schoolchildren and surrounding residents.

All the way to New Zealand's most isolated community

Following the March 2011 Tohoku earthquake the tsunami travelled rapidly across the Pacific Ocean. These photos were taken by 12 yr Thomas Graydon, on his ipod Touch at around 3:00pm (NZ time) on Saturday 12th March 2011. The surges took about 3 minutes to go right out and back in again. Sometimes it came in a lot more than other times. Bubbling of the sea was observed at the entrance to the bay, as the surge changed direction. The biggest variance of water level was 1.4 metres at Flower Pot Wharf, to the North of Pitt Island (Chatham Islands).

Photos from Flower Pot Wharf were sent in by Philip Graydon, Teacher at Pitt Island School.



Latent resources in the community

Jared Thomas, Kate Mora, Abigail Harding & Vince Dravitzki, Opus Central Laboratories

At Te Papa's 2010 Earth Rocks event, Opus Central Laboratories conducted a computer-aided personal interview (CAPI) survey of the latent resources Wellingtonians have available for a disaster situation, looking further than what is in their emergency supply kits. Over the course of the event, 172 householders were asked to quantify the amount of supplies they had in their houses, taking into account less obvious sources, such as the water from their hot water cylinders, toilet cisterns and pools, and food from freezers, gardens and pantries.

Having been presented with a simulation video of a major earthquake event, people's perceived willingness to help and ask for assistance from family, friends and neighbours, to commit socially unacceptable acts (such as breaking into an empty house to take food and water, or into a pharmacy for medication), and commit potentially unsafe acts (such as drinking unpurified water) were examined. Overall, respondents were not well prepared but were confident they could find what they needed (34% of those that did not have 3 days supply) when they took into account less obvious sources. However, it was those who were the most prepared that are the most likely to pursue official aid. There also appears to be a social norm shift with people suggesting they will engage in more "deviant" acts the longer the situation continues. However it should be noted that while people suggest they will take necessary supplies unlawfully (30% after 3 days and 60% after 7 days), taking unnecessary supplies remained generally unacceptable (10% would after 3 days, 30% after 7 days); this suggests "looting" is unlikely. Additionally, over time people become less likely to share resources with others and more likely to lie about it. The results of this research were presented at the Ninth Pacific Conference on Earthquake Engineering in Auckland in April. A journal publication will be prepared and submitted shortly.

Photo: *Visitors to the 2010 Te Papa Earth Rocks event participate in the CAPI study*

For more information about the research, please contact Jared Thomas, Jared.Thomas@opus.co.nz, or go to www.resilience.org.nz.

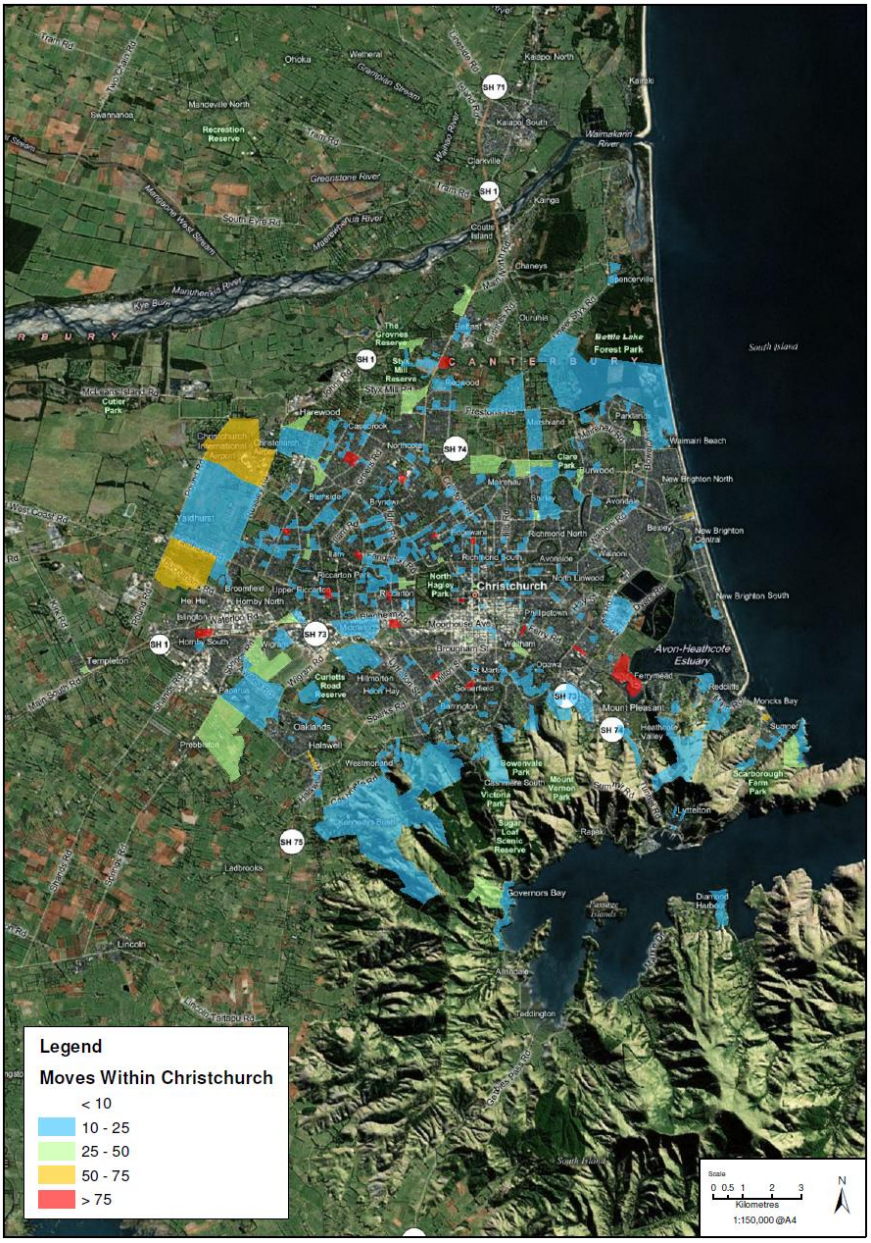
Household Relocation Analysis using New Zealand Post data

Jared Thomas, Kate Mora & Grace Rive, Opus Central Laboratories

As part of the early response to research assistance following the September and February Canterbury earthquakes, Opus Central Laboratories undertook analyses of data sourced from New Zealand Post's mail redirection service to provide an estimate of population migration. Analyses were conducted after the September 4 and February 22nd events both initially, and after 6-8 weeks. While this data set does not capture all moves, and includes those not due to the earthquake, analyses provide a picture of the areas of the Canterbury region that have experienced large population movements (in and out) that can be used for planning and response purposes. GIS maps were also prepared of the most recent data to examine this data at the finer meshblock level (see map). It is hoped that the analysis will be repeated regularly over the coming months to determine the permanence of relocation from the area.

The most recent report showed 8632 households (24892 people) had registered their move with New Zealand Post, a significant increase of 3.6 times compared to the 6 weeks prior to the February quake. Almost 1 in 5 of the relocations were to outside the Canterbury region, but 1 in 6 were indicated as temporary (half of which were less than 2 months). This analysis is just one of a range of analyses of secondary data sources that have been collated by Statistics New Zealand on their earthquake portal.

For a link to the analysis and other relevant research, see the Statistics New Zealand website http://www.stats.govt.nz/tools_and_services/services/earthquake-info-portal.aspx
For further information about the research, please contact Jared Thomas, Jared.Thomas@opus.co.nz or go to www.resilience.org.nz.



Example GIS map of overall population relocations to each meshblock within Christchurch City (23 February – 6 April 2011)

Voluntary household billeting following the Canterbury earthquake

Jared Thomas, Kate Mora, & Grace Rive, Opus Central Laboratories

Following the Canterbury earthquakes, temporary accommodation has been flagged as a major issue for welfare agencies. In addition to the provision of temporary housing options such as mobile homes and relocatable buildings, billeting in private homes is a method that is often used, particularly informally between family and friends. Opus Central Laboratories has designed a survey that will be sent to Canterbury households in the next few months investigating their experiences with either billeting others in their homes, or being billeted by others. With the success of websites such as Trade Me offering accommodation services following the earthquake, it is anticipated that while the majority of billeting will have occurred between friends and family, there may also be an opportunity to examine the experience for those who were previously strangers. The survey will examine the social aspects of billeting, comparing this between both billets and their hosts. The results will give an indication of what issues arose and what incentives and support could be used to facilitate people providing this assistance either in the longer-term recovery of the Canterbury region, or in future emergency events. A best practice guide for the management of household billeting will also be produced from the results, for use by welfare agencies after a disaster event.

For further information about this research, please contact Jared Thomas, Jared.Thomas@opus.co.nz, or go to www.resilience.org.nz.

Variations in Pedestrian Traffic Count in Christchurch due to the September 2010 Darfield (Canterbury) Earthquake

Felicity Powell & Abigail Harding, Opus Central Laboratories

There is a need for time- and cost-effective ways to track the recovery of business areas in the aftermath of natural disasters and other shock events. The fate of retail areas is heavily dependent on the number of potential customers visiting stores. Following the earthquake on 4th September 2010 in Canterbury, researchers at Opus conducted a series of manual pedestrian counts in the Christchurch CBD to test the reliability of regular pedestrian counting as an indicator for business recovery. Twelve sites were selected in the CBD for regular pedestrian traffic monitoring over a 12-month period. All of the sites had also been used in an assessment of urban vitality in 2008 undertaken for the Christchurch City Council by Gehl Architects, so comparative data were available. The 12 sites represented varying earthquake damage throughout the CBD.

Results prior to the February 2011 earthquake that caused significant damage to the Christchurch CBD highlighted areas of low pedestrian activity. Because business turnover in retail areas is strongly linked to pedestrian footfalls, areas of low pedestrian activity are assumed to be at risk of low turnover. Pedestrian footfalls have the potential to be a cost-effective indicator of business recovery, but these findings will be verified using business turnover figures at a later stage of the study. One automatic counter was installed prior to the February aftershock, and we had intended to install more counters. The automatic counters provide continuous data, giving us a richer picture of pedestrian activity in the CBD. As the recovery of the CBD progresses, we intend to install the counters. We will also explore the relationship between pedestrian numbers and business activity in conjunction with a business survey.

For further information about this research, please contact Felicity Powell, Felicity.Powell@opus.co.nz, or go to www.resilience.org.nz.

Map of Christchurch CBD showing areas at risk of low turnover as indicated by low pedestrian footfalls
Pedestrians on Manchester St, walking beside buildings that are structurally unsafe (10 February 2011)

Harding, A.J.M. & Powell, F.I. (2011).Variations in Pedestrian Traffic Count in Christchurch due to the September 2010 Darfield (Canterbury) Earthquake. Proceedings of the Ninth Pacific Conference on Earthquake Engineering April 14-16, 2011, Auckland.

Powell, F.I. & Harding, A.J.M. (2011). Using Pedestrian Traffic as an Indicator of Urban Recovery: An Ongoing Case Study of Christchurch CBD. Proceedings of the New Zealand Planning Institute Conference, March 29-1 April, 2011, Wellington.

Powell, F. & Harding, A. (2010). Using pedestrian traffic as an indicator of urban recovery. Presentation to Christchurch City Council, Planning and Strategy teams, 17 November. Christchurch.

Learnings on business recovery following the December 2007 Gisborne Earthquake informing recovery in Christchurch

Felicity Powell & Abigail Harding, Opus Central Laboratories

Immediately following the 4th September 2010 Canterbury earthquake, Opus prepared advice notes 'Suggestions for enhancing business recovery' and 'Suggestions regarding welfare shelters, billeting, and transitional housing' to help inform the recovery of the region. Building on these advice notes, Dr Felicity Powell was invited to present key learnings from Opus' research on business recovery after the 2007 Gisborne earthquake to Christchurch City Council and other central government and regional stakeholders. Felicity was also invited to present this information to the New Zealand Institute of Landscape Architects in Wellington.

For further information, please contact **Felicity Powell**, Felicity.Powell@opus.co.nz, or go to www.resilience.org.nz.

Photo: Removal of an unstable parapet in the Gisborne CBD. Some businesses were damaged when the parapets of adjoining businesses fell during the earthquake on 20 December 2007.

Powell, F. & Harding, A. (2010). Business Recovery: Lessons from the 2007 earthquake. Presentation to Christchurch City Council, Planning and Strategy teams, 17 November. Christchurch.

Powell, F. & Harding, A. (2010). Business Recovery: Lessons from the 2007 earthquake. Recovery Best-Practice: A national and international perspective, Seminar for those involved in the recovery effort, 28 September. Christchurch.

Powell, F., Harding, A. & Evans, N. (2010). 2007 Gisborne earthquake: Implications for New Zealand cities. NZILA and NZILA Talking Cities 2010 Lecture Series, 30 September. Wellington: Victoria University.

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"

Stuart Fraser (PhD student, School of Psychology, Massey University)
"The potential for using mid to high-rise buildings as vertical evacuation structures in near-source earthquake and tsunami events"

John Lindsay (PhD student, School of Psychology, Massey University)
"Maximising participatory planning in emergency management: implications for professional practice"

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"

Robyn Tuohy (PhD student, School of Psychology, Massey University)
"Disaster preparedness of older adults in New Zealand"

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

Vicky Johnson (PhD student, School of Psychology, Massey University)
"Evaluating disaster education programs for children"

Karlene Tripler (PhD student, School of Psychology, Massey University)
"Emergency management in New Zealand primary schools"

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?"

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"

Alexa Van Eaton (PhD student, Department of Earth Sciences, Victoria University of Wellington)
"On the dynamics of super-eruptions: Towards improved response to New Zealand's caldera-forming eruptions"

Brenda Mackie (PhD student, School of Psychology, University of Tasmania)
"Psychological preparedness for bushfires: risk perception, social context and resource theories"

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."

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

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 (PhD 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."

Anna Mason (EngD student, Department of Civil, Environmental and Geomatic Engineering, University College London) "Monitoring and modelling earthquake affected populations"

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"

Vivienne Bryner (PhD student, Centre for Science Communication & Geology, University of Otago) "Communication of geoscience knowledge to achieve disaster risk reduction"

Mary Anne Thompson (PhD student, School of Environmen, University of Auckland) "The interface between probabilistic hazard and risk assessment and volcanic risk and crisis management."

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."

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."

Sandeeka Mannakara (PhD student, Department of Civil and Environmental Engineering, University of Auckland) "The integration of Build Back Better techniques into disaster reconstruction practices"

Reza Jafarzadeh (PhD student, Department of Civil and Environmental Engineering, University of Auckland) "Cost Modelling for Retrofit buildings."

New Publications

Becker, J., Johnston, D., Paton, D. 2011. Earthquake information and household preparedness: results of interviews with residents in Timaru, Wanganui and Napier. Proceedings of the 9th Pacific Conference on Earthquake Engineering Building an Earthquake-Resilient Society, April 14-16, 2011, Auckland, New Zealand, Paper No.020. (Available free from http://db.nzsee.org.nz/2011/AuthorI.htm)

Doyle, E.E., Cronin, S.J., Thouret, J-C. (in press). Defining conditions for bulking and debulking in lahars. The Geological Society of America Bulletin. Accepted 10th August 2010.

Doyle, E.E., Hogg, A.J., Mader, H.M. (in press). A two layer approach to modelling the transformation of dilute pyroclastic currents into dense pyroclastic flows. Proceedings of the Royal Society: A. Accepted 20th October 2010.

Doyle, E. E. and Johnston, D. M. (2011, in press). Science advice for critical decision-making. In: Paton, D. and Violanti, J. M. (Eds) Working in High Risk Environments: Developing Sustained Resilience. Charles C. Thomas Publisher, Springfield, Ill.

Frandsen, M., Paton, D. & Sakariassen, K. (2011) Fostering Community Bushfire Preparedness through Engagement and Empowerment. *Australian Journal of Emergency Management*, 26, 23-30.

Johnston, D., Becker, J., Coomer, M., Cronin, S., Daly, M., Doyle, E., Glassey, S., Glavovic, B., Houghton, R., Hughes, M., Johal, S., Jolly, S., Leonard, G., Patterson, L., Peace, R., Saunders, W., Stuart, K., Tarrant, R., Taylor, H., de Terte, I., Timar, L., Tuohy, R., & Wright, K. 2011. Exploring elements of an effective recovery process. Proceedings of the 9th Pacific Conference on Earthquake Engineering Building an Earthquake-Resilient Society, April 14-16, 2011, Auckland, New Zealand, Paper No.027. (Available free from http://db.nzsee.org.nz/2011/AuthorI.htm)

Johnston, D.M.; Leonard, G.S.; J. Becker; Garside, R.U. 2011. Evaluating warning response capacity and staff training in the tourism sector in coastal Washington, USA, GNS Science Report 2011/03 14 p.

Lavell A., JC Gaillard JC., Wisner B., Saunders W., van Niekerk D. (in press). National planning and disaster. In: Wisner B., JC Gaillard JC., Kelman I. (eds.). The Routledge Handbook of Hazards and Disaster Risk Reduction.

Leonard, G.S., Gregg, C.E., Johnston, D.M. (in press). Early Warning Systems. Peter T. Bobrowsky (ed.), Encyclopedia of Natural Hazards, DOI 10.1007/978-1-4020-4399-4

Leonard, G.S., Gregg, C.E., Johnston, D.M. (in press). Warning Systems. Peter T. Bobrowsky (ed.), Encyclopedia of Natural Hazards.

O'Brien G., Bhatt M., Saunders W., Gaillard JC, Wisner B. (in press). Local government and disaster In: Wisner B., JC Gaillard JC., Kelman I. (eds.). The Routledge Handbook of Hazards and Disaster Risk Reduction.

Paton, D., Johnston, D., Johal, S. (in press). Human impacts of disasters. In Peter T. Bobrowsky (ed.), Encyclopedia of Natural Hazards, DOI 10.1007/978-1-4020-4399-4.

Saunders, W.; Johnston, D.; Leonard, G.; Becker, J. 2011. Evacuation planning and preparedness: A case study of Seabrook, Washington State, GNS Science Report 2010/62 15 p.

Saunders, W.S.A.; Prasetya, G. and Leonard, G.S. 2011. New Zealand's Next Top Model: Integrating tsunami inundation modelling into land use planning, GNS Science Miscellaneous Series 34, 42 p.

Stewart, C., Wilson, T.M., Leonard, G.S., Johnston, D.M., Cole, J.W. Cronin, S. (in press) Volcanic Hazards and Water Shortages . In: Briggs, C.A. (ed.) Water Shortages: Environmental, Economic and Social Impacts. Nova Publishers.

Tuohy R., Stephens C. 2011. Exploring older adults' personal and social vulnerability in a disaster. *International Journal of Emergency Management* 8: 60 - 73

Wilson, T.M., Cole, J.W. Stewart, C., Cronin, S.J., Johnston, D.M (2011). Ash Storms: Impacts of wind remobilised volcanic ash on rural communities and agriculture following the 1991 Hudson eruption, southern Patagonia, Chile. *Bulletin of Volcanology* 73: 223-239

Wilson, T., Cole, J., Cronin, S., Johnston, D., Stewart, C. 2011. Impacts on agriculture following the 1991 eruption of Vulcan Hudson, Patagonia: lessons for recovery. *Natural Hazards* 57: 185-212

Winstanley, A., Cronin, K. (in press) Supporting communications around the Canterbury earthquakes and other risks: a learning workshop, 7 April 2011. GNS Science Report 2011/08

Upcoming Events

The Australasian Hazards Management Conference

Gold Coast, Australia, from 18-21 July, 2011

The conference theme this year is: "Major Events, Major Impacts"

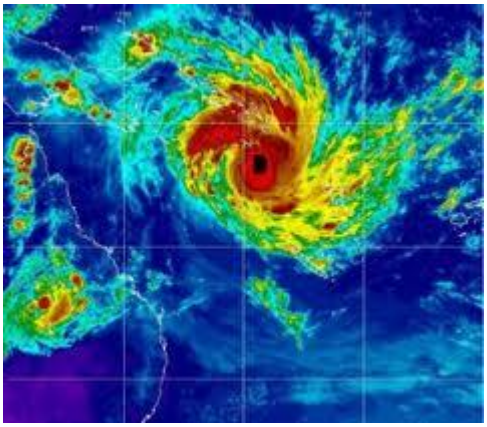
With the major disasters that have occurred within the Australasian region and around the world since the last conference, this year's conference will be an important forum to explore how we conduct research into such devastating hazards, and how we can reduce the associated risks, prepare the community for such natural hazards, and how we can respond to and recover from them.

As with previous conferences, the audience for the 2011 conference includes: Emergency managers, Policy makers, Researchers, Planners, Risk assessors, Asset and utility managers, Scientists, and Students.

Conference Format:

The 2011 conference will take the following format:

- Monday 18 July 2011 – Pre-conference workshops and master classes
- Tuesday 19 – Wednesday 20 July 2011 – Main conference
- Thursday 21 July 2011 – Technical tours addressing natural hazards and emergency management within South East Queensland.



Key Dates:

18 April 2011	Closing date for abstracts and workshop proposals
30 April 2011	Selection of papers and workshops
7 May 2011	Publication of final 2011 Conference Program
30 May 2011	Final date for early bird registrations
18 July 2011	Pre-Conference Workshops and Master Classes
19 – 20 July 2011	5th AHMC Conference
21 July 2011	Technical Tours

If you have any questions regarding this year's conference, please do not hesitate to contact the conference organiser:

Disaster Management Unit
Gold Coast City Council
PO Box 5042, Gold Coast MC QLD 9729 Australia

Contact: AHMC@GoldCoast.qld.gov.au

A special session will be held on the contribution of Psychology to the Canterbury earthquakes response and recovery

FRSITO
Fire & Rescue Services ITO

Enabling Emergency Management Coordination Conference 10 – 13 October 2011

Call for Abstracts

FRSITO is hosting the second biennial conference in Christchurch, New Zealand, on the above dates.

The focus of the conference is working collaboratively within and across agencies. The conference is expected to attract training personnel, from operational and strategic positions, covering a wide range of emergency management sectors.

We are now seeking submissions from organisations and individuals who would like to present at the conference. Presentations should link to vocational education practices for either training or assessment initiatives.

The conference will have both plenary and breakout sessions, and submissions should identify the type of session. Please note the organising committee reserves the right to discuss changes to the presentation type.

Where applicable breakout sessions may be given more than once to ensure delegates are able to attend a wide range of topics. Sessions are scheduled to run for 45 minutes and this should include time for questions.

Submission should be made by completing the Submission Form attached. Submissions close Friday 11 March, and should be sent electronically to: **liz@frsito.org.nz**

The School of Psychology at the University of Western Australia in partnership with the Bushfire Cooperative Research Centre and the Fire & Emergency Services Authority of Western Australia present:

Disaster Research Seminar Series

Natural disasters are on the rise, creating widespread unprecedented emotional and financial devastation. In this seminar series key Australian and New Zealand researchers share their comprehensive knowledge to provide valuable insights into a wide variety of aspects of disaster preparedness and response. The presentations will be of interest to researchers in many disciplines (including, psychology, business, geography, sociology, planning), policy makers, and practioners.

5 August 2011
Adjunct Professor Jim McLennan
(La Trobe University, Victoria)
'Where the rubber meets the road':
The centrality of what people decide to do during the period between awareness of threat and impact of the hazard

2 September 2011
Professor Douglas Paton
(University of Tasmania, Tasmania)
Adapting to living with bushfire and earthquake hazards: Integrating household, community and societal influences

26 August 2011
Professor Kevin Ronan
(CQ University, Queensland)
The role of youth, families and schools in community disaster preparedness and prevention

30 September 2011
A/Professor David Johnston
(Director of the Joint Disaster Research Centre, Massey University/GNS Science, New Zealand)
Exploring elements of an effective disaster recovery process: Lessons from recent New Zealand events

Chairs:
W/Professor David Morrison, W/Professor Carmen Lawrence

Time:
3 – 4.30 pm followed by informal discussions

Venue:
Myers Lecture Theatre, Myers St. Building
University of Western Australia
35 Stirling Highway, Crawley WA 6009

Each presenter also will conduct a **Master Class** 9 am – 12 noon on the morning of their presentation. The Master Classes will be announced separately.

Queries:
Please contact petra.buergelt@uwa.edu.au
or patrick.clarke@uwa.edu.au.

Host:
Bushfire Cooperative Research Centre
School of Psychology
35 Stirling Highway
Crawley 6009

http://www.psychology.uwa.edu.au/research/bushfire

THE UNIVERSITY OF WESTERN AUSTRALIA
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GOVERNMENT OF WESTERN AUSTRALIA

FESA
Fire & Emergency Services Authority of Western Australia

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

APRU
Association of Pacific Rim Universities

7th APRU Research Symposium on Multi-Hazards around the Pacific Rim

Physical and Human Dimensions: From Research to Practice

24-26 November 2011 (The University of Auckland)

In the last two years, the Pacific Rim on which we sit has experienced many traumatic earthquakes, tsunamis and floods. First, societies like Chile, China, Indonesia, Samoa, Australia and New Zealand itself were affected, and then Japan suffered a triple earthquake, tsunami and nuclear crisis.

The scale of these and earlier disasters and their cost in lives and productivity demand attention from our region's research communities. With our 'Ring of Fire' so active, and our climate under stress, how can we forecast events, develop early warning systems, adapt to environmental variability and change, mitigate risks, select energy futures, and prepare our institutions for such shocks? When disasters strike, how can we optimise responses, minimise social and economic damage, and best recover?

This symposium brings engineers, scientists, social scientists, other scholars and members of the public together to debate these and related issues. Please join us.

Symposium Themes: Earthquakes • Volcanoes • Tsunamis • Meteorological hazards • Disaster risk reduction • Disaster management • Disaster recovery • Social impact • Economic impact • Energy futures • Impact on universities

Keynote Speakers: Presidents of Pacific Rim universities hit by natural disasters • The Mayor of Christchurch

The Conference includes optional field trip to Christchurch.

Important Dates

Call for Abstracts	Open
Closing date for Submissions	1 August
Notification to Authors	29 August
Early bird Registration Deadline	23 September

For further information, see: http://www.apru2011mh.com/

JOINT CENTRE FOR DISASTER RESEARCH
School of Psychology, Massey University and GNS Science

MASSEY UNIVERSITY

METSERVICE

GNS SCIENCE TE PŪ AO

EMERGENCY MANAGEMENT

Summer Institute

Massey University Campus,
Wellington, New Zealand

12 - 16 March 2012

Lateral spreading in Riverside Drive, Christchurch, caused by the 22 February 2011 earthquake. *Photo: GNS Science*

DAY 1: Emergency management planning

DAY 2: Developing effective all-hazard warning systems

DAY 3: Evacuation planning and welfare

DAY 4: Classroom in the Coach

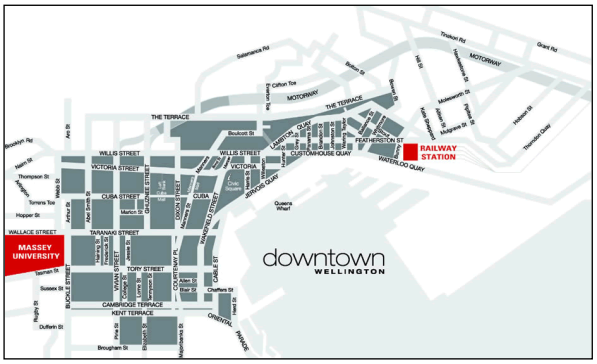
DAY 5: The role of public education, community engagement and public participation in building resilient communities

For more information go to http://disasters.massey.ac.nz/teaching.htm

www.massey.ac.nz www.gns.cri.nz

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.



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