Research Update

May 2007

Joint Centre for Disaster Research

GNS Science – Massey University, School of Psychology

Welcome to the first of the research updates from the Joint Centre for Disaster Research. This new 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.

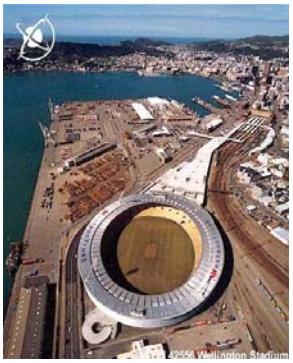
The centre undertakes multi-disciplinary applied teaching and research aimed at:

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

Photo: Research, Science and Technology Minister Steve Maharey, GNS Science chairman Con Anastasiou, Vice-Chancellor Professor Judith Kinnear and GNS Science chief executive Dr Alex Malahoff, at the signing of the Massey University and GNS Science MoU, to establish the Joint Centre for Disaster Research. Avalon, 7 August 2006.

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 (Room T27N). However, the centre will draw on staff from other Massey campuses, GNS Science, and other collaborating organisations. Visits to the centre are welcomed but by appointment only please.



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 will be organised by the centre for the summer of 2008, as part of a summer school. More details of the summer school will be available in August 2007.

New Graduate Students – linked to the Centre

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

Julia Becker (PhD student, School of Psychology)
"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)
"Effective land-use planning for natural hazard management"

Ian de Terte (PhD student, School of Psychology)
"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)
"A tri-partite governance framework for iwi development and resilience"

Rosalind Houghton (Victoria University PhD student – Department of Sociology and Social Policy)
"Domestic Violence following natural hazard events in New Zealand"

David McIvor (University of Tasmania PhD student – School of Psychology) Means-end Chain Modelling of Natural Hazard Preparedness.

Kate Pishief (University of Waikato MSc student – Department of Earth and Ocean Sciences)
"Community understanding and preparedness for tsunami risk in the eastern North Island, New Zealand."

Jen Du Bois (University of Canterbury MSc student – Department of Geological Sciences)
"Spatial and temporal variations in tsunami risk in the South Island"

Current Research Updates

HEALTH SECTOR EMERGENCY MANAGEMENT ROLES IN NEW ZEALAND

In New Zealand, health services will play a significant role in the response and recovery phases of disasters. In contrast to the routine crises that health board staff must contend with, major hazard events could pose considerable and prolonged demands on health care staff and organisations.

To facilitate data collection for her PhD study, Debra Ellis has been working closely with the Auckland District Health Board (ADHB) and Professor Douglas Paton from the University of Tasmania on a project entitled 'Health Sector Emergency Management Roles: Promoting adaptive capacity in incident response and Health Boards'. Normally, resilience research is constrained by the lack of an event that can be used to assess adaptive capacity. The national, real time, relatively long duration pandemic influenza simulation - Exercise Cruickshank (May 2007) will provide an appropriate context within which to assess adaptive capacity. **Photo: Debra Ellis, PhD student**

It is anticipated that the results of the ADHB project will enhance the aims of the PhD study which are: to investigate the personal, team and organisational factors that contribute to the adaptive capacity or resilience of the health sector in New Zealand during the response and recovery phase of disasters. Focussing on the expectations within the health sector of its roles; the competencies, procedures and systems required if the health sector is to fulfil these roles; and how these contribute to the adaptive capacity of personnel, teams and Health Boards during response and recovery to hazardous events. In addition to providing an evidence-based approach to identifying staff training and organisational needs it is the intention that together the ADHB project and PhD study will provide knowledge to inform the development of staff well-being programmes that can be used in routine contexts to meet the demands of the health sector during and following disaster events.

DOES PROVIDING HAZARD INFORMATION MAKE PEOPLE PREPARE?

Although having good information about hazards is important, a number of studies provide evidence that the dissemination of information as a sole strategy will not be a strong influence on whether people take action and become more prepared. Rather, motivating people to form intentions to prepare (and having them follow this up with actual preparation) is a complex process that comes about only as the result of interaction between a number of key factors.

There has been very little in depth study on the details of how individuals' render meaning from hazard information, and how this process feeds into these indicators (and thus affects preparedness). Julia Becker from GNS Science has started her PhD to investigate this issue.

Photo: Julia Becker

Research has shown that a number of community and individual attributes can be used as indicators of resilience. These indicators include outcome expectancy, action coping, articulation of problems, community participation, empowerment, trust, and self-efficacy.

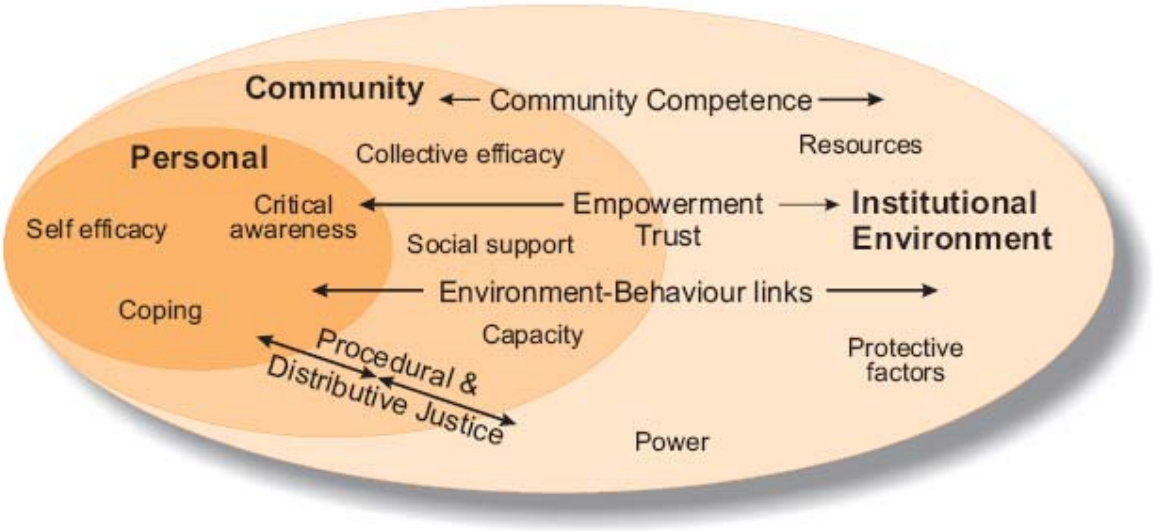


Figure 1. A model of community resilience, showing selected resources at each level and selected transactional resources (after Paton, 2006).

The ultimate aim of this research is to enhance community resilience to natural hazards. With a better comprehension of the influences and mechanisms that enhance preparation, we hope to contribute to the creation of effective policies for hazard management at central government and civil defence emergency management group level. As research to date shows that community resilience is strongly linked to overall community development, future strategies for increasing resilience to hazards should link not only to policies for emergency management, but also with relevant policies in sectors such as health, welfare, education, local government, and resource management. This will ensure that community resilience for hazards becomes part of overall sustainable community development.

For more information contact: Julia Becker (j.becker@gns.cri.nz)

EFFECTIVE WARNING SYSTEMS AND TSUNAMI

Following the 2004 Boxing Day tsunami in the Indian Ocean, New Zealand central and local government and emergency management agencies have been focussing in detail on New Zealand's tsunami resilience.

The Centre's research team has studied warning system case studies for a number of years, developing a picture of what generally does and does not help to effectively warn of natural hazards. This includes research in New Zealand, Australia, Hawaii and mainland USA, Thailand and Japan. Work has focussed on tsunami, volcanoes, flooding, and landslides. In the face of a warning, be it natural or via a 'system', the key success factor is motivating and empowering people in harms way to make correct decisions. From this research, Graham Leonard has led development of a five-step model for effective warning systems that adds planning, cooperation, education, and exercising to the detection and notification of a warning, underpinned by science and evaluation. The work and model is included in the proceedings of the UN-ISDR Third International Early Warnings Conference (EWCIII), Bonn, Germany (March, 2006).

The team was heavily involved in conducting the New Zealand national tsunami preparedness review (2005), analysing the national level of preparedness in terms of components of an effective tsunami warning system. This has lead to a Ministry of Civil Defence and Emergency Management 'Tsunami Risk Management Report' (2006), and to the establishment of a national tsunami warnings working group (2007). In parallel research projects on effective all hazard warning notification have been led by Dr Leonard with Auckland (2006) and Gisborne (2007) regions, and a draft system for tsunami evacuation mapping, planning and education has been prepared with Northland region (2006). Both of these are now being fed into the national working group.

Photo:
Graham Leonard – visiting a tsunami at-risk café on the East Coast

The national coastal community survey, conducted by the team in 2003, provided a baseline set of tsunami public awareness and preparedness indicators prior to the 2004 event. Subsequently the Centre has repeated surveys in Gisborne, Hawke's Bay, and Canterbury. Kate Pishief and Jen du Bois worked on Masters projects with the team, looking at tsunami awareness in the three locations. Kate is about to embark on a PhD with the Centre to investigate "in detail" improved tsunami resilience for New Zealand.

For more information contact Graham Leonard (g.leonard@gns.cri.nz)

EMERGENCY MANAGEMENT IN SCHOOLS

Children and their families have been identified as particularly vulnerable to the effects of hazardous events. Dr Kevin Ronan (Professor and Head of School in Psychology at Central Queensland University) in collaboration with Dr David Johnston are leading a programme of research aimed at assisting children, youth, and families more effectively cope with the effects of disasters.

A recently completed study in Napier has found that children involved in education programmes had significantly higher levels of correct knowledge of readiness and response behaviours, and reported more home-based hazards adjustments than those not involved in education initiatives. The study concluded that even simple and brief reading and discussion programmes produce tangible benefits; findings here encourage the incorporation of additional easy-to-do features.

A parallel project is underway in the Wellington region, in collaboration with local Emergency Management organisations, accessing the level of emergency management education and preparedness in schools. This study, lead by Maureen Coomer from GNS Science, will look at current emergency management teaching and exercises within schools, to assess the information and resources available, and how they are used for Emergency Management education and preparedness in schools.

For more information contact Maureen Coomer (m.coomer@gns.cri.nz)

COMMUNITY-BASED PUBLIC EDUCATION INITIATIVES

Building New Zealand communities' resilience to natural disasters requires moving away from traditional single-agency, media-based, public education campaigns to multi-agency, community-based public education initiatives.

Research currently being undertaken examines the motivation, design, collaborations, outcomes, and evaluation methodology of local and international community-based projects in an attempt to build a framework for community-based hazards education. This work is being undertaken by Dr Kirsten Finnis, a Research Officer at the JCDR, and is funded by the Earthquake Commission. Projects being evaluated in this study are sourced from a wide range of areas including fire safety, injury prevention, health promotion, and land care.

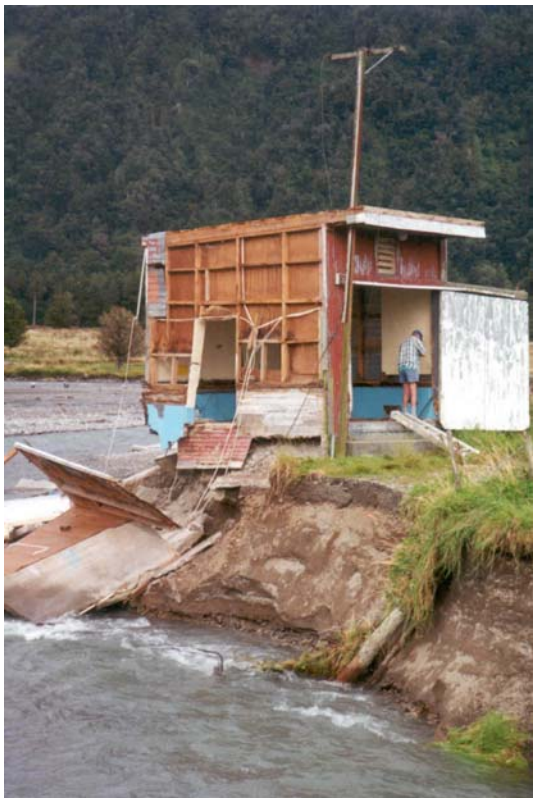
As community-based public education initiatives depend on volunteer labour, motivations behind volunteering and sustaining volunteer interest are also being explored. There are many different reasons that people choose to engage in volunteer work, some of which may be catered for in the programme design. The degree of volunteer engagement also needs to be considered to optimise initiative effectiveness. Some projects require a long-term commitment from all its volunteers, whereas others may only call on people for a day; each having different benefits and disadvantages.

Photo: Community Group in Banos, Ecuador

Evaluation is an important part of a project to ensure that the desired outcomes are met. Once again, there are many ways a project can be evaluated, depending on the way the project is carried out. A range of evaluation methods are being reviewed to get an understanding of which would be most applicable to the community-based public education initiative being developed.

The overall objective of this research is to produce a set of concepts and considerations that can be drawn from to design various hazard-related community-based public education initiatives. For more information contact Kirsten at: k.k.finnis@massey.ac.nz

THE NEED FOR IMPROVING COMMUNITIES IN THE READINESS AND RESPONSE PROCESS: LEARNING FROM THE 1999 MOUNT ADAMS LANDSLIDE



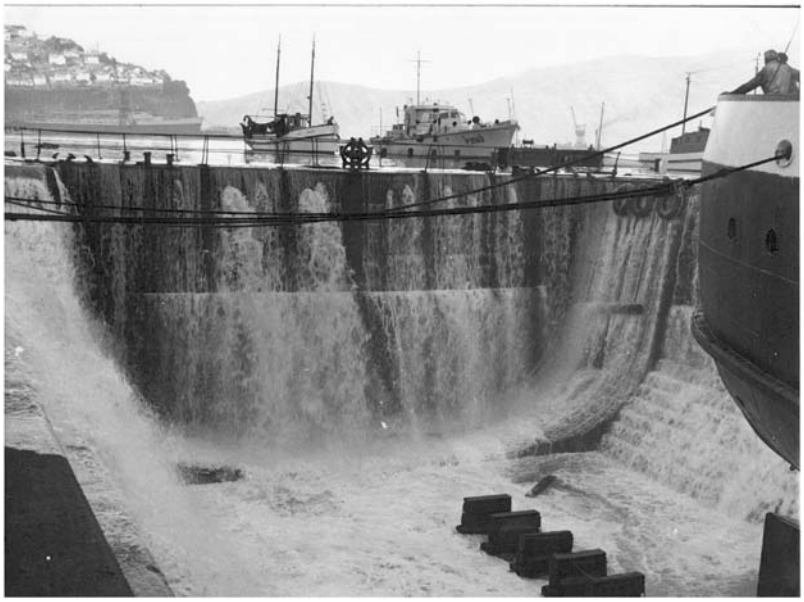
On October 6, 1999, a large rock avalanche from Mount Adams in Westland fell into the Poerua Valley. The landslide blocked the river valley, damming the Poerua River, and creating a large lake. The potential for overtopping and failure of the landslide dam presented a potential dam-break flood hazard that was assessed as posing a serious danger to Poerua Valley residents located downstream. The dam eventually failed 6 days after it was formed. Fortunately, the resulting flood was largely confined to the river channel and flood-plain areas, causing little damage and no deaths.

A recently published paper (see publication list on page 7) by Julia Becker, David Johnston and colleagues, highlights a range of issues that should be addressed in managing future landslide dam-break flood emergencies. This paper summarises the key organisational, community, and response issues arising from a break-out flood. More effective planning for the management of future landslide dam-break floods may help reduce loss of life from future events. Preparations could include setting aside more resources for assessing the hazard, and improved control and communications for managing the response. The study highlights the need for improved community involvement in the readiness and response process.

Photo:
Erosion following the 1999 Mt Adams landslide, Poerua Valley

WHEN DISASTER STRIKES - WHAT'S YOUR STORY?

In partnership with the Ministry of Culture and Heritage, and as part of preparations for Te Ara, the online encyclopaedia of New Zealand, a series of disaster stories were collected in late 2005 and 2006. A number of the stories were selected and are features of the Earth, Sea and Sky theme of Te Ara (http://www.teara.govt.nz/). A total of 38 stories were received and have been sorted by category of natural hazard, and within each category, sorted in reverse chronological order. The purpose of collating them here is to preserve the entire collection of disaster stories and to make them available as a resource. Contact Kirsten Finnis (k.k.finnis@massey.ac.nz) to obtain a pdf version of the stories.



The arrival of 1960 Tsunami in New Zealand. One of the stories featured in "When Disaster Strikes". Photo: Lyttleton Drydock.

Stewart, C. Johnston, D.M., Nathan, S. (compilers) 2007. When disaster strikes: collected disaster stories. GNS Science Report 2007/05 51p.

Upcoming Events

Australasian Natural Hazards Management Conference 2007

From warnings to effective response and recovery

Brisbane 2–3 July 2007
Optional Workshops 1 and 4 July 2007

Contact:
ahm07@hazards-education.org
www.hazards-education.org/ahm07

This conference will provide a forum to discuss the integration of hazard information into effective risk management.

Conference topics include:

- 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.

New Publications

Becker, J., Johnston, D., Paton, D., Hancox, G., Davies, T., McSaveney, M., Manville, V. 2007. Response to landslide dam failure emergencies: issues resulting from the October 1999 Mt Adams landslide and dam-break flood in the Poerua River, Westland, New Zealand. *Natural Hazards Review* 8:35-42.

Becker, J., Saunders, W. 2007. Enhancing sustainability through pre-event recovery planning. *Planning Quarterly* March 2007 p. 14-18.

Davis, M; Johnston, D.; Becker, J.; Leonard, G.; Coomer, M. and Gregg, C. 2006. Risk perceptions and preparedness: Mt Rainier 2006 community assessment tabulated results, *GNS Science Report* 2006/17 43p.

Gregg, C.E, Houghton, BF.., Paton, D., Lachman, R., Lachman, J., and Johnston, D.M. 2006. Natural Warning Signs of Tsunamis: Human sensory and response during the December 26, 2004 earthquake and tsunamis. *Spectra* 22: S671-S691.

Gregg, C.E.; Houghton, B.F.; Paton, D; Johnston, D.M., Swanson, D., Yanagi, B. A. 2007. Tsunami Warnings: Understanding in Hawai`i. *Natural Hazards* 40:71-87.

Hudson, J; Hughes, E. 2007. The role of marae and Maori communities in post-disaster recovery: a case study *GNS Science Report* 2007/15 51 p.

Johnston, D., Becker, J., Gregg, C., Houghton, B., Paton, D., Leonard, G., Garside, R. 2007. Developing warning and disaster response capacity in the tourism sector in coastal Washington, USA. *Disaster Prevention and Management* 16: 210-216.

Johnston, D.; Becker, J.; Coomer, M.; Ronan, K.; Davis, M.; and Gregg, C. 2006. Children's risk perceptions and preparedness: Mt Rainier 2006 hazard education assessment tabulated results, *GNS Science Report* 2006/16 30p.

Leonard, G.S., Johnston, D.M., Paton, D., Christianson, A., Becker, J., Keys, H. (in press). Developing an effective early warning system: ongoing warning system development, exercising and social research at Ruapehu volcano, New Zealand. *Journal of Volcanology and Geothermal Research*

Leonard, G. S.; Johnston, D. M.; Saunders W. S. A. 2007. Hazard warning systems for the Gisborne district: assessment of options, GNS Science Report 2007/04 72 p.

Paton, D & Johnston, D 2006. Disaster Resilience: An integrated approach. Springfield, Ill., Charles C. Thomas.

Paton, D., Gregg, C.E., Houghton, B.F., Lachman, R., Lachman, J., Johnston, D.M., Wongbusarakum, S. (in press). The impact of the December 26th 2004 tsunami on coastal Thai communities: Assessing adaptive capacity. *Disasters*.

Saunders, W., Forsyth, J., Johnston, D., & J. Becker 2007. Strengthening linkages between land-use planning and emergency management in New Zealand. *Australian Journal of Emergency Management* 22:36-43.

Stewart, C. Johnston, D.M., Nathan, S. (compilers) 2007. When disaster strikes: collected disaster stories. *GNS Science Report* 2007/05 51p.

Stewart, C., Johnston, D.M., Leonard, G., Horwell, C.J., Thordarsson, T., Cronin, S. 2006. Contamination of water supplies by volcanic ashfall: a literature review and simple impact model. *Journal of Volcanology and Geothermal Research* 158: 296-3006

Contact Details

David Johnston,
Joint Centre for Disaster Research
GNS Science/Massey University, PO Box 30 368,
Lower Hutt, New Zealand
Ph: + 64 4 570 1444 Fax: + 64 4 570 4679
david.johnston@gns.cri.nz