

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.

Learning from Christchurch



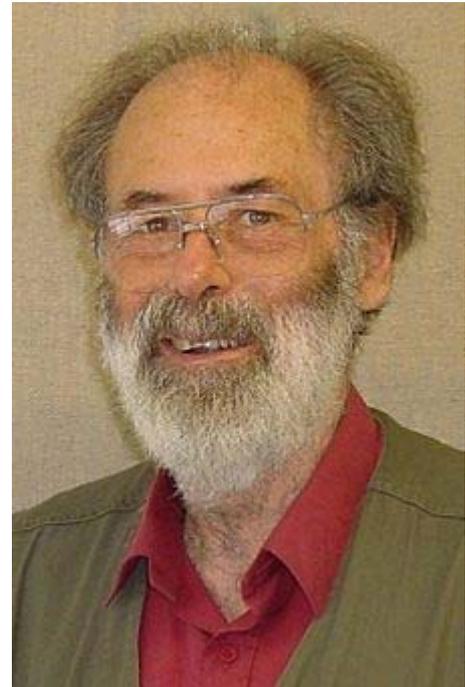
Many international researchers are keen to learn from the Canterbury earthquakes and the region has already played host to physical and social scientist from many countries. One example is the GEM project (<http://www.globalquakemodel.org/>). In September University of Canterbury scientist Dr Tom Wilson (second right) hosted Jen Tobin-Gurley (far left) and Justin Moresco (far right). The GEM Group was also accompanied by Dr Steve Jensen (University of Southern California – second left) and Heather Taylor (JCDR, Massey University- middle)

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

Dr Bill Robinson – a tribute from Dr David Hopkins

It is sad to record the death on Tuesday 16 August, in Christchurch, of Dr Bill Robinson, inventor, scientist and engineer. A family funeral was held on Friday 19 August, and a memorial service is planned in Wellington. This will be fitting for a quietly reserved man who has had a huge influence on seismic safety in New Zealand and throughout the world.

The invention by Dr Robinson of the lead-rubber bearing in 1976 led to its first use in Wellington in 1978 in the William Clayton building. A handful of buildings used this technology, the simplest and most reliable of isolation devices, from that time until 1994. The Northridge earthquake that year affected several hospitals in the Los Angeles suburb, but only one continued to function throughout – protected by Dr Robinson’s invention. Since that time the popularity of the device has grown exponentially and continues to grow. It now protects thousands of buildings around the world, in almost every earthquake-prone country. Notable Wellington buildings protected by the base isolators include Parliament Buildings, General Assembly Library, Te Papa Tongarewa, Rankine Brown Library, Old BNZ Building, Museum of the City and Sea, Wellington Regional Hospital and the recently completed Supreme Court. Overseas buildings include Sacramento State Building, San Francisco City Hall, Bhuj Hospital, Gujarat, Lok Nayak Hospital, Delhi, and private apartment buildings in Taiwan.



The Christchurch Women’s Hospital, protected with lead-rubber bearings, survived undamaged in the recent earthquakes – a fitting tribute to the effectiveness of the lead-rubber bearing. It is likely that the reconstruction of Christchurch will see many building owners choosing base isolation technology for peace of mind and protection of property.



Dr Robinson was honoured with a Queen’s Service Order in 2007 in recognition of his contribution to the reduction of the earthquake vulnerability of communities. However, the full impact of this deceptively simple device, and other devices that Bill invented, has yet to be seen. Many more buildings will be protected and, as time passes, increasing numbers of building owners and communities throughout the world will testify to the lives saved and damage avoided because of the ingenuity of New Zealander, Dr William Henry Robinson. His intellect and wit will be sorely missed, but his legacy will be long lasting.



News from the JCDR Team

Dr **Sarb Johal** (photo right) has just returned from the United Kingdom to take a position at the Centre. He has been appointed as an Associate Professor and will head up the Disaster Mental Health research at the JCDR.

Heather Taylor has been appointed for 3 months on a post-doc to work with us on the Fire Service project. On 2 November Heather successfully defended her PhD and will graduate in the New Year.

Wendy Saunders also successfully defended her PhD and will graduate in the New Year. See more details of Wendy's project in the story on page 9.



Dr **Steve Jensen** (photo left) from the University of Southern California visited the Centre in September 2010 and is working with staff and students on several emergency management research projects.

In June **John Lindsay** attended the Emergency Management Higher Education Conference at the Federal Emergency Management Agency's national training centre in Emmitsburg, Maryland. He moderated and participated in a panel on "International Emergency Management Practices". This session invited a range of international speakers to discuss how education programs are being developed in their respective countries and to contrast that to the U.S. experience. This gave everyone an opportunity to see how unique circumstances can drive the creation of new approaches and to look for ways to transfer and adapt these ideas back to their own situations. Photo right: John Lindsay in nearby Gettysburg PA.



Sarah Beaven continues her role as social science liaison officer with CERA and will take up a scholarship with the University of Canterbury to undertake research on "Science and operational response partnerships after the Canterbury Earthquakes: a model facilitating research and operational collaboration".

Research Partners

Bushfire CRC

The JCDR has recently signed an MoU with the Australian-based Bushfire CRC to explore opportunities for further collaboration. The Bushfire CRC in conjunction with its partners, has developed a comprehensive research plan for the next three years that will set the agenda for longer-term studies. This has drawn on an extensive data collection following the 2009 fires, discussions with leaders in the fire, land-management, local government, academic and policy arenas, and the Council Assisting the VBRC.

The critical areas of concern to the community and to the broader sector fall within three main program areas, which have been aligned to the widely accepted risk-management paradigm:

- **Understanding the Risk** - The work in this program seeks to understand the underlying risk exposure of the community and the things it values.
- **Communicating the Risk** - This program of work focuses on the communication of risk and threat: how are warnings and information best communicated?
- **Managing the Threat** - This program considers the impact of fire events on important infrastructure, resources and the environment.



For more information:

<http://www.bushfirecrc.com/>

Resilient Organisations

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>

OPUS International

The Centre is also pleased to work with colleagues from OPUS international on a number of projects. More information on the disaster-related research projects can be found on their website.



<http://www.resilience.org.nz/index.php>

Integrated Research on Disaster Risk Conference

31st October – 2nd November 2011

Beijing, China

The Integrated Research on Disaster Risk (IRDR) is a decade-long, interdisciplinary research programme sponsored by the International Council of Science (ICSU) in partnership with the International Social Science Council (ISSC), and the United Nations International Strategy for Disaster Reduction (UN-ISDR). It is a global initiative seeking to address the challenges brought by disasters, to mitigate their impacts, and to improve related policy-making mechanisms.

The inaugural IRDR Conference was entitled ‘Disaster Risk: Integrating science and practice’, and brought together leading academics, practitioners and government officials and politicians from all continents in an effort to improve research and policy-making on disaster risk worldwide. IRDR has an international programme office (IPO) in Beijing, where it actively encourages countries to establish IRDR national committees. In 2010, the New Zealand Natural Hazards Platform became the IRDR New Zealand national committee by default. David Johnston is a member of the IRDR Scientific Committee.



As an outcome of both the conference and other work of IRDR there are many opportunities for New Zealand to participate internationally, and to connect with this global initiative. New Zealand had a strong representation at the inaugural IRDR conference this year by researchers from six organisations, some of whom were funded through IRDR.

New Zealand delegation

Assoc. Prof. David Johnston, Massey University/GNS Science*
Assoc. Professor Sarb Johal, Massey University
Prof. Douglas Paton, Massey University
Stuart Fraser, Massey University (PhD student)
Prof. John McClure, Victoria University*
Dr. Caroline Orchiston, University of Otago
Dr. Jean-Claude Gillard, University of Auckland*
Dr. Sarah Beaven, University of Canterbury*
Zach Whitman, University of Canterbury (PhD student)*



A key outcome of the conference was the Beijing Declaration, setting an agenda for improving integrated disaster research, was developed by conference participants and announced at the conclusion of the conference. A summary of the conference, its outputs, proceedings and the Beijing Declaration are available from the IRDR website, <http://www.irdrinternational.org>

* Delegates funded by IRDR to attend the conference.

US science delegation visits New Zealand

Senior Research Associates from the Applied Research in Environmental Sciences (ARIES) non-profit were hosted by Massey University in early September as part of developing further relations under the Department of Homeland Security Science and Technology Agreement.

Dr Lloyd Mitchell, Dr Anne Garland, Ms. Nadine Mitchell (Oneida Tribe elder) and Mr. Kyle Horne met with various agencies during their weeklong stay including the Ministry of Civil Defence & Emergency Management. The MCDEM visit was facilitated by Dr Richard Smith, Ms. Leonie Waayer and Mr. Ian Wilson, and discussions included indigenous emergency management practices such as the Marae Preparedness Programme. The delegation was fortunate enough also to meet briefly with the Director of Civil Defence Emergency Management, Mr. John Hamilton.



ARIES Delegation with MCDEM staff (above) and delegation at Hui held at Kuratini Marae (left)



A Hui was held at the Kuratini Marae at Massey University's Wellington Campus and local Kaumatua, staff and students attended. The whaiwhaikōrero included the importance of preserving indigenous culture and language and led to discussing ways for Massey University and ARIES to collaborate on indigenous emergency management research and education. A strategy is being drafted to progress Maori/Native American Indian emergency management research and education opportunities in

consultation with the Ministry of Civil Defence & Emergency Management, Te Puni Kokiri, Ministry of Science & Innovation, Massey University, Applied Research in Environmental Sciences and local Kaumatua. It is hoped that Native American Indian delegates will attend the upcoming Massey University Summer Institute (12-16 March, 2012) to further develop relations and research opportunities in this area.

Thank you to all participants!

JCDR Emergency Management Exercises for Natural Hazards

Emma Hudson-Doyle, and colleagues David Johnston (Massey) and Douglas Paton (University of Tasmania), would like to thank all participants in the Emergency Management Exercises at the Joint Centre for Disaster Research in November. Your time and help is much appreciated; this research could not be done without you.

We'd also like to thank all who expressed an interest, but were unable to attend. For those, and any others who may be interested in future exercises, we anticipate running a second phase of exercises in 2012. Further information is included below.

These exercises were paper based table-top exercises run to investigate how participants managed information and planned actions, based on a range of information injects for a hypothetical volcanic eruption in a mystery location. The goal of this research program is to develop more effective advice processes, and to build a greater understanding of information management, decision making, and planning. Participants included people involved in incident management from the wide range of agencies involved in the management of hazard events. Their contributions will greatly help us in identifying these issues and developing the process.

If you'd like to find out anymore about this research program, or register your interest for exercises in 2012, please contact:

Dr Emma E. Hudson-Doyle, e.e.doyle@massey.ac.nz

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Learning Resource Centre

The US Federal Emergency Management Agency operates a Learning Resource Centre in Maryland, USA. They operate an extensive collection of literature able to be searched online at

<http://www.lrc.fema.gov/>.

Key facts @ LRC - Connecting first responder leaders to first responder knowledge since 1978.

- Comprehensive all-hazards collections - 195,000 titles in all formats
- Online catalog available to students, first responders, public 24/7
- Over 24,000 downloadable documents
- Numerous subject bibliographies & pathfinders
- Most extensive collection of fire service literature in the United States



About the LRC

The NETC Learning Resource Center (LRC) provides current information and resources on fire, emergency management and other All-Hazards subjects. With its collection of more than 180,000 books, reports, periodicals, and audiovisual materials, the LRC facilitates and supports student and faculty research and supplements classroom lectures and course materials. Users of this Web site may access the LRC's Online Public Access Catalog to perform their own literature searches. In addition to searching the collections cited above, the LRC's catalog is a **unique guide to periodical literature** with citations on fire, emergency response, natural disaster, and homeland security topics going back to the early 1970s. LRC staff index nearly 5,000 newly published articles each year, from scores of professional journals, magazines and newsletters across the country and internationally.

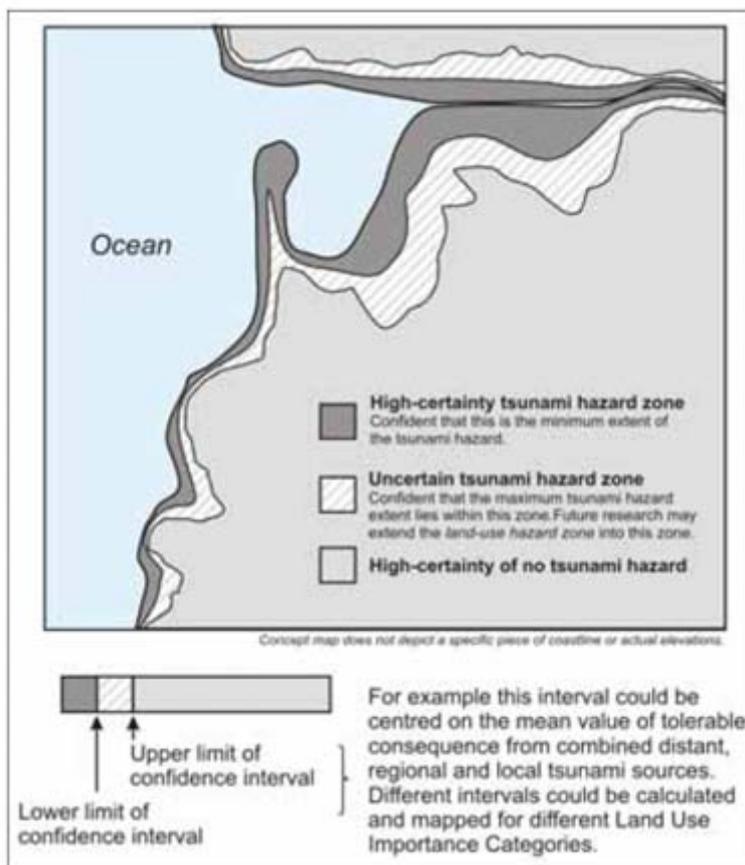
INTER-LIBRARY LOAN IS NOT AVAILABLE OUTSIDE THE USA

Land-use planning for natural hazard risk reduction in New Zealand

Wendy Saunders from GNS Science has completed a PhD dissertation, which investigates innovative land-use planning for natural hazard risk reduction in New Zealand. Traditionally the planning approach for addressing natural hazards has been based on the likelihood of an event occurring. There has been little consideration of the consequences associated with a natural hazard event where it exceeds the design occurrence interval. Wendy has investigated an alternative approach for considering natural hazards within a land use framework. This approach promotes the consideration of the risks associated with the natural hazard as well as the resulting consequences when considering potential developments for events with varying likelihoods of occurring. This risk-based approach to planning allows for a holistic consideration of the potential consequences associated with development for a variety of natural hazards.

The risk-based planning approach has been well received by many territorial authorities around the country and several second generation regional policy statements are promoting this approach to manage the effects from natural hazards within their

respective boundaries. To be able to implement a risk-based approach, councils must be able to determine the relevant risk thresholds which are acceptable, tolerable and intolerable for their respective communities.



To date, little work has been undertaken which allows for councils to measure and determine their respective communities tolerance to a variety of natural hazard events. GNS has recently secured funding through the Ministry of Science and Innovation's 'Envirolink' fund and GNS Science (via the Natural Hazards Platform) to develop a methodology and an associate tool which Councils can use to assess the levels of risk which their local communities are willing to tolerate for a variety of natural hazards. This tool will allow councils to be able to develop a risk-based planning approach which is relevant to the hazardscape of their respective communities, which will in turn assist with ensuring that more robust and holistic planning outcomes in relation to natural hazard mitigation are achieved in the future. This methodology and tool will be developed from the later part of 2011 to 2013 and will be available online in 2013.

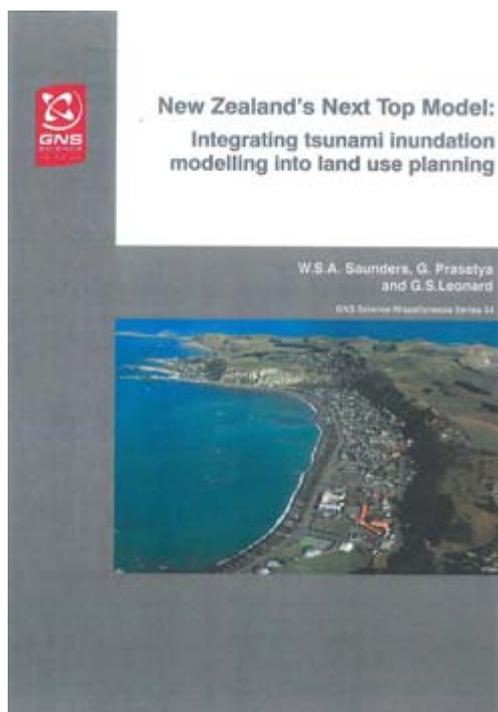


Image right: *The title page of New Zealand's Next Top Model: Integrating tsunami inundation modelling into land use planning. GNS Science Miscellaneous Series 34, 442P, which includes the risk-based planning methodology. Available from www.gns.cri.nz/content/download/.../EQCRReport_NZNTMv3.pdf*

A history of tsunami events in the Chatham Islands, New Zealand

The Chatham Islands are prone to tsunami inundation from several directions, due to their low elevation and physical isolation. In recent years, tsunami warnings have been issued for the islands on several occasions as a consequence of large earthquakes off the coast of South America. Both anecdotal and geomorphological evidence of past tsunami events in the islands can be found and this wealth of information remains to be documented and fully explored. The location of the Chatham Islands means that they are the first populated area of New Zealand to be affected by tsunami that originate off the coast of South America, and are thus very important from a national tsunami hazard management perspective.

Previous research on tsunami in the Chatham Islands is very limited and pertains primarily to physical evidence of a tsunami which

struck the islands in August 1868. However, the untapped potential of the Chatham Islands for studying tsunami events is noted (Nichol et al., 2010). Evidence of the 1868 event was documented in two areas of the island, the Okawa Wetland in the northeast of the island (Nichol et al., 2010) and around Cape Patisson in the northwest (Goff et al., 2010). The form of these deposits varies between locations; appearing as a pebble and sand layer in the northwest, compared with a thin layer of dune sand in Okawa Wetland. Interestingly, evidence of tsunami in the wetland was not widespread, which the authors attributed to a lack of accommodation



space. Another tsunami deposit was located beneath the 1868 horizon in the northwest, which was interpreted to have resulted from a trans-South Pacific tsunami associated with the 1604 earthquake in South America (Goff et al., 2010). Historical records of the effect of the 1868 event in the sparsely-populated Chatham Islands also exist, with a report that contains descriptions of tsunami damage (Travers, 1871) and an annotated map of inundated areas and run-up heights (de Lange and McSaveney, 2009).

In August 2011 Claire Kain, a PhD student at University of Canterbury took part in a week-long trip to the Chatham Islands. The oral history of the tsunami events of 1960 and 1868 is recorded and physical evidence of the 1868 event examined. These two forms of evidence complement each other and will form part of further research.

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Understanding social media

Ongoing research by GeoNet Outreach Coordinator (and Massey student) Sara Page is exploring the role of social media in disseminating earthquake information. From May 2010 to September 2011 the number of Facebook 'Likes' or followers has grown from just over 400, to over 13,000. The GeoNet blog was started in February 2011 following the devastating Christchurch earthquake, with weekly posts including: response to Christchurch earthquake, technicians out in the field, and 'how to's for the website. For more information contact Sara Page.

SOCIAL MEDIA

In 2010 GeoNet joined the ever-growing social media platforms 'Facebook' and 'Twitter' and more recently a blog was started on 'Blogger'. All of these services are available via computer and mobile phone.

Some of the benefits of using social media in conjunction with our website include the fact it's fast, easy to use and extends the audience reach. Social media also let GeoNet release facts, keep people informed and alerted to problems (such as instrument outages on the website) and also let the public engage with us and each other, which can be important during large events.

Blogging has also allowed the public a look 'behind the scenes' at GeoNet, with videos touring the offices and photos documenting how technicians build new sites out in the field. It also has frequent 'how to' posts with information on how to use various features on the GeoNet website.

Although the GeoNet website is still the main way to get information about all of New Zealand's geological hazards, with over 13,000 people following Facebook and over 9,000 on Twitter, social media allow GeoNet to get information out quickly to a wide audience.

Contact: Sara Page
Email: s.page@gns.cri.nz


www.twitter.com/geonet


www.facebook.com (search GeoNet)


<http://geonet-shakemotstired.blogspot.com>

GEONET - 7

Tell your story

The earthquakes that struck Canterbury in 2010 and 2011 are among the most significant events in New Zealand history. A website has been established by Manatū Taonga / Ministry for Culture and Heritage in partnership with NV Interactive. It is part of the University of Canterbury CEISMIC consortium (which includes Christchurch City Libraries and National Library), a long-term project dedicated to the preservation and study of information relating to the Canterbury earthquakes.

Tell your stories about the earthquakes of September 2010 and February 2011 and their aftershocks. Stories of the aftermath, rescue effort, the clean up and how your life continues to be affected – the highs and the lows. Keep telling your stories as time goes on, as the region, the city and people's lives are rebuilt.

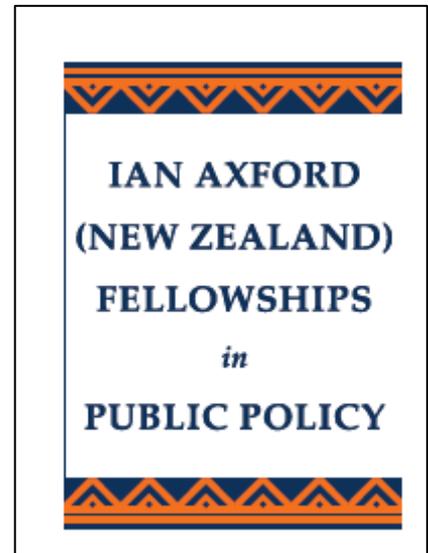


<http://www.quakestories.govt.nz/>

Disaster preparedness education in schools: Recommendations for New Zealand and the United States

The United States (US) Federal Emergency Management Agency (FEMA) and Department of Education (ED) are currently considering strategies to reach children and youth through disaster preparedness education in schools and extracurricular activities. Collaborating with the National Commission on Children and Disasters, FEMA established a Children's Working Group in 2009 and in September 2010 launched the first "National Summit on Youth Preparedness" in Washington, DC. Chandrika Kumaran of the New Zealand Ministry of Civil Defence & Emergency Management (MCDEM) spoke to participants at the Summit about New Zealand's national school-based disaster preparedness education programme, "What's the Plan, Stan?" (WTPS). WTPS includes learning and teaching resources for children aged seven to 12 years old, as well as information on school emergency management and disaster drills. WTPS could be a potential model for the US as a single national teaching resource. There are currently a number of disparate federal programmes for disaster education for children and school emergency management planning, in addition to many state-based programmes.

This study by Vicky Johnston aimed to gather insights on the implementation of WTPS and to identify some of the impacts of developing and promoting a single, national resource for disaster preparedness education in New Zealand schools. The study used a mixed methods approach of focus groups, interviews and an online survey. Seven focus groups in different regions on both the North and South Islands were used to gather in-depth qualitative data on personal and group experiences of primary and intermediate school educators. Focus group participants who had used WTPS in their classroom were provided a 10 question online survey to gather additional information on their use of WTPS resources. Lastly, individual and group interviews were conducted with regional and local CDEM and Council staff to gather perspectives on their role in working with schools and supporting WTPS. On 22 February 2011, in the midst of planning for this study, a magnitude 6.3 earthquake occurred in Christchurch taking the lives of 181 people. The focus groups and interviews took place in March and April 2011 and the results were uniquely influenced by these events.



Findings from this study indicate there is a very positive impression of WTPS among the participants who have used the resource. Some advantages to the WTPS

resource are the inclusion of components recommended in research for disaster education programmes for children, such as 1) adoption of an emergency management perspective that supports teaching of protective behaviours before and during disasters, 2) use of a graduated sequence of learning activities across school years and 3) the inclusion of activities that facilitate interaction between children and parents.

More research is needed to determine national uptake of WTPS and school disaster drills, and an evaluation of effectiveness would be useful to determine if WTPS is achieving learning outcomes in students. A number of challenges to implementation were identified. First, a national strategy with measurable outcomes and on-going evaluation of WTPS is needed. Because there are no requirements for disaster preparedness education or disaster exercises beyond fire evacuation drills in schools, it is sometimes difficult for schools and individual teachers to make the topic of disaster preparedness a priority in classroom activities. Improved coordination and consistency in messaging from MCDEM and the Ministry of Education are needed, particularly as WTPS is in competition with other important school-based safety and life skills education programmes. Findings from the study also indicate there is mixed understanding among educators about the roles of schools as civil defence centres. There is also concern about the appropriate approach to discussing disasters or conducting earthquake drills in schools in the aftermath of the Christchurch earthquake.

Recommendations for New Zealand include 1) an evaluation of effectiveness of WTPS, 2) an outcomes-based strategy for children's exposure to disaster preparedness education, 3) the establishment of a National

School Earthquake Exercise Day, ideally in collaboration with the US, 4) messages for schools developed pre-disaster, 5) utilisation of webinars and search engine optimisation to address surges in inquiries from schools, and 6) incorporation of disaster preparedness lessons with Firewise and the Life Education Trust mobile classroom. There are a number of lessons for the US from New Zealand's experience implementing a single national teaching resource for disaster preparedness education for children. Before embarking on the development and endorsement of a single national resource, FEMA and ED should collaborate with state agencies and relevant experts to develop a measurable outcomes-based strategy for children's exposure to effective disaster preparedness messages and consider the best approach for meeting those goals. The best approach may depend on a number of factors including the current use of state-based teaching resources and the level of funding needed to maintain awareness, buy-in and on-going evaluation. Also, US states should determine the use and frequency of school disaster drills in high-risk areas and determine if a new strategy is needed to increase uptake. Lastly, both the US and New Zealand should incorporate and evaluate psychosocial resources to address the needs of children affected by disasters to ensure these resources meet the needs of teachers.

Vicky Johnson was on an Ian Axford Fellowship in Public Policy hosted by MCDEM. She is now doing a PhD at the JCDR.

Public perceptions of the NZ Fire Rescue Services during the Christchurch earthquakes

The Christchurch earthquake on 22nd February 2011 involved the largest urban search and rescue operation in New Zealand. Both that earthquake and the September 2010 Canterbury earthquake were the largest call on the NZFS' and support organisations' resources, experience, preparation and adaptability for non-fire purposes. Non-Fire Service Assets (NFSAs) and response organisations played a vital role in this response, supporting the New Zealand Fire Service (NZFS). Public expectations, formalised arrangements at all levels



of government, and memorandums of understanding with partner agencies, place the NZFS at the forefront of the response in this type of event. However, there does not exist the same unambiguous mandate for response as there does for fire-related emergencies.

In addition, NZ has been fortunate to have experienced a long and relatively calm period with no significant seismic activity in close proximity to a major population. However, this has resulted in existing NZFS and NFSAs inter-agency communication and shared earthquake response being largely untested in a real event. There now

exists an opportunity to investigate the role of the NZFSAs and their rescue capacity in supporting the NZFS response to high impact events. This non Fire Service rescue capacity ranges from semi-trained Primary NFSAs (e.g. fire wardens) to trained Secondary NZFAs (e.g. volunteer response organisations, Rural Fire Brigades and other Search and Rescue (SAR) teams). This research seeks to produce an enhanced understanding of the demands placed on this NFSAs rescue capacity by the extraordinary 4th September Canterbury and 22nd February Christchurch earthquakes, and the existence of and use of pre-existing plans and arrangements between this capacity and the NZFS. This event was not the worst case scenario expected for a large earthquake in NZ, such as may occur on the Alpine or Wellington Faults, and so it is important to identify if the expected demands built into response plans matched those experienced during this real event. By examining available incident data of the NZFAs response and systematic interviews with NZFAs and NZFS staff, the researchers seek to build an operating picture of the interaction of NZFAs with the NZFS, as well as identify the existence and use of non Fire Service response plans. If you would like to find out more about this study, please contact Emma Hudson-Doyle at e.e.doyle@massey.ac.nz

Supporting communication around the Canterbury earthquakes and other risks: A learning workshop

A workshop *Supporting Communication around the Canterbury Earthquake and Other Risks: A Learning Workshop* took place on 7 April 2011, at the Environmental Science and Research (ESR) Offices in Christchurch. The workshop took place just over 6 weeks after the devastating magnitude 6.3 earthquake in Canterbury on 22

February 2011 that claimed 181 lives and caused extensive damage throughout Christchurch. The two hour workshop was organised by social scientists at ESR and GNS Science, to bring together people with different areas of expertise and experience to generate a 'big picture view' of the communication dynamics at work around a major emergency. Around forty participants took part, including government communications and emergency management staff, researchers from



Crown Research Institutes and Universities, individuals from industry, community and iwi organisations, and experts in crisis and risk communication.

The aims of the workshop were:

- To create a supportive space for communication practitioners working on the ground in the response and recovery phase of the Canterbury earthquake, to share experiences and learning with researchers in risk communication.
- To explore communication processes, including the design of 'hazard messages'; the selection of communication channels, and uptake of messages.
- To explore the interplay between formal and informal communication processes emerging in response to the earthquake.

A report is currently being finalised and will be on the ESR website early July 2011.

The report provides a summary of the presentations and discussion, for workshop participants and other interested parties. We hope this report will also serve to:

- promote individual, organisational and institutional reflections on recent hazardous events, and
- enable learning from both experience and research to enhance future communication around earthquakes and other risk events such as a public health emergency, biosecurity outbreak or extreme climate events.

For more information, contact Dr. Karen Cronin at ESR (karen.cronin@esr.cri.nz) or Michele Daly at GNS Science (m.daly@gns.cri.nz).

Report available free from JCDR website.

Nature and type of injuries from the 4 September 2010 and 22 February 2011 Canterbury earthquakes

Despite significant advances in the understanding of earthquake hazard, risk and mitigation, earthquake deaths and injuries continue to increase globally (Spence et al. 2011). The use of earthquake risk and impact modelling is therefore gaining an increasing importance for informing the value of mitigation through the development of appropriate building regulations and controls for urban development; public education around actions to take during earthquakes; planning post-disaster emergency operations; development of insurance schemes; and planning of mitigation measures for existing building stock (Spence et al. 2011). However, such models rely on reliable estimates of the number of deaths and the number and type of injuries which may result from a given pattern of ground shaking. It is therefore necessary to examine each earthquake disaster to learn new lessons about the causes and nature of death and injury for future mitigation strategies.

Data obtained from Accident Compensation Corporation (ACC) in New Zealand is part of a collaborative study to understand the nature and type of injuries from the 4 September 2010 and 22 February 2011 Canterbury earthquakes. This is unique data set as it contains information on all claims lodged for injuries from both earthquakes. Upon presentation at any health care provider, patients with earthquake injuries are required to fill out ACC forms. The description box allowed the patient or caregiver to write a small explanation of how the injury occurred. Over the coming months a more detailed analysis of death and injuries will be undertaken but primary sorting on all injuries is summarised in Table 1.

Table 1 Cause of injury resulting from 4 September 2010 and 22 February 2011 earthquakes from ACC claims

Category		Sept. 2010	Feb. 2011
Primary	Immediate ¹	16.6% (375)	43.6% (3129)
	Action ²	45.3% (1023)	18.0% (574)
	Unknown ³	2.2% (50)	8.0% (574)
Secondary		22.0% (497)	25.6% (1881)
Aftershock		13.8% (311)	3.8% (275)
Total		100.0% (2256)	100% (7171)

¹ Injury was immediate and unavoidable (e.g. object falls on leg)

² Injury was as a result of an action (e.g. got out of bed and tripped over box)

³ Unidentifiable from records

Primary injury was defined as occurring at the moment of the earthquake as a direct result of the immediate shaking. It was divided into two sub categories, immediate and action. An “immediate” type injury was an injury of unavoidable cause. The following is an example from the data base of a “primary immediate injury”: *“Books fell onto back during earthquake”*. Alternatively, a primary injury could be classified as “action” a result of a movement that the person may have made. An example of a “primary action injury”: *“Dived under desk during earthquake, struck right shoulder on leg of desk, painful since”*. Secondary injury was defined as an indirect consequence of the 7.1 earthquake, any injuries that occurred as a result of the earthquake but once the shaking had stopped. Example of a “Secondary injury”: *“Slipped over on uneven surface whilst cleaning up from earthquake now back pain radiating down both legs”* Aftershock injury was defined as being any injury caused by the shaking from any of the aftershocks following the main-shocks. Finally there was a small category of unknown claims that did not have sufficient information to indicate why or how the injury occurred.

Reference Spence, R., So. E., Scawthorn, C. 2011. Human casualties in earthquakes: progress in modelling and mitigation. Springer 322p.

Community understanding of earthquake risk in Eastern Washington, USA

David Johnston (JCDR) and Caroline Orchiston (U of Otago) ran a series of focus groups and presentations in eastern Washington (State) in October 2011 as a follow-up to a study undertaken last September (2010). The 2010 study was funded by the Washington State Emergency Management, with support from the United States Geological Survey. This research has highlighted that the low frequency, yet high consequence nature of earthquakes in Washington act to reduce resident preparedness and awareness of earthquake hazards. The 2011 seminars discussed the survey results and discussed options for improving earthquake preparedness in Eastern Washington.

The 2010 survey data was gathered from interviews with 527 people at five County/State fairs in Eastern Washington between September 2 and 11, 2010 (Kittitas County Fair, Ellensburg – September 2; Ferry County Fair, Republic – September 3; Walla Walla Fair and Frontier Days – September 5; Spokane Interstate Fair, Spokane – September 10; Columbia County Fair, Dayton – September 11.



Key earthquake-related findings from an analysis of interviews show:

1. Respondents reported a low level of personal experience of earthquakes. Only 20% reported that they had been affected by an earthquake. This is compared to a high of 39% reporting being affected by storms.

2. There is disconnect between awareness of the possibility of future earthquakes and the real risk posed by earthquakes hazards in the region. The majority of respondents report the possibility of an earthquake in the near future, or within their lifetime.



However, over three quarters of respondents agree with a statement that 'Eastern Washington does not have earthquake hazards'

3. The majority of respondents had heard or received information about preparing for emergencies from at least one source. The most commonly reported source was TV/Radio (64%), followed by newspaper/magazines (50%).

4. Respondents were asked what they or their family had done to prepare for a hazard or emergency. While, 95% reported having a flashlight and 94% reported having a smoke detector, few had

undertaken key earthquake-specific actions i.e. adding lips to shelves, strapped water heaters, installing flexible tubing to gas appliances, and bolting their house to the foundations.

5. The majority of respondents (59%) reported having a plan for how to contact their family during an emergency.

A report on this study should be available in early 2012.

Barriers to seismic safety: the case study of Morgan Middle School, Ellensburg, USA

Morgan Middle school, Ellensburg, Washington was built in 1929, and added onto several times up until the 1970s. It started out with 200 pupils, and now has 730. The auditorium was built to hold 800 (doubling as a community centre at the time), with a balcony held up by two thin pillars. The building is aged and poorly constructed with no support structures connecting the roof to the walls, or the walls to the foundations. It is made of hollow bricks, and has unreinforced walls with concrete slab floors. The oldest part of the school is the most hazardous, and has 2/3 of the pupils in it each day. It is 2-storey, but has no fire escapes from the upper floors.

A recent report on the structural condition of the building found that deficiencies include “the use of unreinforced masonry, hollow clay tile, and glass block for partitions and infill between the concrete frames.” Other “areas of concern include inadequate connectivity at the second floor and roof diaphragms, the lack of exterior brick veneer ties back to the structure, and deteriorated precast concrete window heads and sills”.



Paul Farris (Superintendent of Schools in Kittitas County) and Michelle Bibich (Principal of Morgan Middle School) have been lobbying to have the school closed down and rebuilt. They have tried to convince the community, but there is resistance because, as the Superintendent put it, they have a ‘sweat investment’ into the school, and also people don’t understand the risk it poses in the event of an earthquake. Community decisions of this nature are taken by sending out a ballot form to everyone in the town so they can vote. In order to pass a vote, 60% of residents or more need to support it. Last time they tried they got 55% support, which wasn’t enough. This is how communities make decisions throughout the USA, although other states only require 50% support.



Paul Farris said that to do a basic retrofit of the building would cost \$US5M, with a thorough retrofit costing \$14-15M. A total rebuild has been estimated at \$US40M. They are proposing that the school is rebuilt alongside the high school nearby, which has some existing green space, and that the current site is left as green space and then redeveloped as a new elementary school (since the existing elementary school needs to be rebuilt as well). Photo: Caroline Orchiston (U. of Otago), Michelle Biblich and Paul Farris.

This study highlights the challenges of dealing with seismic safety of public buildings. The State of Washington and the USGS are working together address the earthquake hazards in the State.

Post traumatic stress and resilience in adolescents following the Christchurch earthquake.

This study will investigate post-traumatic stress and resilience amongst teenagers who experienced the February 22 earthquake in Christchurch. Two self administered questionnaires will be completed by teenagers in high schools throughout Christchurch. The Child Post Traumatic Symptom Screening questionnaire (CPSS; Foa et al., 2001) will be used to measure post-traumatic stress symptoms, whereas The Resilience Scale for Adolescents (READ; Hjemdal et al., 2006) will be used to measure resilience. Data will also be collected on the severity of traumatic exposure. Various statistical analyses will be conducted to test the following hypotheses:

- A significantly higher percentage of adolescents will have symptoms constituting Post Traumatic Stress Disorder than the normal adolescent population.
- An inverse correlation will exist between Post Traumatic Stress and Resilience.
- Higher levels of traumatic exposure will be positively correlated to post traumatic stress symptoms.
- Results will be reported and submitted to a psychological journal for dissemination.



For more information on this study please contact Tim Heetkamp (photo above): tim.heetkamp@sjog.org.nz or Ian de Terte (supervisor): I.deTerte@massey.ac.nz.

The communication of uncertain scientific advice during natural hazard events

At the annual NZ Psychological Society Conference, held in Queenstown from 20-23 August 2011, Emma Hudson-Doyle presented preliminary results from the international survey run this year to investigate the different perceptions of probability and uncertainty statements for volcanic crisis events. This presentation was co-authored by David Johnston (Massey), John McClure (U. Victoria), and Douglas Paton (U. Tasmania), and a brief summary follows below.

During natural hazard crises such as earthquakes, tsunamis, and volcanic eruptions, a number of critical challenges arise in emergency management decision-making. A multidisciplinary approach bridging psychology and natural hazard sciences has the potential to enhance the quality of these decisions. Psychological research into the public understanding of different phrasings of probability has identified that the framing, directionality and probabilistic format can influence people's understanding, affecting their action choices.

Preliminary findings from the research have identified that:

- translations of verbal to numerical probability phrases differ between scientists and non-scientists,
- translation tables such as those used for the IPCC reports should be developed for natural hazards,
- individuals may 'shift' the likelihood of an event towards the end of a time window, and that this effect can be altered by subtle changes in the wording of likelihood statements.

If you would like to find out more about this study, please contact Emma Hudson-Doyle at e.e.doyle@massey.ac.nz

Finally, we would like to thank all participants for taking the survey and their contribution to the research!

Volcanic ash impacts on critical infrastructure

Volcanic eruptions can produce a wide range of hazards. Although phenomenon such as pyroclastic flows and surges, sector collapses, lahars and ballistic blocks are the most destructive and dangerous, volcanic ash is by far the most widely distributed eruption product. Although ash falls rarely endanger human life directly, threats to public health and disruption to critical infrastructure services, aviation and primary production can lead to significant societal impacts. Even relatively small eruptions can cause widespread disruption, damage and economic loss. Volcanic eruptions are, in general, infrequent and somewhat exotic occurrences, and consequently in many parts of the world, the management of critical infrastructure during volcanic crises can be improved with greater knowledge of the likely impacts. This article presents an overview of volcanic ash impacts on critical infrastructure, other than aviation and fuel supply, illustrated by findings from impact assessment reconnaissance trips carried out to a wide range of locations worldwide by our international research group and local collaborators. ‘Critical infrastructure’ includes those assets, frequently taken for granted, which are essential for the functioning of a society and economy.

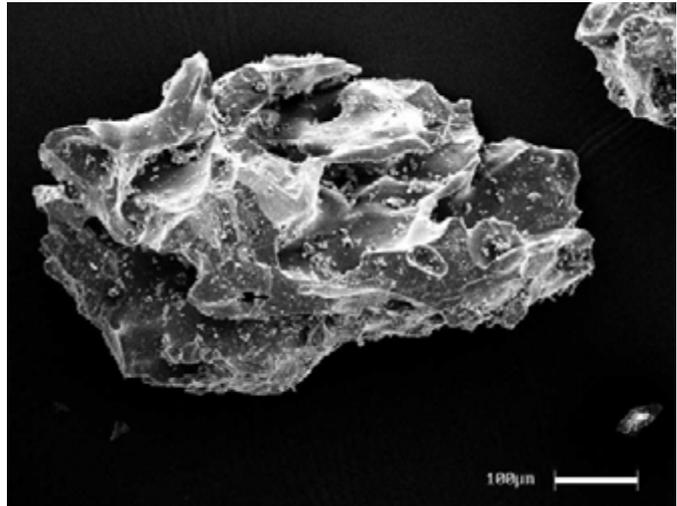


Figure 1: Volcanic ash particle (above right). Note the cavities are the broken walls of vesicles. Scale bar is 100 μm .

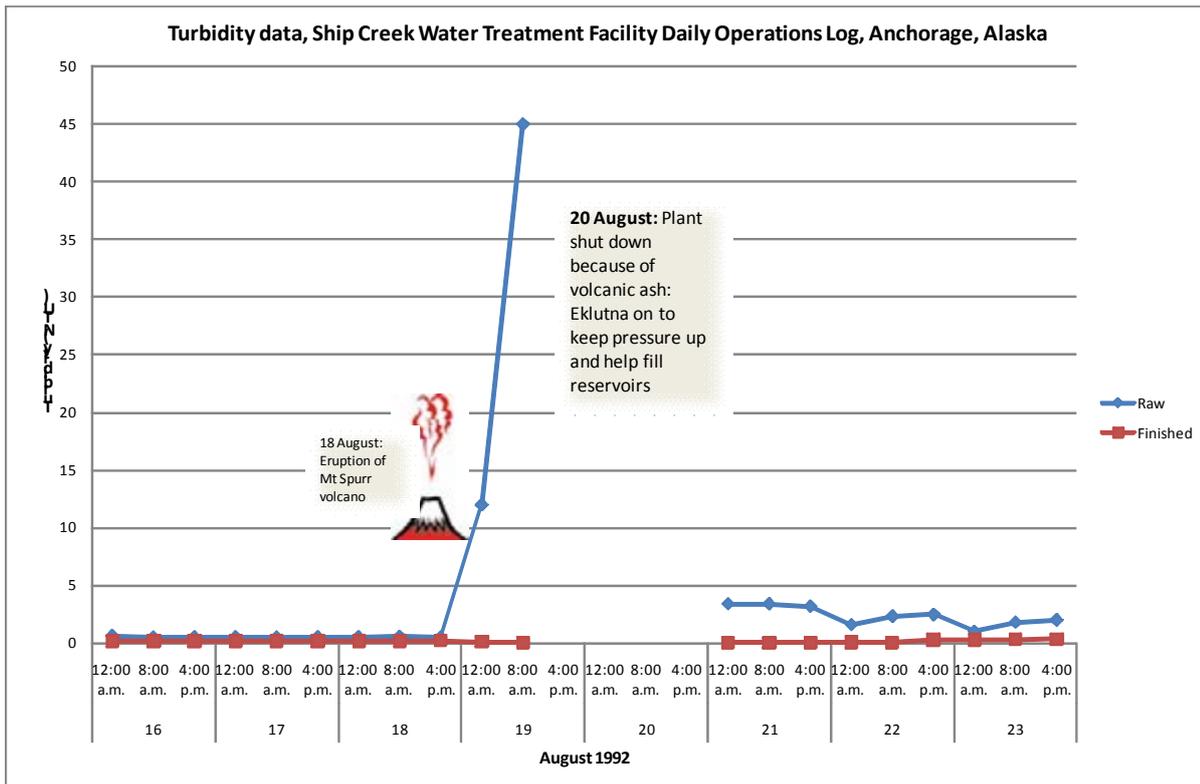


Figure 2: An example of a flashover (3 faults) on a glass string insulator (left). The insulator has been coated with 3 mm of wet volcanic ash. Flashover occurred at ~ 40 kV (insulator string design voltage 40 kV).

Electricity networks are very vulnerable to disruption from volcanic ash falls. This is particularly the case when fine ash is erupted because it has a greater tendency to adhere to line and substation insulators, where it can cause flashover (unintended electrical discharge) which can in turn cause widespread and disruptive outages. Weather conditions are a major determinant of flashover risk. Dry ash is not conductive, and heavy rain will wash ash from insulators, but light rain/mist will mobilise readily-soluble salts on the surface of the ash grains and lower the ash layer's resistivity. Wet ash is also heavier than dry ash, increasing the risk of line breakage or tower/pole collapse. Particular issues for water supply managers include: monitoring turbidity levels in raw water intakes, and if necessary increasing chlorination to compensate for higher turbidity; managing water demand; and communicating monitoring results with the public to allay fears of contamination. Ash can cause major damage to wastewater disposal systems.

Ash deposited onto impervious surfaces such as roads and car parks is very easily washed into storm drains, where it can form intractable masses and lead to long-term flooding problems. It can also enter wastewater treatment plants (WWTPs), both through sewer lines and by direct fallout. Damage to modern WWTPs can run into millions of dollars. Ash falls reduce visibility creating hazards for ground transportation. Dry ash is also readily remobilised by vehicle traffic and wind, and dry and wet ash deposits will reduce traction on paved surfaces, including airport runways. Ash cleanup

from road and airports is commonly necessary, but the large volumes make it logistically challenging. Vehicles are vulnerable to ash; it will clog filters and brake systems and abrade moving parts within engines.



Lastly, modern telecommunications networks appear to be relatively resilient to volcanic ash fall. Signal attenuation and interference during ash falls has not been reported in eruptions over the past 20 years, with the exception of interference from ash plume-generated lightning. However, some telecommunications equipment is vulnerable to airborne ash, in particular heating, ventilation and air-conditioning (HVAC) systems which may become blocked from ash ingestion leading to overheating.

This summary of volcanic ash impacts on critical infrastructure provides insight into the relative

vulnerability of infrastructure under a range of different ashfall scenarios. Identifying and quantifying these impacts is an essential step in building resilience within these critical systems. We have attempted to consider interdependencies between sectors in a holistic way using systems thinking. As modern society becomes increasingly complex and interdependent this approach is likely to become increasingly necessary.

Wilson, T.M., (2011) et al. Volcanic ash impacts on critical infrastructure. J. Phys. Chem. Earth, doi:10.1016/j.pce.2011.06.006

Please contact Tom Wilson for copies of the paper: thomas.wilson@canterbury.ac.nz

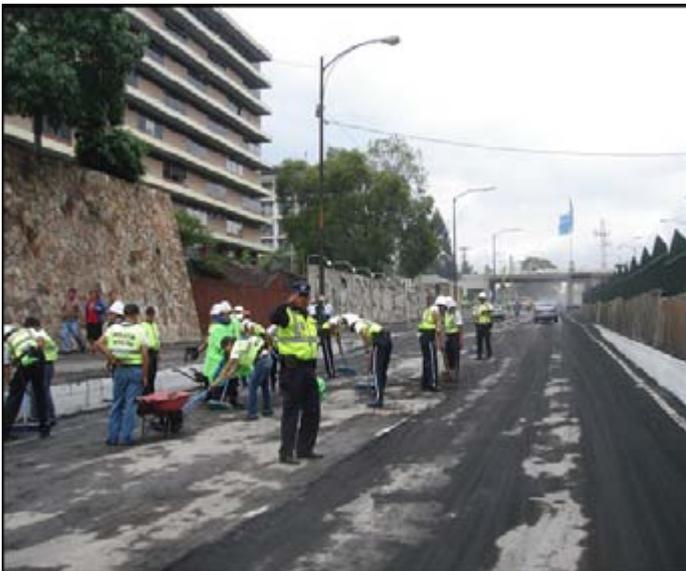


Figure 3: Turbidity increases at Ship Creek water treatment facility following eruption of Mt Spurr volcano (data from Anchorage Water and Wastewater Utility, AWWU)

Figure 4: Cleanup of Guatemala City roading network (photo credit: Ing. Alvaro Hugo Rodas Martini, Municipality of Guatemala City, 2010)

The effects of the September 2010 Southland snowstorm on rural communities

In mid-September of 2010, the Southland region was affected by a late cold front, bringing with it snowfall, freezing rain, and an extended period of unseasonably cold temperatures. It created national attention with the collapse of the Stadium Southland (photo on next page) in Invercargill due to snow loading and led to no significant impacts to farming, with lambing well underway. Invercargill was blanketed with more than 10 cm of snowfall and to the east, coastal areas experienced snow depths greater than 30 cm. Snowfall thickness generally decreased northward, with Edendale receiving 15-20 cm and the township of Winton reportedly only receiving a dusting. Anecdotal accounts suggest that snow thicknesses were variable across the region. The snowfall was very dense due to its high water content, and snow loads on roofs became a safety hazard. Power outages and road closures were relatively minor however, with reported outage durations in the order of a few hours. The average low temperatures during the event and sampled organisation locations are displayed in Figure 1.

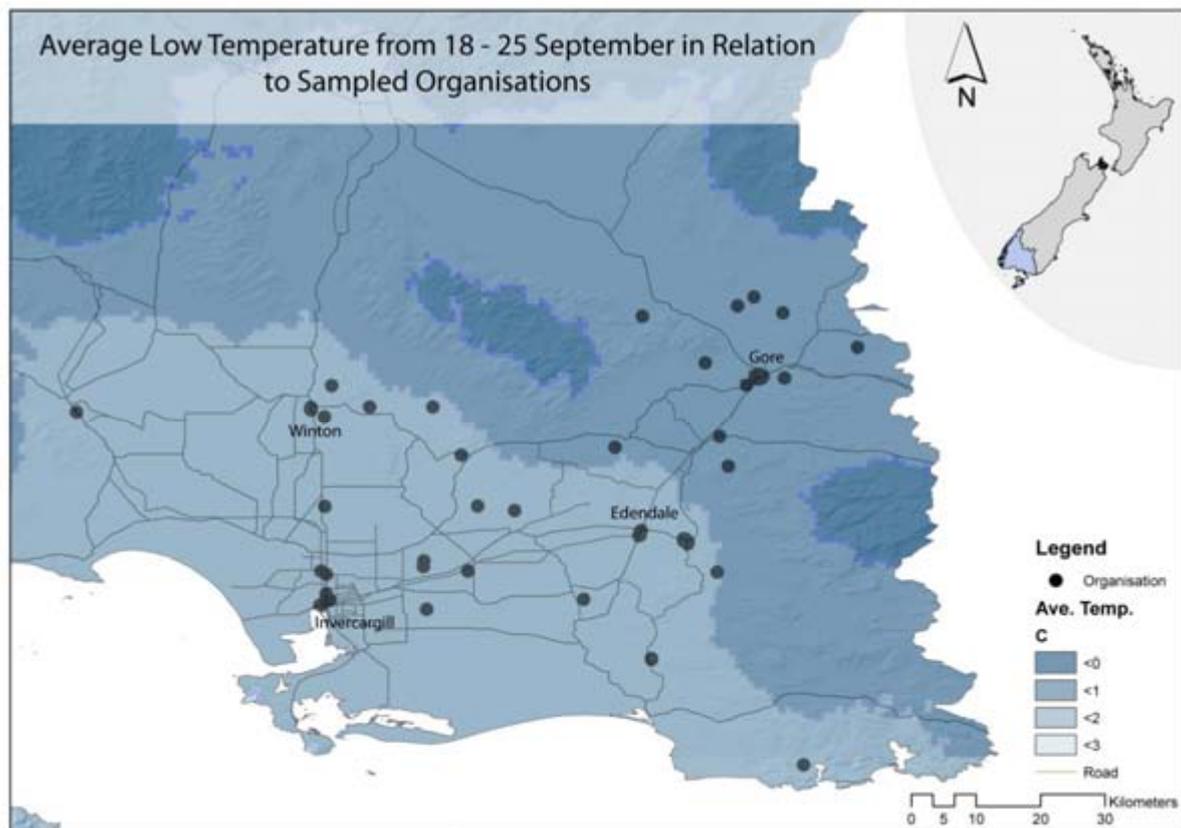


Figure 1 – Average low temperatures from September are shown with the locations of responding organisations in the Southland District sample area as of 31 May 2011. Farms were severely affected by the extended period of unseasonably cool temperatures and precipitation which created high stock losses and lowered production for the season. Temperature data was provided by CliFlo.

The impacts on farms and rural businesses from the September 2010 snowstorm have recently been collected as part of an 18 month project studying the effects of natural disasters on rural organisations in the South Island of New Zealand by University of Canterbury doctoral candidate, Zach Whitman, in collaboration with the Southland Rural Support Trust and Emergency Management Southland. Data was collected from 114 farms and rural businesses from across the affected region 6-8 months after the snowstorm. Preliminary analysis suggests that impacts to farms were highly variable, not evenly distributed, and not necessarily a direct result of snowfall. This is supported by data collected by the Southland Rural Support Trust who coordinated the delivery of welfare packages to affected farms, using this as a means to assess the damage, identify extreme cases and alleviate stress caused by the event. During the recovery phase, the Trust identified candidates for Rural Assistance Payments and worked in collaboration with Federated Farmers and other ag-support organisations to provide best-practice solutions for affected farms.

The post-impact Whitman study found while some structural damages were observed in Invercargill, the most notable case being the city's sport's stadium roof collapse, structural damage on affected farms was minimal. The most significant storm-related damage was livestock losses and on-going livestock welfare concerns. For 7 days, sub-zero temperatures and muddy, wet conditions caused large reductions in lambing rates, capital livestock numbers, and negatively impacted milk production. As a direct result of the storm, lambing losses reported by affected farms reached as high as 35 %, with ewe losses (capital stock) reaching 15 per cent in the worst reported cases. Anecdotal accounts indicated there may have been lambing losses as high as 50% in the worst affected areas. These preliminary impacts raised concerns among central and regional governmental agencies that the region would require a long recovery timeframe, with sheep and beef farming in the region already in a weakened state after several difficult years.



The most significant challenges reported by farmers (in order of frequency) were: livestock management, livestock loss, stress and cash flow. Livestock management issues were due to the late timing and the unusual direction of the cold front which rendered many of the shelterbelts ineffectual. Because of the snow coverage in paddocks, milk fever and sleepy sickness (illnesses generally related to under nutrition of post-parturient stock) was a significant challenge for many farmers. Sourcing medication was difficult during the event due to the abnormally high incidence of

occurrence across the region. While some farmers had sufficient quantities of supplemental feed, because of the longevity and unusual timing of the event many exhausted their supply and consequently additional feed was in high demand. Obtaining lamb and calf covers was also a challenge as the existing supply was quickly exhausted. Blocked or unsafe driving conditions on snow and ice covered roads meant some dairy farms that did not receive high levels of snowfall were forced to dispose of excess milk as milk tankers were unable to reach farms. As a direct result of the snowstorm, it is estimated that 8 million litres of milk were lost during the event and an average drop in production of 500,000 litres per day for the season was due to the stress on livestock. In a cruel twist, a very dry spring and summer in Southland also had a significant impact on milk production and contributed to the overall drop in productivity for the region. Significant psycho-social trauma was reported due to high lamb and capital stock losses, the extended periods of long working days, and the impact to organisational cash flow.

The single most important factor in mitigating the effects of the snowstorm was the rise in commodity prices following the event. After a series of difficult years the high commodity prices meant farms in Southland were forecasting a strong year of production, but the snowstorm event depressed already depleted livestock numbers, decreased farm productivity, and decreased expected farm revenue. However, farmers noted that the commodity price increases have erased many of the losses created by the event and local banks have identified that heavily affected farms have been able to repay debt due to the boost in organisational cash flow, despite the loss in assets.

These findings are preliminary results of the immediate impacts following the event. Participating farms and rural non-farm organisations will be sampled in the beginning of 2012 to assess longer term impacts and supply chain network impacts to local and supporting organisations. The resilience of these organisations will be quantified and analysed for impact patterns related to natural disasters, providing empirical evidence for natural disaster mitigation strategies for organisations in the short and medium timescales.

For more information, please contact: Zach Whitman at zachary.whitman@pg.canterbury.ac.nz; or Dr. Thomas Wilson at thomas.wilson@canterbury.ac.nz

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 Potter (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 Canterbury)
“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”
- 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 plausibility 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 Environment, 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

- Bell, A., Patterson, L., Dryburgh, M., Johnston, D. (in press). Empire to Nation: education for nationhood through natural disaster stories. *History of Education Review*
- 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.
- Garside, R. 2011. The benefit of experience. *Human resources*: August/September 2011.
- Johal, S., Chambers, R., Collins, S., de Terte, I., Gardner, D., Glavovic, B., Johnston L., Karanci A.N., Mooney M.F., Paton, D., Johnston, D. (2011). Potential social and psychological consequences of the Rena incident: lessons from an international perspective. *The New Zealand Medical Journal* Vol. 124 No. 1345
- Johnson, V.A. 2011. Disaster preparedness education in schools: Recommendations for New Zealand and the United States. *Ian Axford Fellowship Report*, 76p.
- Johnston, D., Becker, J., Jolly, G., Potter, S., Wilson, T., Stewart, C., and Cronin, S. 2011. Volcanic Hazards Management at Taranaki Volcano: Information Source Book, *GNS Science Report* 2011/37 108 p.
- Lavell A., JC Gaillard JC., Wisner B., Saunders W., van Niekerk D. (2011). National planning and disaster. In: Wisner B., JC Gaillard JC., Kelman I. (eds.). *The Routledge Handbook of Hazards and Disaster Risk Reduction*.
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- Lindsay, J. 2011. "Planning for Equity in Disaster Recovery: Lessons from the Christchurch Earthquakes". *Plan Canada*. Vol 51. No. 3
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- Orchiston, C. (in press) Seismic risk scenario planning and sustainable tourism management: Christchurch and the Alpine Fault zone, South Island, New Zealand. *Journal of Sustainable Tourism*, DOI:10.1080/09669582.2011.617827
- 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.
- Paton, D. & Violanti, J. (2011) *Working in High Risk Environments: Developing sustained resilience*. Springfield, Ill., Charles C. Thomas.
- Pedrosa, F. & Paton, D. (2011) *A Dimensao Humana dos Incendios Florestais. Estratégias Criativas*: Porto, Portugal.
- Pondard, N. and Daly, M., 2011. Natural hazards risk modelling: an approach providing risk management solutions for local government, *GNS Miscellaneous Series* 38. 12 p.
- Reese, R.; Becker, J. S.; Johnston, D. M.; Coomer, M. A. and Tuohy, R. 2011. Flood perceptions, preparedness and response to warnings in Kaitaia, Northland, New Zealand: Results from surveys in 2006 and 2009, *GNS Science Report* 2011/10. 90 p.
- Ronan, K. R. (2011). Education and training for emergency preparedness. In P. Bobrowsky (Ed.), *Encyclopedia of natural hazards*. Springer: Heidelberg: in press.
- 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.

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Winstanley, A.; Cronin, K.; Daly, M. 2011. Supporting communication around the Canterbury earthquakes and other risks: A learning workshop 7th April 2011, *GNS Miscellaneous Series 37*. 39 p.

Wilson, T., Stewart, C., Sword-Daniels, V., Leonard, G., Johnston, D., Cole, J., Wardman, J., Wilson, G. and Barnard, S., 2011. Volcanic ash impacts on critical infrastructure. *Physics and Chemistry of the Earth* (2011), doi: 10.1016/j.pce.2011.06.006

Upcoming Events



**2011 North Island
CDEM Conference**

Save the date

21-22 November 2011

Waipuna Hotel
58 Waipuna Road
Auckland 1060

(more information coming soon)





NEW ZEALAND ASSOCIATION FOR IMPACT ASSESSMENT (NZAlA)
Annual Conference: 24th-25th Nov 2011,
Lincoln University, Christchurch

Natural disasters: impact assessment for sustainable recovery

Following natural disasters such as the Canterbury Earthquakes in September 2010 and February 2011, impact assessment can play two particular roles. One is to identify the diverse social, economic, environmental and health impacts that follow from the more obvious and immediate physical impacts. The second is to help inform options and decisions about reconstruction activities.

After the immediate needs of damage assessment and emergency response, the approach of impact assessment encourages us in the weeks after a disaster to look beyond negative social impacts such as loss of lives, homes and livelihoods (rescue and recovery) toward stronger and more sustainable communities in the future (rebuild and adapt). It helps build strength and resilience in local communities by providing a participatory framework for their input and helps to reinforce trust between communities and layers of government, by supporting informed decision-making that recognises the wider implications of policies, plans and projects. It is vital to develop a strategic approach to understanding and managing impacts rather than falling back on a "business-as-usual" mentality. This strategic approach encourages flexibility and the prior assessment of options from a variety of perspectives and then requires the progressive evaluation of outcomes (interim and cumulative), so that decision makers and affected groups can learn and adapt as the future unfolds.

As with previous NZAlA conferences, we are inviting a variety of speakers (planners, policy makers, consultants, academics) to discuss case studies and practical approaches to assessing the impacts of natural disasters on environmental systems and on the social, economic, cultural and environmental wellbeing of people and communities. With Christchurch as a primary case study, the focus will be on how we assess impacts of all types, from ecological and physical, to social, cultural, and health, in a way that recognises the integrated nature of human and natural systems. The scope of the conference also includes the strategic assessment of reconstruction policies and plans, as well as the assessment of specific response and recovery projects, and of cumulative effects. Community and iwi perspectives are emphasised, to complement the views and approaches of national, regional, and local authorities.

The conference will be of interest to anyone involved in planning for and making decisions about urban recovery and reconstruction following a natural disaster, and environmental planning and management that recognises natural hazards and increases resilience and sustainability at the local and regional level (including government agencies, policy planners and consents officers in local and regional councils), iwi, environmental and public health staff, environmental consultants, academics, and local community groups.

Conference venue:

Lincoln University, Christchurch. The registration form and information on accommodation options will be posted on the NZAlA web site: www.nzaia.org.nz

Further information:

Prof. Richard Morgan (Chair of the organizing group)
Department of Geography, University of Otago, Dunedin. email: rkm@geography.otago.ac.nz

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/>





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>



**NZSEE
CONFERENCE
2012**

FIRST CALL FOR ABSTRACTS

ABSTRACTS DUE: 2 NOVEMBER 2011

NEW ZEALAND SOCIETY FOR EARTHQUAKE ENGINEERING TECHNICAL CONFERENCE & AGM

Implementing lessons learnt

APRIL 13 - 15, 2012 | CHRISTCHURCH



Conference Website

<http://conference.nzsee.org.nz>

Conference Location

Central Lecture Theatres
University of Canterbury
Christchurch
New Zealand
www.canterbury.ac.nz

Conference Organisation

Rajesh Dhakal
(Convener)
University of Canterbury
rajesh.dhakal@canterbury.ac.nz

Stefano Pampanin
(Co-Convener)
University of Canterbury
stefano.pampanin@canterbury.ac.nz

Website & Proceedings

Bruce Deam
University of Canterbury
bruce.deam@canterbury.ac.nz

Further Information:

Contact the secretary
secretary@nzsee.org.nz
+64 4 562 7920

Sponsored by:



The Conference

The annual NZSEE technical conference gathers researchers and practitioners in the multi-disciplinary field of Earthquake Engineering. The theme of the 2012 conference is:

"Implementing lessons learnt"

The September 2010 Darfield and the February 2011 Christchurch earthquakes have re-emphasized the need for our society to be better prepared for the consequences when (not if) large natural disasters strike. We should have learnt our lessons, but they sadly came at the expense of 182 lives and more than 20 billion dollars. How many lessons do we still need? It is time to take some actions and develop a cohesive strategy to implement what we already know to improve our society. To contribute to this long term goal, this conference aims to advance implementation of the lessons learnt from past earthquakes into practice.

Suggested Topics

- Earthquake Response and Recovery
- Strategies to Minimise Social and Economic Impacts of Earthquakes
- Improvements in Seismic Design Regulations
- Advances in Earthquake Engineering Practice
- Improving Seismic Performance of Ground and Structures
- Earthquake-Resilient Lifelines and Infrastructures

Submit Abstracts:

- Online: <http://conference.nzsee.org.nz/>

Please enter a brief abstract of no more than 250 words.

Prizes will be awarded for the following:

- Best Student Paper & Presentation
- Best Research Paper
- Best Practice Paper
- Best Poster Paper

KEY DATES:

ABSTRACT DEADLINE:
2 NOVEMBER 2011

AUTHORS NOTIFIED:
25 NOVEMBER 2011

FINAL PAPERS DUE:
13 FEBRUARY 2012



6th Australasian Natural Hazards Management Conference 2012

From warnings to effective response and recovery

Call for papers
(due 1 April 2012)

Photo: D. Beetham, GNS Science

**University of Canterbury, Christchurch, New Zealand
21–22 August 2012**

Optional Workshops 20, 23 & 24 August 2012

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 2011	Call for papers, workshops and trade displays
March 2012	Registration details on the web and printed final circular available
1 April 2012	Deadline for abstract submissions
1 May 2012	Confirmation of programme
20–24 August 2012	Conference and workshops

Contact:

ahmc@hazards-education.org
www.hazardseducation.org/conference

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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