

EQS 2315

EQS 2315 (Project 06/524)

**Multi-agency community engagement during
disaster recover: Lessons from two New Zealand
earthquake events**

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New Zealand earthquake events**

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Abstract

Effective survival and recovery from disasters depends not just on physical impacts of the event but also on how the social environment supports the complex and protracted processes of recovery. Recovery from disasters can be greatly enhanced by ensuring that the existing social environment supports the recovery process. This includes an environment where multi-organisational and multidisciplinary input can be fed into the recovery process, and where effective engagement within the community takes place to determine their needs in terms of physical, social and psychological recovery. This study examines the role of multi-agency community consultation during two recent New Zealand earthquakes: the 1987 Edgecumbe and 2003 Te Anau events and explores the effectiveness of various approaches in providing information, reducing stress and anxiety, and facilitating a recovery process.

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Abstract

Effective survival and recovery from disasters depends not just on physical impacts of the event but also on how the social environment supports the complex and protracted processes of recovery. Recovery from disasters can be greatly enhanced by ensuring that the existing social environment supports the recovery process. This includes an environment where multi-organisational and multidisciplinary input can be fed into the recovery process, and where effective engagement within the community takes place to determine their needs in terms of physical, social and psychological recovery. This study examines the role of multi-agency community consultation during two recent New Zealand earthquakes: the 1987 Edgecumbe and 2003 Te Anau events and explores the effectiveness of various approaches in providing information, reducing stress and anxiety, and facilitating a recovery process.

Introduction

Effective survival and recovery from disasters depends not just on physical impacts of the event but also on how the social environment supports the complex and protracted processes of recovery (Gordon, 2004). The social environment is crucial in determining how well people adapt to stress, change and emergencies (Coles and Buckle, 2004). Traumatic events shatter essential assumptions and beliefs that communities and individuals rely on for psychological health - these structural elements of life and personality are formed in the community and need to be reconstructed by the social environment. Chronic stress during the recovery period, often over a period of years, further erodes and degrades these structures, and undermines the social communication processes by which the social structures are maintained and which deliver social support processes (Gordon, 2004).

Recovery from disasters can be greatly enhanced by ensuring that the existing social environment supports the recovery process. This includes an environment where multi-organisational and multidisciplinary input can be fed into the recovery process, and where effective engagement within the community takes place to determine community needs in terms of physical, social and psychological recovery.

Currently, there is only limited research evidence in New Zealand to support the idea that communities and individuals benefit from multi-agency community consultation during and after emergencies. However, anecdotal evidence suggests that where communities and individuals seek out information following emergencies, they receive a greater understanding of the event and emergency as a whole, which in turn leads to reduced stress levels.

A number of reports and papers describing and/or reviewing the recovery aspects of specific New Zealand events have been published (e.g. Baines, 1984 – Southland floods (1984); Bell, 1986 – Aorangi floods (1986); Davy, 1992 – Edgecumbe earthquake (1987); Luketina, 1986 – Southland floods (1984); Ward et al., press. – Ohura flooding (1998); Paton et al., 2001 – Ruapehu eruptions (1995-1996); Forsyth et al. 2004 and Becker & Richardson 2000 – Queenstown floods (1999); Walton et al., 2004 - Weather Bomb floods (2002); Saunders et al., 2005 - Manawatu-Wanganui floods (2004); and Gordon (in

press) - Matata debris-flow (2005)). Except for Paton et al. (2001), Ward et al. (in press) and Gordon (in press), little research has been specifically directed to investigating the role of community participation in the recovery process.

Paton et al. (2001) showed the heterogeneity of even small communities in a case study of the impacts of the 1995-1996 Ruapehu eruptions, and highlighted the need to manage the community recovery process in a contingent rather than a prescriptive manner. That is, community diversity (e.g., demographics, experience, community characteristics) has a significant influence on how communities confront recovery issues, their ability to use resources to meet their own needs, and their ability to use their experience to develop future resilience (Paton, 2006).

Ward et al. (press) described the community recovery process following the Ohura floods in 1998. Despite the multi-agency community consultation and development of a future mitigation plan for Ohura, the agreed actions within the plan have not progressed due to a number of interrelated factors. Their research highlights some of the inherent problems of getting communities to participate in complex decision-making in times of stress immediately after the disaster event. This theme is again highlighted in the study by Gordon (in press) who investigated the social response to the 2005 Matata debris flow and outlined the problems of community participation in complex decision-making after the debris flow event.

International research on recovery highlights the importance of not only strong local government capacity, but also of a cohesive system of public, private and volunteer groups integrated into the community (Mileti, 1999; Rubin, 2000, Norman and Coles, 2002; Dynes, 2003; Coles and Buckle, 2004; Gordon, 2004). This research has also highlighted that effective recovery planning must consider in advance issues around 1) community involvement, 2) the provision of information, and 3) procedures for making recovery decisions. Mileti (1999) describes the shift in conceptualising disaster recovery from a linear phenomenon to a more interactive process between decision makers and a variety of groups and institutions, including households, businesses, and the broader community. Underpinning this process is the need for effective communication and dialogue.

Study Objectives and Method

This study reviews the role of multi-agency community consultation during an emergency and examines the effectiveness of various approaches in providing information, reducing stress and anxiety, and facilitating a recovery process. Research focuses around lessons from two New Zealand earthquakes: the 1987 Edgecumbe and 2003 Te Anau events (Figure 1). Semi-structured interviews were undertaken between October 2006 and March 2007 with key agencies and individuals involved in the response to the two events. The analysis of the response to the 2003 earthquake also draws on the results of a community survey undertaken by the research group (Leonard et al., 2004).

1987 Edgecumbe earthquake

The 2nd March 1897 M_L 6.1 Bay of Plenty earthquake (commonly known as the 'Edgecumbe earthquake') occurred at shallow depth beneath the Rangitaiki Plains in the Bay of Plenty (Nairn & Beanland, 1989; Anderson & Webb, 1989). The main shock followed a large M_L 5.2 foreshock 7 minutes previously. The earthquake caused heavy damage in Edgecumbe, Te Teko, Kawerau, and Matata to both residential properties and industry. Luckily there was only one indirectly associated death and a small number of injuries. Total losses were estimated at around NZ\$374 million (in 1987 dollars) making this event the most costly natural disaster in New Zealand in the last 50 years (as of 2007).

DSIR Meetings

In the weeks following the earthquake, the Department of Scientific and Industrial Research (DSIR) was approached by one of the impacted industries – the Caxton Pulp and Paper Mill to brief staff on issues related to the earthquake (New Zealand Geological Survey, 1987). From this meeting and other feedback from the community it was identified that there was considerable misinformation relating to the earthquake. Consequently, a number of public meetings were organised by the DSIR, involving staff from three divisions (New Zealand Geological Survey, Geophysics Division and Physics and Engineering Laboratory). Public meetings were held on the evenings of 14 and 15

April 1987, in Edgecumbe and Kawerau respectively. About 450-550 people attended the Edgecumbe meeting and around 250-300 the Kawerau meeting.

The Edgecumbe meeting was held in the Edgecumbe College Hall and was chaired by the Mayor of Whakatane (Bob Byrne) with introductions by the chairman of the Edgecumbe Community Council and by the disaster relief coordinator, Muir Coup. The Kawerau meeting was held in the Kawerau Intermediate Hall and was chaired by the Mayor of Kawerau, Lynne Hartley (New Zealand Geological Survey, 1987).

The meeting held in Edgecumbe started with a Civil Defence-compiled video of the earthquake's effects and continued with presentations from experts. At both the Edgecumbe and Kawerau meetings, the expert presentations included information on the earthquakes themselves; regional geology, faulting and deformation; regional volcanism and relationship to the Edgecumbe Earthquake; strong ground motions and structural damage; and ground damage (New Zealand Geological Survey, 1987). The nature of the information presented varied a little depending on the inferred technical understanding of the audience. Some maps, diagrams and posters were also displayed during the presentations and used for post-meeting discussions. After the presentations the audience were able to ask formal questions of the presenters, with more informal questioning continuing afterwards. The main issues raised in both meetings are summarised in Table 1.

In addition to the public meetings, two presentations were made by DSIR to senior pupils of Edgecumbe College on 15 April. These pupils had already had some exposure to the subject matter having experienced the earthquake themselves and being involved in prior talks and a DSIR-run field trip to the Edgecumbe Fault the week before.

A number of smaller meetings discussing aspects of the earthquake were also held between DSIR and various organisations (e.g. Caxton, a meeting in Hamilton with Ministry of Works and Development, Electricorp, Petrocorp and Tonkin and Taylor Consultancy) and other individuals. A 20 minute radio interview was undertaken with Dr Euan Smith on the local radio station Radio IXX. Subsequent DSIR meetings were also held at later dates (e.g. in Whakatane on 22nd May 1997; Whakatane Beacon, 12 May 1987; 26 May 1987).

In an “Immediate Report” (New Zealand Geological Survey, 1987) produced following public meetings, Wood and Smith concluded that: 1) there was need for factual information about the earthquake, its aftershocks and related effects and 2) information was needed in various forms - talks, radio interviews, and news and magazine articles. Wood and Smith found that there was an overwhelming need by residents and agencies for factual information about the earthquake and its effects. This was backed up by anecdotal evidence in newspapers at the time, with one article suggesting that people left the meetings “...feeling better; they seemed reassured” (Whakatane Beacon, 22 April 1987). In addition, a number of people interviewed as part of this research felt that the DSIR meetings were helpful as they were also attended by elected representatives and experts (e.g. engineers) who could provide useful information and advice for individuals, thus helping them to solve their immediate problems and gain control back on their lives (Pers. Comm. Bob Byrne, former Mayor of Whakatane during the Edgecumbe earthquake, 2006).

Both the DSIR and anecdotal evidence back up the concept that multi-agency consultation and engagement with the community is a vital part of the recovery process. Such consultation helps communities understand the impacts of disaster events and assists in taking steps to move toward an effective recovery.

Psychologists’ Meetings

After the Edgecumbe Earthquake, a number of psychology-based meetings were organised by Chris Sides, a clinical psychologist from the Eastern Bay of Plenty. These meetings were held in March almost immediately after the earthquake (from the 11th to the 13th March), and in the locations of Edgecumbe, Kawerau, Whakatane, and Otakiri. Psychologist Tony Taylor from Victoria University, Wellington, and Lewis Rivers from Timaru addressed the meetings (Sides, 1989). Rivers had the personal background of being impacted by severe flooding in Timaru in 1986.

The meetings were originally organised for the benefit of teachers working in the area affected by the earthquake, but were also often attended by school children and their parents (Pers.Comm. Chris Sides, 2006). In total, five meetings were held with respect to

schools, with approximately a 30-35% teacher turnout in Whakatane, 70% in Kawerau and 100% from Edgecumbe/Te Teko (Sides, 1989). Other interested parties were also involved in speaking with the psychologists at separately-requested gatherings (e.g. social welfare agencies, clergy, etc.) (Pers. Comm. Chris Sides, 2006). Over 500 people were spoken to during the course of the meetings including 220 teachers and 70 Department of Social Welfare workers (Taylor, c. 1987).

The purpose of the meetings was:

- a. to get [peoples'] own experiences in perspective,
- b. to talk over techniques for helping others, and
- c. to enquire about the kind of personal reactions – that might arise among survivors in the near future for which they might have to prepare themselves.
 - as teachers
 - as parents
 - as CD [Civil Defence], DWS [Department of Social Welfare], Insurance.

(Taylor c. 1987; Pers.Comm. Chris Sides, 2006).

The meetings were not lectures or presentations, but open-ended question and answer sessions where people could ask anything they liked. Questions tended to be similar from meeting to meeting and included recurring themes such as evacuation, financial issues, children's reactions, the ability of children to resume learning, teachers' ability to cope and the impact on class programmes (Taylor, c. 1987). The meetings were found to be most useful immediately after the event itself, when people had the most unanswered questions (Pers. Comm. Chris Sides, 2006). Later on, other avenues for communication were set up (e.g. the welfare and information centre at Edgecumbe squash rooms) where people could also go and ask specific questions.

Six weeks after the Edgecumbe Earthquake, two surveys were undertaken to assess the psychological status of survivors. The first survey was directed at students in Form 1 (equivalent to Year 7) and above. It sought information on students' fears, and the effect of their fears on behaviour. Understandably, those who had experienced greater impacts from the earthquake said that they were more frequently afraid of earthquakes, although not a single respondent reported that it was affecting their behaviour (Sides, 1989). However, when interpreting this finding, it is important to draw a distinction between

current and future behaviour. The significance of clarification stems from the relationship between levels of earthquake fear and anxiety and a reduction in the likelihood that people will prepare for future earthquakes (Paton et al., 2005). Thus, the impact of fear may be less on immediate day-to-day behaviours, and more on less tangible preparatory behaviours, with the change in the latter significantly increasing future risk status.

The second survey was sent to teachers who were working in areas of a range of earthquake damage, from light to severe, and included the locations of Whakatane, Kawerau, Edgecumbe, and the Rangitaiki Plains. As well as asking about damage, administration issues, and social impact, the survey also asked specific questions relating to the effectiveness of the meetings held by the visiting psychologists. It queried the ability of those psychological services to meet peoples' emotional needs and enhance those peoples' ability to cope with the stresses and challenges of the disaster (Sides, 1989).

Teachers were allowed to discuss the survey, and work in groups or syndicates to fill out the forms together. In total, the views of 162 primary and secondary school teachers were reported on 88 survey forms (approximately a 50% return rate) (Sides, 1989).

Table 2 replicates the findings of the teacher survey with respect to the evaluation of talks by visiting experts. In general there was a high level of agreement by teachers across all of the locations that the talks from visiting experts provided realistic and relevant information (87%); helped get their experiences in perspective (74%); helped them understand children's needs (75%); and provided useful information in the handouts (97%). A high percentage of respondents (88%) were also glad that the meetings were arranged (Sides, 1989).

The more impacted the teachers were (i.e. if they were working in Kawerau or Edgecumbe) the more likely they were to agree that the meetings were useful. Individual comments from the samples reflect those figures with respondents from the less impacted town of Whakatane providing more comments on that fact that the meetings were "irrelevant or "too late", and Edgecumbe/ Kawerau respondents being very pleased to have an opportunity to participate in the meetings. From participating in the meetings Edgecumbe/ Kawerau respondents knew that they were not alone, that people cared, that

they were normal, that they could confirm their efforts, and that mutual support and reassurance was available (Sides, 1989).

Suggested improvements for the meetings included more participation by the audience to re-work their own experiences together using the local context. In addition, follow-up meetings or the formation of smaller self-supporting groups were also suggested as being beneficial (Sides, 1989).

The data from the survey undertaken by Sides (1989) provides firm evidence that undertaking communication and engagement with communities post-disaster provides a significant benefit to people in high impact disaster areas. This is reflected in the survey of teachers who in general agreed that the meetings held by psychologists were useful, and who were interested in continuing engagement over a longer time frame into the recovery phase.

Other Methods of Engagement

In order to determine the other methods of engagement that occurred within the community after the Edgumbe Earthquake, we conducted informal interviews with ten people to ask what they remembered with respect to recovery after the earthquake and the community involvement in the process. Those interviewed were either people who were in employed positions at the time of the earthquake and were involved in the recovery process or community members themselves. The interviews were semi-structured around a series of pre-prepared questions.

As could be expected, people's memories about the earthquake had deteriorated somewhat in the twenty years since the event, but we were still able to identify some important comments about the community involvement in recovery. All comments have been verified as much as possible by comparing with written records from immediately after the earthquake.

In general, the interviewees remembered a number of types of engagement that took place after the earthquake. These included:-

- Meetings convened by the DSIR to outline the reasons for and nature of the Edgecumbe Earthquake and likelihood of any future events. These meetings occurred immediately after the earthquake as well as many months later;
- Meetings held by psychologists, which focussed on teachers in particular. These meetings were held to outline the expected psychological impacts of the earthquake and to discuss coping mechanisms;
- Informal meetings held by more “grass-roots” community groups (for example: the weekly women’s support group held at the Presbyterian church in Edgecumbe).
- Meetings held at the welfare/information and recovery centres involving people from the civil defence unit, disaster welfare committee, other welfare agencies, housing committee, engineering committee, Māori affairs, and education sector. Many of these meetings were internal rather than ‘public meeting’ based. However, there was also some interaction between the different recovery committees and other external organisations. For example, on request, a team from the recovery centre at Edgecumbe went across to talk to a meeting of workers at the Edgecumbe dairy factory (Bay Milk Products) in a question and answer/discussion-type forum (Pers. Comm., Lorraine Brill, former Recovery Coordinator for the Edgecumbe earthquake, 2006). People were also able to come into the welfare/information and recovery centres to talk with people and organisations stationed there about welfare and recovery issues.
- Federated Farmers initiated some meetings for their members. For example, a Federated Farmers public panel discussion was held toward the end of March 1987 which was attended by representatives from the Department of Social Welfare, the Bay of Plenty Catchment Commission, Rangitaiki Drainage Board, Bay of Plenty Electric Power Board, Bay Milk Products, Whakatane District Council and Farmers Mutual Insurance (Whakatane Beacon, 20 March 1987) as well as the public.
- Some meetings were held with respect to restoration work (e.g. community meetings which discussed the rebuilding of the Edgecumbe community hall).
- After the earthquake many residents from Te Teko were evacuated to Onepu Marae where they stayed there for several days. Many found the environment a supportive and comforting place, and found it difficult to return home to their damaged homes. As well as the support and engagement which existed within the

Marae environment, there was also external engagement with other agencies (e.g. the Mayor of Whakatane, Bob Byrne, came and spoke to people staying on the Marae with respect to returning home and beginning the recovery process).

2003 Te Anau earthquake

The 21 August 2003 Mw 7.2 Fiordland earthquake was centred ~ 10km northwest of Secretary Island at a depth of ~20km (Reyners et al. 2003). It was New Zealand's largest shallow earthquake the last 35 years and was felt strongly over much of Otago and Southland. Damage was relatively minor although spectacular, with items thrown from shelves in Te Anau and the cracking of many concrete structures (Hancox et al. 2003; Forsyth & Johnston 2005). Damage to residential properties in Te Anau is reported by Leonard et al. (2004), based on responses from a community survey.

Following the earthquake, the Southland District Council held a public meeting on the evening of 28 August 2003 in the Te Anau community hall. The public response to the meeting exceeded the initial expectations of the organisers with in excess of 300 people attending. Presenters from several agencies (The Earthquake Commission (EQC), GNS Science, Department of Conservation and Civil Defence Emergency Management) discussed issues around the earthquake, including the cause, impacts and aspects of the local and central government responses (Table 2). The mayor at the time, Frana Cardno, chaired the meeting.

Many of people's concerns were primarily addressed during the talks themselves, as a variety of topics were touched upon by the speakers including:-

- The nature of plate tectonics around the world and within New Zealand.
- An explanation of earthquake magnitude and intensity.
- The origin of the Fiordland Earthquake and its relationship to subduction zone earthquakes and the Alpine Fault.
- Comparisons of the Fiordland earthquake with past earthquakes in the same area;
- Earthquake risk in Fiordland compared with other areas of New Zealand (for context).

- Insurance, including the role of EQC and private insurance companies, who and what is covered by insurance, excess issues and the claim process.
- What people can do to reduce their risk and increase their preparedness for future earthquakes at an individual and business level.

Following each of the talks, audience members were able to ask questions of the speakers. The public asked the GNS Science speaker a number of questions about the nature of earthquakes including what kind of ground motions an earthquake produces, how earthquake waves worked and what influence earthquakes had on different ground conditions. They were also interested in finding out what potential future earthquake damage might occur for buildings (both inside and out). Aftershocks were asked about several times, as was a question about whether residents would experience any bigger earthquakes.

A few questions were asked of the EQC representative about insurance issues including the role of the EQC and its relationship to private insurance, what items the EQC cover, and the length of the claim period. The representative from the Ministry for Civil Defence and Emergency Management fielded questions about current civil defence/volunteering arrangements, issues relating to the care of children and the elderly after an earthquake, and counselling opportunities.

Agencies were able to use the public meeting as an opportunity to present initial information and then direct the audience to areas where they could find further details. For example, EQC were able to give advice on what number to call to make contact, and advised the public that they would also be receiving more information about the claims process in the mail and through the assessors. The Ministry for Civil Defence and Emergency Management alerted the audience to the fact that brochures on how to prepare for disasters were available, and that they could collect these from the Te Anau public library or from their civil defence representative. GNS Science since also handed out earthquake "Felt Reports" that people could take home, fill out (describing the effects of the earthquake at their location), and send back to GNS Science.

At the end of the meeting the Mayor summed up the feelings of many attending the event by stating "I guess we all need to talk about it [the Fiordland earthquake] and it's

important that we can get together and hear people such as yourselves. I know personally after hearing what you have to say, Dr. Warwick Smith [from GNS Science], that I can relax a little, because when you read the conflicting newspaper reports, and some warning us that any day we are going to get the big one, we were sort of starting to get a bit nervous. So it was really good to hear your explanation" (Southland District Council, 2003).

In addition to anecdotal evidence, Leonard et al. (2004) notes the importance of the Te Anau public meeting in their community survey, with 33% of residents surveyed reporting they attended the meeting (Table 3). The survey also found that around 70% of those who did not attend but knew someone who attended, and overall the community rated the meeting as "very useful" (Table 4). The study found that public meetings are clearly an effective and well received a way of communicating information to those both with and without out damage/loss.

Discussion

The disaster recovery environment presents many challenges for government and non-government agencies, businesses, community groups and individuals. There are many competing demands, not only for physical resources but also for information, support and participation in the recovery process. The need for effective community participation and consultation in recovery is widely acknowledged in current New Zealand recovery planning (MCDEM, 2005; Norman, 2006). The importance of participation and consultation relates to both its role in helping people understand a recent experience and providing a collective forum for developing future community resilience.

Due to the need for multiple agencies to be involved, and the varying needs of the affected community during recovery, there is a strong case for the integration, where possible, of the efforts of a diverse range of agencies. Many of the agencies may have had only limited interaction with one another prior to the event. The multi-agency public meeting following 2003 Te Anau earthquake illustrated usefulness of a coordinated public meeting to support the community in a number of ways. Provision of scientific information about the event was identified as important by many attendees at both 1987 and 2003 meetings to help them understand what had happened and what to expect in the

future. The public meetings also allowed the emergency management and other welfare agencies an opportunity to inform the public on welfare arrangements, on other support available, and importantly, to seek feedback from the affected population. The Earthquake Commission used the meeting to explain and answer questions related to issues on insurance and the claims process.

Despite the effectiveness of the meetings none of the agencies involved had any formal connections prior to the event and arrangements were made in an ad hoc manner. Lack of prior planning for multidisciplinary and multi-agency interactions can limit the effectiveness of the response and recovery. In the early stages of the 1995 Ruapehu eruptions in New Zealand, the lack of prior arrangements was seen as a significant issue (Paton et al., 1998, 1999; Johnston et al., 2000).

The benefit of prior communication and planning amongst agencies that must cooperate in an emergency has been commonly seen in relation to the effectiveness of hazard warnings (e.g. summarised in Leonard et al., in press). This was recently highlighted during the response to a dam-break flood at Mt Adams, West Coast, New Zealand in 1999 when communication difficulties and misunderstanding between the science advisors and the emergency managers led to delays in warning at-risk communities (Becker et al. 2007). In contrast, the benefits of prior planning for multidisciplinary and multi-agency warning response were seen during the 18 March 2007 Ruapehu lahar. More than a dozen agencies were required to work together in response to an impending lahar, many with their own internal multiple boundaries of authority (Galley et al., 2004). An effective and coordinated response to the event was observed by our research team. This was achieved through clearly-documented, shared and agreed planning; cooperation and communication at regular planning meetings and especially during exercises; and education through the meetings, exercises, documentation, and media coverage. A key element was a concerted and sustained team approach across a wide range of agencies. This was aided by political, media and public interest in averting a disaster, and the relative ease of forecasting the timing of occurrence of the event as the lake filled.

Although public meetings provide an effective vehicle for engaging the community in a post-disaster situation it must also be remembered that there are several limitations to the process and other approaches need to be considered. The work undertaken by Sides

(1989) and colleagues after the Edgecumbe Earthquake highlights this fact, with teachers in the high impact areas finding the initial meetings held very useful, but having a desire to continue with the psychological support in a more participatory and engaging fashion.

The work by Ward et al. (in press) and Gordon (in press) highlights caution in making recovery decisions when a community is under stress. There are problems of getting communities to participate in complex decision-making in times of stress immediately after a disaster event. This may be alleviated by ensuring that communities are participating in similar participatory decision-making processes prior to an event, so that the process and structure is familiar to them, thus putting them in a more recognizable and less stressful environment after a disaster.

In summary, due to New Zealand's location on an active tectonic plate boundary and the associated high seismic risk it is only a matter of time before we are again impacted by a major damaging earthquake. The time to strengthen the capability and capacity to effectively recover from such an event is now. Continued research, pre-planning, and exercising between multiple agencies is essential to develop and maintain the ability to respond and recover effectively, and to minimise the social and economic impacts of the next event.

Provision of expert information can assist recovery, and bringing people together can provide a foundation for collective approaches to developing future community resilience. However, realising the full potential of this approach requires that appropriate mechanisms are in place in communities to build on the momentum generated by such events. The importance of this is supported by the finding that for members of the community not present at the meetings, social facilitation can occur as they discuss and comment on the perceived value of the process with those who attended the meetings and with other members of the community. However, the momentum gained from the public meetings maybe lost if a community engagement-based risk management process is not in place to build on community support for future mitigation (Paton, 2005).

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Tables

Table 1 Principal issues raised at three of the public meetings after the 1987 Edgecumbe earthquake and the 2003 Fiordland earthquake (14 April 1987 Edgecumbe College Hall; 15 April 1987, Kawerau Intermediate Hall; 28 August 2003, Te Anau) Modified from New Zealand Geological Survey 1987 and Earthquakes and Aftershocks, the Fiordland Earthquake, 2003).

Principal issues raised at public meetings		
14 April 1987 – Edgecumbe College Hall	15 April 1987 – Kawerau Intermediate Hall	28 August 2003 – Te Anau, Holiday Inn
<ul style="list-style-type: none"> • White Island activity¹ • Earthquake and volcanic eruption predication² • Aftershocks • Ground level changes – flooding³ • Matahina Dam performance⁴ • Affects on properties • Advice and assistance for practical recovery tasks. 	<ul style="list-style-type: none"> • White Island activity¹ • Aftershocks • Nature of earthquakes (including ground motions, wave directions and sounds) • Unmapped faults⁵ • Science response limited by funds⁶ 	<ul style="list-style-type: none"> • Nature of earthquakes (including ground motions, wave directions and sounds) • Damage – including reasons for distribution of damage and potential future damage to buildings. • Aftershocks • Nature of rock/ground conditions • Insurance, EQC and private • Counselling to address concern and stress. • Advice about appropriate care of children and the elderly following an earthquake. • Current civil defence and volunteering arrangements.
<p>Explanation Notes.</p> <ol style="list-style-type: none"> 1. People were worried that White Island was going to become active as a consequence of the earthquake, and produce a tsunami. 2. People were concerned about the link with the earthquake and activity from the Okataina Volcanic Centre. 3. People were concerned about flooding on the Rangitaiki River due to the subsidence following the earthquake. 4. There was concern about the long-term integrity of the Matahina Dam and the potential for a dam-break flood which would affect towns downstream. 5. The Edgecumbe Fault (source of the earthquake) was unmapped, and therefore unidentified before the earthquake occurred. People were concerned about movement from other unmapped faults on the Rangitaiki Plains. 6. The Edgecumbe earthquake occurred at a time of government science funding restructuring. People were concerned about funding for on-going and future science research and response. 		

**Table 2. Teacher evaluation of the talks by visiting experts (i.e. psychologists)
(Sides 1989)**

		Strongly Agree (%)	Agree (%)	Disagree (%)	Strongly Disagree (%)	Whole Area Agreeing (%)
i) The information presented was realistic & relevant	Whakatane Kawerau & Edgecumbe	0 14	66 77	0 8	33 0	87
ii) The meeting helped me get my experiences in perspective	Whakatane Kawerau & Edgecumbe	5 18	15 72	40 10	45 0	74
iii) The meeting helped me understand children's needs and how to meet them	Whakatane Kawerau & Edgecumbe	0 21	50 61	0 14	50 4	75
iv) The handouts were useful	Whakatane Kawerau & Edgecumbe	5 23	80 77	10 0	5 0	97
v) I'm glad these meetings were arranged	Whakatane Kawerau & Edgecumbe	5 24	58 70	0 4	37 1	88
TOTALS	Whakatane Kawerau & Edgecumbe Overall	3 20 16	54 72 68	11 7 8	33 1 8	57 92 84

Table 3 Attendance at the public meeting, held by Southland District Council with speakers from EQC, GNS, DoC and Civil Defence, one week after the earthquake (on Thursday, 28th August, 2003). Data from Leonard et al. 2004.

% (n=156)	All
Yes I attended the meeting	32.7
I didn't attend but yes I know someone who did attend the meeting	46.2
No, I don't know anyone who attended	21.2

Table 4 Usefulness of the public meeting (from 1 = Very useful to 5 = Not at all useful). Data from Leonard et al. 2004.

(%)	All	(of those answering the following to 'any damage/loss at all' in Question 1)	
		Yes	No
Very Useful	33.3%	30.3%	39.4%
	33.3%	33.3%	33.3%
	23.2%	25.8%	18.2%
	7.1%	7.6%	6.1%
Not at all useful	3.0%	3.0%	3.0%
N	99	66	33

Figure 1

Location map of the 1987 Edgecumbe and 2003 Fiordland earthquakes, with Modified Mercalli isoseismals.

