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# **Earthquakes and their Aftermath: Lessons Learned from the Canterbury Quakes 2010-2011**

**Lynn Campbell**

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## **Abstract**

At 4.35am on Saturday 4th September, 2010, the Canterbury district in the South Island of New Zealand experienced a 7.1 magnitude earthquake. The epicentre was located 40km west of Christchurch, near Darfield, and had a focal depth of 10km. It caused widespread damage and was felt over the whole of the South Island, with tremors felt as far away as Auckland in the North Island. No one died during this earthquake but properties were badly damaged including many heritage buildings. On December 26<sup>th</sup> there was another big aftershock, again with no loss of life. However on the 22<sup>nd</sup> of February, 2011 at 12.55pm a 6.3 magnitude aftershock centred in Heathcote near the Port of Lyttelton devastated central Christchurch and killed 185 people, mostly in the central city district in relatively modern buildings. The severity of this quake was caused by the fact that it was close to the city and its focal depth was only 5.5km. It was the shallowness of the shake that caused the widespread destruction. Directly after the earthquakes many heritage and cultural institutions were unable to be accessed, adding further stress and concern to museum professionals already coping with extreme distress over the fate of family, friends and homes. Communication networks broke down, along with power, water and sewage facilities. After assisting in the salvage of cultural and heritage collections over the next year in the Canterbury region it became evident that something was not right in the state of Canterbury heritage recovery efforts.

The research undertaken at the Getty Institute was based on these experiences. This study aimed to investigate preventive methods relating to disaster preparedness systems that could be achieved with limited time on a limited budget. The production of a disaster plan can be very time consuming and costly in funds and person power. Therefore the research investigated aspects that related to this topic by reviewing the current literature, which is prolific and excellent, and also looked further afield into other professions to see if there are any alternative processes that can be used effectively in cultural and heritage institutions. The aim was not to reinvent the wheel but use what was there already to assist in the production of a set of processes that could enable museums, art galleries, archives and libraries to produce a realistic set of procedures to use in the event of disaster.

Methods used to investigate these problems involved:

- interviewing known experts in the field, if available, and people that had experienced wide scale destruction in and around their museums in the United States. From these interviews it was hoped to glean information to pass on via workshops, lectures and possible publications in New Zealand and the Pacific region.

- researching related peer-reviewed books, journals and articles in the Getty Library and on the internet.

A template was produced relating to a set of questions for the interviewees in an attempt to produce a standard that was neutral and effective and fair for all. Before leaving for the Getty research took place in and around the Canterbury region to ascertain what did and did not work during the recovery of collections after the earthquakes. This had a significant impact on the questions and what research would take place once at the Getty.

## 1. Introduction

New Zealand is known as “the shaky isles” because earthquakes are not uncommon. However Wellington, in the North Island, was the city considered to be most at risk, not the Canterbury region. This unknown system of faults near Christchurch that generated the catastrophic 2010 and 2011 earthquakes came as a surprise to earthquake experts around the country and overseas. Although the epicentre, of the most destructive earthquake, was in Heathcote, near Lyttelton, the energy waves travelled along the hills causing most damage to areas in the central business district of Christchurch 10km away.

The amount of damage was dependent on the type of ground upon which the buildings were sitting. Soils such as sand and silt, or reclaimed land caused much more displacement due to liquefaction. Liquefaction was, in fact, a huge issue and occurred where there was water, sand and silt present. Much of Christchurch is a low lying former wetland and liquefaction was widespread across the region. Ground shaking during an earthquake can cause some soils to liquefy. These soils behave more like a liquid than a solid during an earthquake, and silt, sand and water form a mud-like material that is invasive and destructive. Once the water dissipates it leaves a fine grey dust that is abrasive and potentially dangerous to people and objects.

After being extensively involved in the salvage of heritage collections throughout the series of earthquakes it became apparent that cultural heritage institutions were not prepared. Having



Fig. 1 New Zealand.



Fig. 2 Dried liquefaction.

formed the Canterbury Disaster Salvage Team in 1987, and held annual workshops stressing the importance of preparation and awareness of possible threats to collections, it was horrifying to discover how ill-prepared the smaller cultural institutions in particular were, despite regular training. The issues related to the small amount of time or money to develop their training or plans beforehand. They were well aware that the preparation of a disaster recovery plan is the most effective method for ensuring the safety of their collections but were unable to progress with this for various reasons, principally lack of funds or personnel to do the work. Unfortunately there is no one-size-fits-all solution and coming up with a template or plan for all is not effective due to the difference in the size, location and makeup of the institutions in the region.



Fig. 3 Damage after February 22, 2011.

My research also looked at new ways of using risk assessment and disaster planning that incorporates fresh processes of managing any potential disaster. I was particularly interested in pursuing a line of research into effective processes and procedures that can be used to minimise the effects of a catastrophic disaster, not necessarily from the museum sphere alone but in areas such as engineering, project management, and emergency first responders etc, such as FEMA, to discover methods that can be applied in the cultural heritage sector. A key to the success of minimising damage in a disaster scenario seems to be preparation. My project was aimed at discovering processes to help smaller institutions in New Zealand and elsewhere in the world to



Fig. 4 Damage to wooden structures.

find cost-effective preventive measures that lessen the amount of damage in major disasters such as earthquake. As mentioned before, the components pursued at the Getty included interviewing experts in the field, and researching relevant articles using the extensive library there. By far the most interesting aspect was the interviews that were candid, sad and gave the study a human factor that was not originally envisaged.

## 2. Review of Problems

Specific problems arising after the three significant quakes in September 2010, February and June 2011 in terms of the salvaging collections included;

- *Lack of any meaningful communication and a splintering of networks both within and outside of cultural and heritage institutions.*

Only one large museum in the Canterbury region was in a position to reach out to help the wider museum community during and after the earthquakes. The Air Force Museum of New Zealand, under the directorship of Therese Angelo, was sterling in its efforts in helping other heritage agencies. The Air Force Museum also worked to find funding partners to enable part of their planned new building to be used as a temporary recovery centre for the smaller heritage organisations that had lost their buildings. This centre is now up and running and assisting many museums and cultural institutions with collection-related services.



Fig. 5 Triage session on Lyttelton Museum's collection at the Recovery Centre Air Force Museum

- *Lack of administrative power on a regional level.*  
The declaration of a national emergency by the New Zealand Government made it very hard for external cultural and heritage institutions in the rest of New Zealand and the world to gain access and to help as much as they wanted to.
- *Procedural manuals and disaster plans when they existed appear to be ignored or did not work.*

**2.1 Questions asked as part of the Getty research included:**

- Why is disaster planning so difficult for museums to achieve and keep updated?
- What sorts of procedures would make life easier for them to achieve a good level of disaster preparedness?
- Is there something wrong with the current thinking where it may be too difficult to achieve any form of disaster proficiency in museums and galleries?

**2.2 Methods used to address these problems included:**

- *Interviews* - interviewing known experts in the field and people that have experienced destruction in and around their museums in the United States and from this, gleaning information to pass on via workshops and lectures.
- *Research* - researching related peer-reviewed articles in the Getty Library and on the internet.

The interviews revolved around four topics; storage, display, people and buildings. Questions were asked regarding what worked and what did not in relation to these topics. Aligned to this I read and attempted to digest as much as possible in the three month period. The interviews developed into a riveting and intriguing series of related experiences that in many cases mirrored each other and yet were completely different. Leading to the inevitable, and obvious you might say, conclusion that it is the culture and the actions of the society in which the museums exist that decide how effective recovery and salvage can be in the event of a catastrophic event. Despite any preventive measures if the will is not there at the national and senior levels then it appears any efforts on successful reconstruction will be limited.

**3. Research to date**

After three months studying at the Getty it was obvious that some very good disaster preparedness programmes are being undertaken, particularly in California. After sitting in on a workshop at the Gene Autry Museum run by Julie Page of the California Preservation Program (CPP) and Western States & Territories Preservation Assistance Service (WESTPAS), it was evident that disaster preparedness was considered to be a vital component of collection management in heritage institutions.

CPP is funded by the California State Library ([calpreservation.org](http://calpreservation.org)) through the Institute of Museum and Library Services and WESTPAS is funded by National Endowment for the Humanities to serve 14 Western states and Territories ([westpas.org](http://westpas.org)). Another excellent initiative has been instigated by the Foundation of the American Institute for Conservation Historic and Artistic Works (FAIC) - AIC - CERT. AIC-CERT (American Institute for Conservation Collections Emergency Response Team) and was set up in 2007 to produce an effective disaster salvage response for cultural institutions during emergencies and disasters. This is achieved by coordinating recovery of collections by liaising with first responders, state agencies and the public. FAIC also received funding from the Institute for Museum and Library Services to train museum staff in disaster recovery of collections producing very effective workshops for this

purpose. These systems and processes that were being put in place that would definitely help cultural and heritage organisations deal with future disasters.

The interviews with professionals from the Getty Institute, Los Angeles, San Francisco and New Orleans showed how so much can be learnt from those that have experienced catastrophic disaster. There were many mixed thoughts on the use of disaster plans from the positive to the extremely negative, but almost all felt that prevention of damage by the use of safe storage and display was essential. Training in disaster preparedness was also considered vital for all cultural and heritage professionals. Many also felt that should disaster plans be produced then all staff of the organisation should be included in its preparation and not a small minority. For example one cultural heritage organisation in Canterbury produced a visually pleasing facilities plan for itself but failed to add anything relating to how the public would be dealt with by the staff in the event of a city-wide emergency. It was only when it was publically disseminated that the education department of the same institution noted the omission. If the education department had been involved from the outset this would not have occurred.



Fig. 6 Fire and Flood Workshop run by the Canterbury Disaster Team.

Training in disaster prevention can never compare to an actual experience of one. However it will make the participants aware of issues, problems and how to proceed should a similar event affect their collections. There needs to be a will from senior managers to allow their staff to train in these types of workshops and to actively encourage the production of relevant materials, communication links and systems that will safeguard their staff, public and collections.

#### 4. Conclusion

For cultural heritage professionals in New Zealand, this event has proved to be a salutary lesson on what to expect should the very worst happen. Future disaster planning should take into account not just the normal disaster scenarios but also ones that were not immediately apparent, such as a museum being taken over by Civil Defence teams and government granting extended powers that have a severe impact on the safety of cultural heritage collections. In the future it is suggested that there should be some consideration of a network between heritage and cultural institutions to share and work together to protect each other in the event of disaster. DISACT in Canberra, Australia is a very good example of how museums, galleries, libraries and archives are coming together to help save their joint heritage from damage in the event of disaster. They have produced a letter of intent to help each other. As quoted from the DISACT website:

*DISACT ('Disaster ACT') was established by cultural and scientific collecting institutions in Canberra to improve disaster preparedness and provide local mutual assistance in the event of emergencies affecting public collections. DISACT sponsors disaster recovery training, conducts quarterly DISACT Network meetings and has a website resource. Participants include the Australian War Memorial, National Archives of Australia, National Gallery of Australia, National Library of Australia, National Museum of Australia, Screen Sound Australia and a range of other agencies. (<http://www.cpbr.gov.au/disact/>)*

## 5. Acknowledgements

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