

MĀORI AND THE CHRISTCHURCH EARTHQUAKES

The interplay between Indigenous endurance and resilience through urban disaster

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Abstract

The disastrous earthquakes that struck Christchurch in 2010 and 2011 seriously impacted on the individual and collective lives of Māori residents. This paper continues earlier, predominantly qualitative research on the immediate effects on Māori by presenting an analysis of a survey carried out 18 months after the most destructive event, on 22 February 2011. Using a set-theoretic approach, pathways to Māori resilience are identified, emphasising the combination of whānau connectivity and high incomes in those who have maintained or increased their wellbeing post-disaster. However, the results show that if resilience is used to describe a “bounce back” in wellbeing, Māori are primarily *enduring* the post-disaster environment. This endurance phase is a precursor to any resilience and will be of much longer duration than first thought. With continued uncertainty in the city and wider New Zealand economy, this endurance may not necessarily lead to a more secure environment for Māori in the city.

Keywords

resilience, disasters, disaster risk reduction, Indigenous communities, set-theory

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Introduction

Indigenous peoples are increasingly “city bound”. In Aotearoa New Zealand, 84% of Māori live in towns and cities (Ministry of Social Development, 2010): one in four live in Auckland. In North America, over half of First Nations/Aboriginal peoples reside in urban areas (United Nations Human Settlements Programme, 2010); in Latin America the figure is around 40% (Del Popolo, Oyarce, Ribotta, & Jorge, 2007); and about 30% of Australian Aborigines live in cities and another 40% in towns (United Nations Housing Rights Programme, 2007, p. 58). While the picture in Africa and Asia is not as clear, what is accepted is that Indigenous peoples are migrating to urban areas at an increasing rate.

Contemporary urban life exposes residents to new and emerging risks—pollution, crime, traffic, terrorism, fire—and some, such as flooding and drought, which have historically been more associated with rural communities. For Māori in Christchurch a series of traumatic earthquakes, beginning 4 September 2010, shook their faith in the built environment and its geophysical and political foundations. The eastern suburbs, home to many of the city’s Māori, were particularly affected and the recovery period will be of many years’ duration and involve highly contested decisions. For the local iwi authority, Te Rūnanga o Ngāi Tahu, a formal stakeholder role in the rebuild has been enabled through the Canterbury Earthquake Recovery Act of 2011 (Rae, 2013). But for the 60% of Māori who do not identify as Ngāi Tahu, further marginalisation and ongoing emotional and financial tolls are a real risk.

As settlers of a geologically active country, both Māori and Pākehā were regularly reminded of earthquake and volcanic risk (Goff & McFadgen, 2003). These and other natural hazards such as flooding (Hudson & Hughes, 2007) and cyclones (notably Cyclone Bola in 1998; see Te Puni Kōkiri, 1992) have revealed important roles for Māori institutions.

This article describes the experiences of Māori through the response and early recovery stages of this major *urban* disaster. Examining how Māori have endured and (some) have rebounded under extreme conditions will give us a better understanding of how resilience is enabled within the cultures of Indigenous peoples in the complex and dynamic environments of the world’s cities.

Resilience, Indigenous resilience, and resilience to disasters

Boulton (2012) notes that “the terms resilience/resilient are not easily found in New Zealand literature, nor are these terms commonly used to describe Māori” (p. 6). In Christchurch we have the inverse of this, with “resilience” in common usage for describing individuals and communities post-disaster but too often incorporated uncritically into debate. Resilience is a nuanced concept used across many disciplines. Important contributions have come from psychology, with an emphasis on individual psycho-social strength (Bonanno, Galea, Bucciarelli, & Vlahov, 2007); engineering and the ability of systems to absorb shocks before needing to be altered in some way (Thomas, Mora, Murray, Walton, & Dravitzki, 2011); and ecology and the ability of ecosystems to stabilise following disturbance (Adger, 2000). Shocks and disturbances can *build* resilience provided there is “system memory”, in both ecological and social systems. Whereas ecological memory is contained within the composition and functioning of species assemblages (Berkes & Folke, 2002), social memory is the “long-term communal understanding” that captures the experience of past changes, achieved through community debate and decision-making processes that enable appropriate strategies for ongoing change (Berkes, Colding, & Folke, 2003).

The implication of any resilience model is that mitigation of even large disasters is possible

through reducing vulnerability prior to the event (for example, better planning, sturdier construction, more training and education). In Figure 1, magnitude and temporal contexts are integrated to indicate policy foci (see McDaniels, Chang, Cole, Mikawoz, & Longstaff, 2008; Ministry for Civil Defence and Environmental Management, 2008). In the post-event context, more funding, better administrative coordination and stronger political leadership could enable a better response and quicker recovery. The stark reality of an event forces us into response and recovery stages no matter how much we might wish to be back in the reduction and readiness phases.

Acknowledgement of pre-disaster inequities (such as racism) and the considered inclusion of spiritual metaphors can help ethnic minorities deal with post-disaster trauma (McCoombs, 2010). Indigenous scholars argue that Indigenous spirituality has a key role in averting and healing various pathologies, often linking Indigenous resilience to relationships with land (Gladue & Lund, 2008; Panelli & Tipa, 2008; Troster, 2002). Fleming and Ledogar (2008) take the position of Indigenous resilience being a “positive adaption despite adversity”:

Resilience is the natural human capacity to navigate life well. It is something every human being has—wisdom, commonsense. It means

coming to know how you think, who you are spiritually, where you come from, and where you are going. (p. 7)

However, this nascent field lacks robust theory or a unified conceptual basis—a point echoed by Andersson (2008), who accepts there is no integrated Indigenous view of resilience “as different sources reflect varying degrees of integration with the Western view and different degrees of displacement from the land” p. 3. Tory (1979) notes that Spanish colonisation in Peru limited Indigenous population mobility, severely undermining Indigenous hazard management, and Oliver-Smith (1994) argues that Spanish influences on building materials, urban design and settlement patterns contributed to the vulnerability of Indigenous communities in the 1970 Peruvian earthquake disaster. The literature shows evidence of syncretisation, for want of a better term, between Indigenous knowledge and so-called Western science. For example, Davis (1986) notes the importance of the Russian Orthodox Church among Pacific Eskimos after the 1964 Alaskan earthquake in the subsequent rebuilding of heavily damaged villages.

Arguably, the villages Davis was observing are far smaller than what would be considered urban. Of more interest perhaps is the impact on political and social arenas post-disaster. After

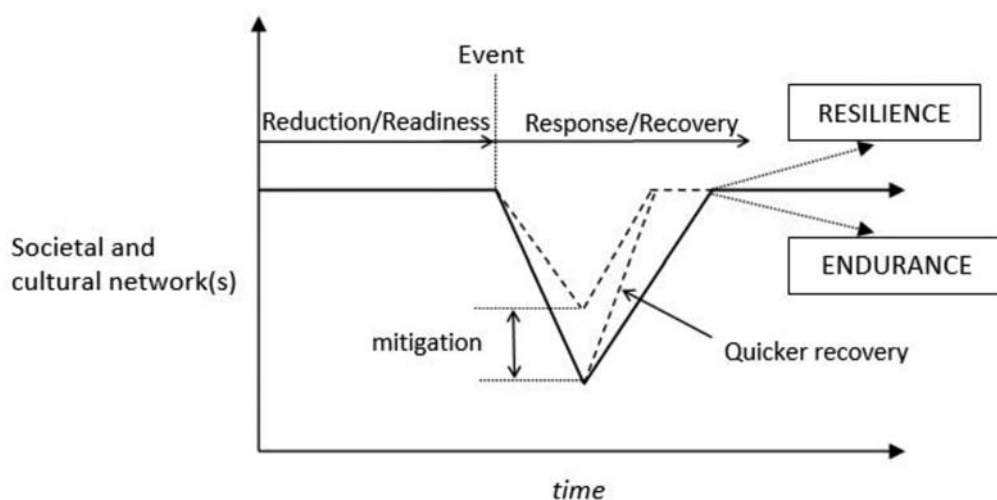


FIGURE 1 Disaster resilience model

the 1970 Peruvian earthquake, reconstruction was found to “reinforce traditional social hierarchies” (Oliver-Smith & Goldman, 1988) but significant changes were noted for mestizos and Indian social hierarchies (Bode, 1977). Disasters have accelerated the climate of mobilisation and protest and added new demands for accountability (Robinson, Hernandez, Mata, & Bernard, 1986) but this is not evident within Māori politics from the Christchurch disaster although the formalisation through legislation (that is, the Canterbury Earthquake Recovery Act 2011; see Rae, 2013) of Te Rūnanga o Ngāi Tahu as a stakeholder in the recovery is a significant development in Indigenous planning history.

While all these areas are of interest to Indigenous peoples, the theory and practice of *resistance* is often at the heart of Indigenous research (Penehira, 2011) and this adds an activist angle to how resilience is conceived. For a theory of resilience to be relevant to Indigenous communities it must offer “a more nuanced way of looking at precisely which concepts have been continued ... and how” (Lawson, 2006, p. 8). This challenge frames the concept of cultural resilience, often in tandem with ecological contexts of sustainability, and allows, indeed demands, that Indigenous resilience encompass those aspects of individual and community resistance to loss and marginalisation so that the restoration of holistic wellbeing as an Indigenous person or collective is enabled.

Disasters occur when natural hazards meet social vulnerability, with both damage and the capacity to respond varying according to membership of societal subsets including class, gender, ethnicity and location (Barnett, 2000; Cutter, 2010; Ellemor, 2005). Two broad approaches can be identified. On the one hand there are systematic investigations of individual disasters following the geophysical or technological triggering of the event, as occurred following Hurricane Katrina or the 2011 earthquake and tsunami in north-eastern Japan. On the other hand, disasters can be

conceptualised as being generated from *within* social systems and requiring technical and social responses (Jasanoff, 2010). Historically Māori have drawn on traditional institutions such as whānau, marae, hapū and iwi in past crises and this history forms an important backdrop to understanding the Māori response. But our past is just a starting point. Future Indigenous occupancy of urban spaces with recurring disaster events that will dislocate and damage built environments requires the reappraisal of how we conceive, identify, analyse, communicate and enable resilience.

For Indigenous communities, ancient knowledge of environmental hazards has enabled a certain resilience to recurring disasters such as floods, drought, tsunamis and earthquakes (Shaw, Sharma, & Takeuchi, 2009). These collectives are increasingly urban and disconnected from the lands in which their resilience memories are embedded. What knowledge and assets do they have or need in dealing with 21st century urban disasters?

Approach: Fuzzy-set qualitative comparative analysis as a set-theoretic approach to resilience

This paper draws on narratives of personal, professional and institutional experiences of Māori through the disaster (Lambert, Wilkie, & Mark-Shadbolt, 2014) and an e-mail survey carried out 17–18 months after the February event. These sources provide rich data that help counter the paucity of robust statistical data on Māori, and support a set-theoretic approach to understanding relations between selected social phenomena (such as family, employment, wellbeing) as set relations.

Qualitative comparative analysis (QCA) is perhaps the most widely known of the formalised set-theoretic approaches (Rihoux & Ragin, 2009). QCA and its variants accept that causation will be configurational (that is, more than one factor will be involved) and,

as a consequence, more than one pathway to the outcome may exist. The examination of different configurations of causal factors in producing outcomes enables the interpretation of set relations in terms of sufficiency and necessity with results expressed as equations that can be minimised through Boolean analysis. Central to this configurational thinking is property space, an analytic device conceptualising cases as combinations of qualitative attributes. Property space is analogous to the use of coordinates to map a location in spatial terms. However, many social phenomena vary by degrees as cases can variously belong to a population or set, interpreted by this “crisp” method as either the presence or the absence of selected variables expressed within causal configurations.

In contrast to crisp dichotomies, fuzzy-set QCA (fsQCA) acknowledges a continuum of belonging and allows for the scaling of membership in sets identified by the researcher, “fuzzy” referring to the lack of firm distinction between concepts and the destabilising of assumptions of homogeneity behind the structuring of populations, case studies and possible causal conditions (Ragin, 2000). As with QCA, results are interpreted as the presence or absence of variables within causal configurations, but in fsQCA, cases are calibrated along a continuum of set membership, for example, from being “fully in” the set of Māori in large Christchurch whānau, to “fully out” by having no whānau, or some category between the two poles.

Space precludes a full description of the operationalising of fsQCA (interested readers are directed to the website for Comparative Methods for Systematic Cross-case Analysis <http://www.compass.org/about.htm>). In brief, the steps involved are:

- Specify the relevant domains for assessment.
- Clarify the concepts being investigated, and designate relevant degrees of fuzziness.
- Identify empirical evidence that allows the calibration of membership scores, and

decide what type of fuzzy set is best for each concept.

- Translate empirical evidence into scores.

Our survey was distributed through networks that grew out of our initial research. Five key variables were ultimately chosen for fsQCA, each of which has some basis in the literature as well as appearing in preliminary analyses as key to how Māori were responding to the disaster. The variables are whānau in Christchurch (a key organising structure for Indigenous communities; see Cunningham, Stevenson, & Tassell, 2005); damage to house and contents; personal impacts (Cutter, Mitchell, & Scott, 2000); personal income (Vatsa, 2004); and whether respondents moved or stayed post-disaster (Esnard & Sapat, 2014). Māori cultural factors were collected in the survey but interestingly were not found to have a significant role in resilience and were excluded.

Some of these variables were treated as “crisp” either/or variables; for example, respondents either left the city or stayed. Others were subject to the fsQCA technique of varying membership from 0 (fully out of the set) to 1.0 (fully in). For example, working inductively through our data on whānau, the potential for connecting with whānau in Christchurch might be more insightful than the simplistic measure of whānau size as the finer distinctions between numbers of family members in the city may not be relevant to the concept of whānau. A simple six-value fuzzy-set logic for membership in whānau is shown in Table 1.

Software simplifies calculations and automates Boolean minimisation to the presence or absence of variables, producing configurations of necessary and/or sufficient conditions for selected outcomes. While software has simplified both QCA and fsQCA, considerable effort is required on the part of researchers in an approach that is inductive as the data come out of the real experiences of Māori living through a disaster.

TABLE 1 Six-value fuzzy-set scoring for Christchurch whānau connections

Raw whānau numbers	Frequency	Fuzzy score
0	1	0
1–2	3	0.2
3–5	6	0.4
6–10	2	0.6
11–20	5	0.8
Over 20	6	1

The effects on Māori of the Christchurch earthquakes

Although Christchurch is not known for a high Māori population, on a national basis it contains a relatively large urban population of Māori, including the majority of Māori in the Canterbury region and across the South Island. Christchurch is the largest city in the South Island of New Zealand and the second largest city in the country, with a population of around 350,000. The city experienced a series of earthquakes, beginning on 4 September 2010 with a magnitude (M) 7.1 event that resulted in no deaths. A smaller (M6.3) but shallower and therefore more damaging earthquake on 22 February 2011 killed 185 people and caused widespread destruction in the CBD as well as significant damage to thousands of residential and community properties in some areas. Between the major quakes were more than 12,000 aftershocks (over 30 were stronger than M5.0), constituting a unique “seismic event” that has serious repercussions for New Zealand socio-economic policies.

While the disaster has led to a plethora of reports, Māori often are not directly represented but are present by proxy, either geographically, with the eastern suburbs acknowledged as home for many Māori (see, for example, Yanicki, 2013), or socio-economically, with Māori being overrepresented within poorer communities. Thornly, Ball, Signal, Lawson-Te Aho, and Rawson (2013) accept community resilience as a “process, not an outcome” but

acknowledge the “various elements” are “inter-connected and difficult to separate”. Resilience was framed by pre-existing community connectedness and community infrastructure; community participation in disaster response and recovery; community engagement in official decision-making; and external support from organisations and authorities outside the community.

A large survey of wellbeing undertaken by the Canterbury Earthquake Recovery Authority [CERA] (2012) shows an alarming pattern of Māori suffering some of the worst effects on wellbeing of the 2011–12 earthquakes. For example, of those less likely to rate their overall quality of life positively, 56% were Māori respondents. Māori as a group featured across most of the indicators (stress, damaged or poor quality housing, loss of access to the natural environment, uncertainty, transport pressures, relationship problems, potential or actual loss of income). This poor showing worsened in the third survey (CERA, 2013), with 63% of Māori less likely to rate their overall quality of life positively, a figure repeated in the fourth wave of the survey (CERA, 2014).

Previous research by Māori researchers at Lincoln University has contributed to understanding of the initial and subsequent impacts of the earthquakes on Māori. Anderson (2012) produced a report from a summer internship at Lincoln University that summarised the Māori response to the disaster, based on interviews with individuals and managers who had significant roles through the disaster, and described

their personal and institutional challenges and opportunities. Lambert, Mark-Shadbolt, Ataria, and Black (2012) draw on interviews conducted in the weeks after the most destructive earthquake of 22 February 2011. Primary concerns were for the safety of children, wider whānau, colleagues and neighbours. Families quickly clustered together for security, staying “marae style”—mattresses laid out on floors in the most suitable housing—often hosted by family outside of the most damaged areas. Some left the city immediately, others later, but many fled for a period of time before returning, often relying on traditional family connections and migrating “back home” (for many Māori this meant the North Island). Others had no intention of returning in the short or medium term, including some who have emigrated to Australia (Lambert, 2014).

Māori organisations such as the Māori wardens and several North Island iwi responded very quickly, helping to undertake rapid assessments of public health and other needs. The Māori wardens were generally self-sufficient, sometimes using their own whānau networks for accommodation, an important tactic given the severe pressure many locals were under. The Māori Women’s Welfare League became a key agency for other Māori health organisations for logistical and supply support from the Canterbury District Health Board (Anderson, 2012). All marae in a position to host in the Canterbury region were opened and supported with essential supplies, including resourcing by Ngāi Tahu (Paton, Johnston, Mamula-Seadon, & Kenney, 2014).

Māori schools operated as important community nodes, an extension of their pre-disaster role but a role made more important by the collapse of so many other support networks. The insights that staff had of whānau circumstances were vital to ascertaining needs and the whānau framework for schooling Māori and non-Māori students enabled a reassuring network of trust for parents. Many residents mentioned the feeling of community that quickly grew in some

of the most damaged areas. In the badly hit eastern suburbs, Māori wardens and other first responders continued door knocking, checking on residents’ wellbeing, giving emotional support, providing information and delivering food and water (Dixon, 2011; Te Puni Kōkiri, 2011). The “new normal” post-quake situation saw homes rearranged to enable quick evacuation and many people avoided tall buildings, especially shopping malls.

As the fourth CERA Wellbeing Survey (2014) shows, for many Christchurch residents, life in the city three years after the February event remains stressful, with Māori disproportionately represented among those negatively affected. Before examining particular cultural approaches identified in how Māori responded to the earthquakes, we should ask what—if any—are the differences between Māori and Pākehā post-disaster? Perhaps the most robust data are school enrolments, shown for Christchurch by ethnicity for ages 6 to 14 in Figure 2.

Survey results show similar impacts experienced by Māori and Pākehā respondents, some of which are compared in Figure 3. Māori respondents were more likely to have lost hours and/or employment and suffered poor health.

These data are, on their own, not especially useful. With such a small sample size, and considering the size of the disaster, all we have is a broad indication of how a small subset of Māori got on in comparison to an equally small subset of non-Māori. However, we do have a wide array of data to integrate and this is done below to identify key configurations of variables that can be interpreted as leading to resilience or a lack of resilience.

Indigenous resilience: Who is rebounding?

The earthquake disaster in Canterbury provides a valuable opportunity for empirical studies of Indigenous disaster resilience. A number of

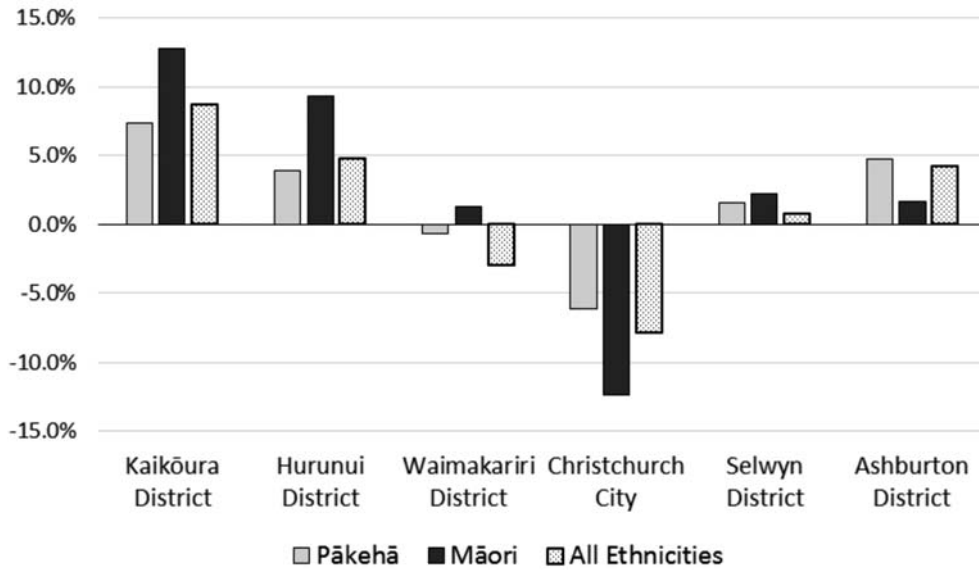


FIGURE 2 Change in school rolls 2010-11 (Years 5-10) (Newell 2012)

Māori participants ($n = 23$) involved in projects mentioned earlier took part in a confidential e-mail survey in July/August 2012. They were asked over 50 questions on their experiences, living and working circumstances, family, emergency preparation and so on (Lambert, 2012). Respondents recorded their wellbeing across four contexts (economic, social, environmental and cultural) before 22 February 2011, and then at the time of the survey (July-August 2012) according to six scores: very strong, strong, good, average, weak and very weak (Table 2). We can use these data to determine resilience by calculating the difference in wellbeing, pre- and post-disaster, ranked in the final

column from biggest increase to biggest decline. To what extent has wellbeing changed since the disaster, and is this a good proxy for resilience?

Most participants show a decline in each area of wellbeing and—recalling our definition for this research of resilience as the ability to absorb and then *rebound* from a shock or disturbance—are here interpreted as lacking resilience.

But is this finding premature? Can it be reinterpreted? It can take many years for a community to bounce back from the disruption and dislocation of disaster (World Bank & United Nations, 2010), and results show that not all participants in this research have

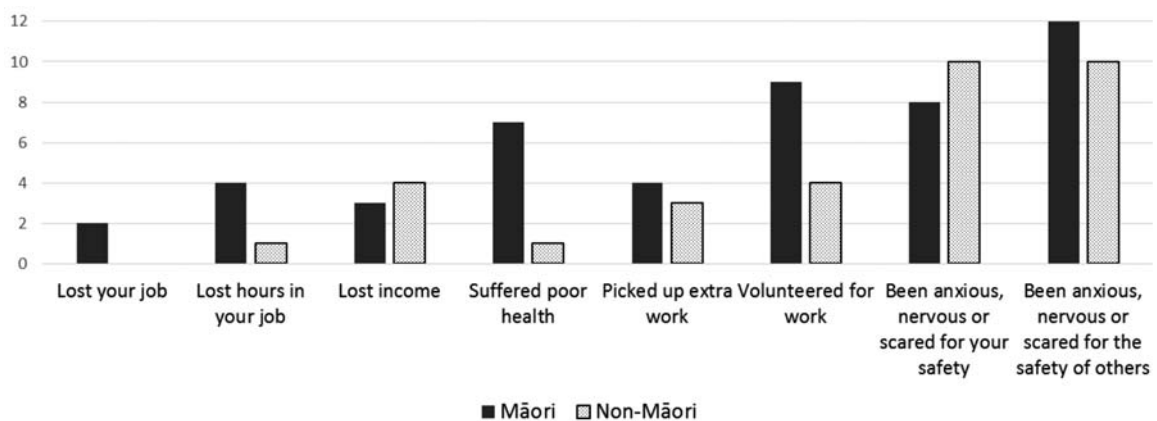


FIGURE 3 Impacts from earthquakes on participants (Māori and non-Māori)

TABLE 2 Wellbeing and derived resilience scores for Māori survey respondents

Case	econ1	soc1	envt1	cult1	econ2	soc2	envt2	cult2	wb1	wb2	Res
19	1	0.2	0.2	0.6	0.8	1	1	0.6	2	3.4	1.4
20	0.8	0.2	0.4	0.4	1	0.6	0.6	0.4	1.4	2.6	1.2
23	0.8	1	1	1	1	1	1	1	3.8	4	0.2
6	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	3.2	3.2	0
8	1	1	0.8	1	1	1	0.8	1	3.8	3.8	0
21	0.6	0.8	0.8	0.6	0.6	0.8	0.8	0.6	2.8	2.8	0
2	1	1	1	0.6	1	0.8	1	0.6	3.6	3.4	-0.2
11	0.6	0.4	0.8	0.4	0.8	0.4	0.4	0.4	2.2	2	-0.2
13	0.6	0.8	0.8	0.4	0.8	0.6	0.4	0.6	2.6	2.4	-0.2
16	0.8	0.6	0.4	1	0.6	0.4	0.6	1	2.8	2.6	-0.2
10	0.8	0.8	0.8	0.8	0.8	0.6	0.6	0.8	3.2	2.8	-0.4
15	0.6	0.6	0.6	0.6	0.4	0.4	0.6	0.6	2.4	2	-0.4
14	0.8	0.8	0.6	0.6	0.6	0.6	0.4	0.4	2.8	2	-0.8
18	0.8	0.8	0.8	0.8	0.8	0.4	0.8	0.4	3.2	2.4	-0.8
12	0.6	0.6	0.6	0.6	0.6	0.2	0.4	0.2	2.4	1.4	-1
17	1	0.8	0.8	1	0.6	0.6	0.8	0.6	3.6	2.6	-1
22	0.8	0.8	0.6	0.8	0.6	0.6	0.4	0.4	3	2	-1
1	1	1	1	1	0.6	0.4	0.6	0.8	4	2.4	-1.6
9	0.8	0.8	0.8	0.8	0.4	0.2	0.4	0.4	3.2	1.4	-1.8
3	0.8	1	1	1	0.6	0.8	0.2	0.2	3.8	1.8	-2
4	0.8	0.8	0.8	0.8	0.6	0.2	0.2	0.2	3.2	1.2	-2

NB: econ1, soc1, envt1 and cult1 = economic, social, environmental and cultural wellbeing before 22 February 2011, respectively; econ2 etc. = wellbeing Jul–Aug 2012; wb1 and wb2 = overall wellbeing pre- and post-disaster. Res = resilience.

suffered an overall decline in their wellbeing. Three cases (6, 8 and 21) have no decline and can be said to have absorbed the impacts of the disaster; another three cases (19, 20 and 23) have actually *improved* their wellbeing. Others have minimal declines: just -0.2 in cases 2, 11, 13, and 16; -0.4 in cases 10 and 15. These cases could be interpreted as having absorbed the worst effects of the disaster, and therefore exhibiting some degree of resilience. We can incorporate this variance in wellbeing through our different cut-off points, using fsQCA for a more inclusive interpretation of resilience through the use of fuzzy sets by drawing qualitative anchor points to delineate the degree to which a case is a member of the set of resilient Māori. The scoring calibrations are depicted in Table 3.

Several cases recorded an increase in their overall wellbeing. Those cases scoring over 1.0 are considered “fully in” the set of observed resilience; cases with a decline of -1.5 or more are considered “fully out” of the set. The cross-over point is calibrated at -0.5, meaning that cases above this are “more in than out” and cases below being “more out than in”. These qualitative anchors enable relevant and irrelevant variations to be distinguished. The software calibrates fuzzy scores from these three researcher-defined inputs to give memberships in nominated sets, which in this research are connectivity in Christchurch whānau; damage to house and contents; personal impacts; personal income; and the crisp set of whether respondents moved or stayed post-disaster.

TABLE 3 Fuzzy scoring for resilience

Case	Resilience	Fuzzy score	↑ Increasing resilience
19	1.4	0.99	↑ Increasing resilience ↓ Decreasing resilience
20	1.2	0.99	
Fully “in”			
23	0.2	0.85	
6	0	0.78	
8	0	0.78	
21	0	0.78	
2	-0.2	0.68	
11	-0.2	0.68	
13	-0.2	0.68	
16	-0.2	0.68	
10	-0.4	0.56	
15	-0.4	0.56	
Cross-over			
14	-0.8	0.29	
18	-0.8	0.29	
12	-1	0.18	
17	-1	0.18	
22	-1	0.18	
Fully “out”			
1	-1.6	0.04	
9	-1.8	0.02	
3	-2	0.01	
4	-2	0.01	

read as the presence of a variable in upper case, its absence in lower case in combination with the tilde (“~”). “Raw coverage” refers to the proportion of the outcome explained by each configuration. “Unique coverage” measures the proportion of the outcome explained solely by each configuration. “Consistency” is a measure of the degree to which each configuration is a subset of the outcome. The “solution coverage” measures the proportion of the outcome explained by all the listed configurations, and the “solution consistency” measures the degree to which the configurations are consistent with being a subset of the outcome.

There are four main configurations or pathways to resilience, grouped here according to whether respondents moved because of the disaster or stayed in Christchurch. The most significant pathway (with raw coverage of 0.517 and unique coverage of 0.38) was:

1. Being a member of a large whānau, having no or minimal damage to house and contents, earning high personal income and not moving away from the city.

Three other pathways were also shown:

2. Significant damage to house and contents but no or minimal personal impacts, earning a high personal income and not moving away from the city;
3. No or minimal damage to house and contents, significant personal impacts, low personal income and moving away from the city; or
4. Being in a small whānau, no or minimal damage to house and contents but experiencing significant personal impacts and moving away from the city.

These last three pathways have less coverage but show that resilience is possible by more than just the first pathway. Overall, the four pathways can be said to be sufficient (they lead to resilience) but not necessary (as other pathways

Fuzzy-set qualitative comparative analysis results

To reiterate, fsQCA uses researcher-defined sets (for example, the set of resilient Māori individuals) and understands links between social phenomena as set relations (such as intersection and union). The following three boxes give the fsQCA results as produced using the software to undertake a Boolean minimisation of results to the key configurations to resilience (Boxes 1 and 2) and the lack of resilience (Box 3). The nomenclature varies somewhat among researchers; the terms here are to be

BOX 1 Complex causal configurations for resilience shown by Māori respondents

	raw coverage	unique coverage	consistency
1. WHĀNAU*~damage*PERSINC*~move	0.516634	0.381605	0.887395
2. DAMAGE*~impacts*PERSINC*~move	0.143836	0.008806	0.700000
3. ~damage*IMPACTS*~persinc*MOVE	0.132094	0.067515	0.710526
4. ~whānau*~damage*IMPACTS*MOVE	0.113503	0.048924	0.966667
solution coverage: 0.706458			
solution consistency: 0.820454			

BOX 2 Parsimonious solution for resilience shown by Māori respondents

	raw coverage	unique coverage	consistency
1. ~move*PERSINC	0.572407	0.572407	0.722222
2. MOVE*IMPACTS	0.200587	0.200587	0.683333
solution coverage: 0.772994			
solution consistency: 0.711712			

BOX 3 Parsimonious solution for lack of resilience shown by Māori respondents

	raw coverage	unique coverage	consistency
1. ~move*IMPACTS*~persinc	0.446792	0.219092	0.984483
2. ~move*WHĀNAU*~persinc	0.372457	0.144757	0.933333
3. MOVE*WHĀNAU*PERSINC	0.082160	0.023474	0.807692
4. MOVE*~impacts	0.074335	0.015649	0.950000
solution coverage: 0.689358			
solution consistency: 0.937234			

may exist). Boolean minimisation enables logically simpler solutions (see Ragin & Sonnett, 2004). In Box 2 the parsimonious solution is essentially composed of the conditions essential to distinguishing between positive cases, framed as resilient in this research, and negative (or not resilient) cases.

We can also investigate cases that recorded significant declines in their wellbeing, interpreted here as a lack of resilience. The parsimonious solution for this is presented in Box 3, again to identify the most fundamental configurations of the nine cases who are more “out” than “in”

the set of resilient individuals.

Again we can divide cases into those who stayed post-disaster and those who left. For those who stayed, the *lack* of high personal income seems to be the common feature, although high personal income is no guarantee of resilience in such a disaster as it is present in solution 3, albeit with comparatively small coverage.

This study relies on a small number of respondents and their self-reported wellbeing through what was a period of great anxiety for many of them; their memories and social

constructionist processes around the disaster can further confuse memory (Gow, 1998). However, the results do point to the importance of economic security for wellbeing post-disaster and highlight the risks of assuming that Indigenous knowledge is somehow a ready-made resource which urban Indigenous communities can draw on for their resilience.

Indigenous endurance: Are Māori just hanging on?

An important discourse is growing on the role of Indigenous knowledge in disaster risk reduction. The findings from this research are somewhat contrary to other findings in that I have found mātauranga Māori has barely featured in this urban disaster that has impacted Māori who are living away from their traditional territories. Logically, why would we expect a people who have been systematically dispossessed, marginalised, “modernised” and urbanised (and most of that urban population distant from their traditional lands) to be in a position to retain and act upon their Indigenous knowledge? In the words of Indigenous planner Ted Jojola (2013), “the worst aspect of colonialism was that Indigenous knowledge was devalued or destroyed in the name of conquest and domination” (p. x).

While acknowledging that *any* individual can be overwhelmed by a disaster, these findings reiterate previous research that identifies disaster resilience being enabled by resources and disabled by their lack. The use of fsQCA has identified varying degrees of resilience to the Christchurch earthquakes for Māori but this resilience is primarily enabled by high personal income and not moving. However, for those severely impacted by the disaster, *leaving* the city was a fundamental component of their resilience. Our results show that those who stayed and managed to maintain or even *increase* their wellbeing were generally members of large whānau with strong personal finances, with no

or minimal damage to house and contents and/or no or minimal personal impacts. There is no doubt as to the danger, fear, anxiety and loss across the city of Christchurch but the combination of family contacts and strong income is fundamental to Māori disaster resilience.

To label this post-disaster urban life as *endurance* is not to dismiss what has been achieved. What this research stresses is the somewhat banal but ultimately fundamental observation that economic wellbeing provides *options* which are vital to absorbing and even rebounding from disaster (see Vatsa, 2004). Whether it is through the ability to leave a disaster area, even intermittently, or attain in some way the security and reassurance that many were desperate for, wealth has enabled people to survive what was a difficult and, for some, near impossible time. Neither the New Zealand economy nor the so-called “Māori economy” can prevent the recurrence of earthquakes, tsunami, volcanic eruptions, flooding and storms but decision-makers must take into account the continued economic vulnerability of too many Māori to the very features of our land and waters with which we identify.

Many of Christchurch’s Māori do not whakapapa to local tribes (Ngāi Tahu, Waitaha, or Kāti Māmoe) but have land, extended whānau and possibly still strong personal links to “home” which lies in the North Island. Of course, it could be argued that Māori have been economic migrants from the time of leaving the mythical homeland of Hawaiki! Although the sample size of this research is small, several cases managed to maintain their wellbeing after leaving the city. Enduring a post-disaster landscape is difficult and liable to become *more* difficult over time; leaving is a rational decision. Many residents are now struggling through frustrating rebuilding and difficult insurance claims amidst a confused political response at both national and local levels and a broader economic context in which many Māori were struggling *before* the disaster. The network Māori are able to access is now global, and Māori individuals

and collectives have always possessed a certain self-determination in their responses to, *inter alia*, disaster when they exercise their right to migrate from tribal or residential territories.

Conclusion

While resilience was a constant theme in Christchurch and New Zealand's political and media arenas in the aftermath of the February 2011 event, this article presents a more ambivalent interpretation of the experiences of Māori residents. Mobility is an important response to disaster, and Māori displayed more mobility than Pākehā (though not necessarily more mobility than Pasifika or Asian communities). It is important to draw a distinction between merely enduring a disaster—something Indigenous peoples have already mapped into their lifeworlds through colonisation—and absorbing *and then rebounding* from shocks and disturbances.

Broad resilience to urban disaster by Māori can only come from better strategies of reduction

and readiness, actions which must take place before any disaster. An important component of this resilience will be for Māori to be empowered in accessing options and opportunities, outcomes which primarily originate with higher incomes, although bigger networks, the epitome of which is family, are also fundamental. Disasters recur; they are inherent within our world. Indigenous economic marginalisation and consequent vulnerability are not.

Glossary

hapū	sub-tribe
iwi	tribe
marae	meeting grounds
mātauranga Māori	Māori knowledge
Pākehā	New Zealanders of European descent
whakapapa	to trace genealogy
whānau	family

References

- Adger, W. N. (2000). Sociological and ecological resilience: Are they related? *Progress in Human Geography*, 24, 347–364.
- Anderson, K. (2012). *Researching the Ōtautahi earthquake*. Auckland, New Zealand: Ngā Pae o te Māramatanga.
- Andersson, N. (2008). Affirmative challenges in Indigenous resilience research. *Pimatisiwin. A Journal of Aboriginal and Indigenous Community Health*, 6(2), 3–6.
- Barnett, J. (2000). *The meaning of environmental security: Ecological politics and policy in the new security era*. London, England: Zed Books.
- Berkes, F., Colding, J., & Folke, C. (Eds.). (2003). *Navigating social-ecological systems: Building resilience for complexity and change*. Cambridge, England: Cambridge University Press.
- Berkes, F., & Folke, C. (2002). Back to the future: Ecosystem dynamics and local knowledge. In L. Gunderson & C. S. Holling (Eds.), *Panarchy: Understanding transformations in human and natural systems*. Washington, DC: Island Press.
- Bode, B. (1977). *No bells to toll: Destruction and creation in the Andes*. New York, NY: Scribner.
- Bonanno, G. A., Galea, S., Bucciarelli, A., & Vlahov, D. (2007). What predicts psychological resilience after disaster? The role of demographics, resources, and life stress. *Journal of Consulting and Clinical Psychology*, 75(5), 671–682.
- Boulton, A. (2012). *Facilitating whānau resilience through Māori primary health intervention*. Whanganui, New Zealand: Whakauae: Research for Māori Health and Development; Health Research Council. Retrieved from http://www.whakauae.co.nz/media/download_gallery/Resilience%20Technical%20Report.pdf
- Canterbury Earthquake Recovery Authority (CERA). (2012). *CERA wellbeing survey 2012 report*. Retrieved from <http://cera.govt.nz/sites/default/files/common/cera-wellbeing-survey-2012-report-20120220.pdf>
- Canterbury Earthquake Recovery Authority (CERA). (2013). *CERA wellbeing survey April 2013 report*. Retrieved from <http://cera.govt.nz/sites/default/files/common/cera-wellbeing-survey-april-2013-report-20131120.pdf>
- Canterbury Earthquake Recovery Authority (CERA). (2014). *CERA wellbeing survey April 2014 report*. Retrieved from <http://cera.govt.nz/sites/default/files/common/cera-wellbeing-survey-april-2014-report.pdf>
- Cunningham, C., Stevenson, B., & Tassell, N. (2005). *Analysis of the characteristics of whānau in Aotearoa*. Palmerston North, New Zealand: Research Centre for Māori Health and Development School of Māori Studies.
- Cutter, S. (2010). Social science perspectives on hazards and vulnerability science. In T. Beer (Ed.), *Geophysical Hazards* (pp. 17–30). Dordrecht, The Netherlands: Springer.
- Cutter, S., Mitchell, J. T., & Scott, M. S. (2000). Revealing the vulnerability of people and places: A case study of Georgetown County, South Carolina. *Annals of the Association of American Geographers*, 90(4), 713–737.
- Davis, N. Y. (1986). Earthquake, tsunami, re-settlement and survival in two north Pacific Alaskan native villages. In A. Oliver-Smith (Ed.), *Natural disasters and cultural responses* (pp. 123–154). Williamsburg, VA: College of William and Mary.
- Del Popolo, F., Oyarce, A. M., Ribotta, B., & Jorge, R. (2007). *Indigenous peoples and urban settlements: Spatial distribution, internal migration and living conditions*. Santiago, Chile: United Nations.
- Dixon, A. (2011, 2 March). Maori wardens to provide “fresh feet on ground”. *The Southland Times*. Retrieved from <http://www.stuff.co.nz/southland-times/news/4720455/Maori-wardens-to-provide-fresh-feet-on-ground>
- Ellemor, H. (2005). Reconsidering emergency management and indigenous communities in Australia. *Global Environmental Change Part B: Environmental Hazards*, 6(1), 1–7.
- Esnard, A.-M., & Sapat, A. (2014). *Displaced by disaster: Recovery and resilience in a globalising world*. New York, NY: Routledge.
- Fleming, J., & Ledogar, R. J. (2008). Resilience, an evolving concept: A review of literature relevant to Aboriginal research. *Pimatisiwin. A Journal of Aboriginal and Indigenous Community Health*, 6(2), 7–23.
- Gladue, R., & Lund, C. (2008). An elder’s view of community resilience. *Pimatisiwin. A Journal of Aboriginal and Indigenous Community Health*, 6(2), 181–186.
- Goff, J. R., & McFadgen, B. G. (2003). Large earthquakes and the abandonment of prehistoric coastal settlements in 15th century New Zealand. *Geoarchaeology*, 18(6), 609–623.
- Gow, K. (1998). The complex issues in researching “False Memory Syndrome”. *Australasian Journal of Disaster and Trauma Studies*,

- 1998–3. Retrieved from <http://www.massey.ac.nz/~trauma/issues/1998-3/gow1.htm>
- Hudson, J., & Hughes, E. (2007). *The role of marae and Māori communities in post-disaster recovery: A case study*. Palmerston North, New Zealand: Geological and Nuclear Sciences.
- Jasanoff, S. (2010). Beyond calculation: A democratic response to risk. In A. Lakoff (Ed.), *Disaster and the politics of intervention* (pp. 14–40). New York, NY: Colombia Press.
- Jojola, T. (2013). Foreword: Indigenous Planning. In I. Skelton and O. Lopez (Eds.), *Models of Indigenous Development* (x–xiv). Champaign, IL: Common Ground.
- Lambert, S. (2012, August). *Response and recovery by Māori to the Christchurch earthquakes*. Paper presented at the 6th Australasian Natural Hazards Management Conference, University of Canterbury, Christchurch, New Zealand.
- Lambert, S. (2014). Indigenous peoples and urban disaster: Māori responses to the 2010–12 Christchurch earthquakes. *Australasian Journal of Disaster and Trauma Studies*, 18(1), 39–48.
- Lambert, S., Mark-Shadbolt, M., Ataria, J. M., & Black, A. (2012, June). *Indigenous resilience through urban disaster: Māori and the Christchurch/ Ōtautahi earthquakes*. Paper presented at the International Indigenous Development Conference 2012, Auckland, New Zealand. Retrieved from <http://www.maramatanga.ac.nz/sites/default/files/NPM%20Conference%20Proceedings%202012.pdf>
- Lambert, S., Wilkie, M., & Mark-Shadbolt, M. (2014). *Kia Manawaroa: Surviving disaster*. Christchurch, New Zealand: Lincoln University.
- Lawson, A. M. (2006). *Resistance and resilience in the work of four Native American authors* (Unpublished doctoral dissertation). University of Arizona, Tucson, Arizona.
- McCoombs, H. G. (2010). The spiritual dimensions of caring for people affected by disasters. In P. Dass-Brailsfords (Ed.), *Crisis and disaster counselling: Lessons learned from hurricane Katrina and other disasters* (pp. 131–147). Thousand Oaks, CA: Sage.
- McDaniels, T., Chang, S., Cole, D., Mikawoz, J., & Longstaff, H. (2008). Fostering resilience to extreme events within infrastructure systems: Characterizing decision contexts for mitigation and adaptation. *Global Environmental Change*, 18(2), 310–318.
- Ministry for Civil Defence and Environmental Management. (2008). *National civil defence emergency management strategy 2007*. Wellington, New Zealand: Author. Retrieved from <http://www.civildefence.govt.nz/assets/Uploads/publications/national-CDEM-strategy-2008.pdf>
- Ministry of Social Development. (2010). *2010: The social report/te pūrongo oranga tangata 2010*. Retrieved from <http://www.socialreport.msd.govt.nz/people/distribution-population.html>
- Newell, J. (2012). *Towards an understanding of migration following the 2010–2011 Canterbury earthquakes: Usually resident population estimates for greater Christchurch and emerging estimates of the migration effects of the earthquakes*. Wellington, New Zealand: Monitoring and Evaluation Research Associates.
- Oliver-Smith, A. (1994). Peru's five hundred year earthquake: Vulnerability in historical context. In A. Varley (Ed.), *Disasters, development, and environment* (pp. 3–48). London, England: Wiley.
- Oliver-Smith, A., & Goldman, R. E. (1988). Planning goals and urban realities: Post-disaster reconstruction in a third world country. *City and Society*, 2(2), 105–126.
- Panelli, R., & Tipa, G. (2008). Beyond foodscapes: Considering geographies of Indigenous well-being. *Health & Place*, 15, 455–465.
- Paton, D., Johnston, D., Mamula-Seadon, L., & Kenney, C. (2014). Recovery and development: Perspectives from New Zealand and Australia. In N. Kapucu & T. L. Kuotsai (Eds.), *Disasters and Development* (pp. 255–272). London, England: Springer.
- Penehira, M. (2011). *Mouri tū, mouri moko, mouri ora!* (Doctoral thesis). University of Waikato, Hamilton, New Zealand.
- Rae, H. T. (2013). *Kia tahuri i te riu, kia tika: Indigenous participation in earthquake recovery planning: Insights from Taiwan and Canterbury* (Unpublished master's thesis). University of Otago, Dunedin, New Zealand.
- Ragin, C. (2000). *Fuzzy-set social science*. Chicago, IL: University of Chicago Press.
- Ragin, C., & Sonnett, J. (2008). Limited diversity and counterfactual cases. In C. Ragin (Ed.), *Redesigning social inquiry: Fuzzy-sets and beyond* (pp. 147–159). Chicago, IL: University of Chicago Press.
- Rihoux, B., & Ragin, C. (Eds.). (2009). *Configurational comparative methods: Qualitative comparative analysis (QCA) and related techniques*. Los Angeles, CA: Sage.
- Robinson, S., Hernandez, F. Y., Mata, C. R., &

- Bernard, H. R. (1986). It shook again: The Mexico City earthquake of 1985. In A. Oliver-Smith (Ed.), *Natural disasters and cultural responses* (pp. 81–123). Williamsburg, VA: College of William and Mary.
- Shaw, R., Sharma, A., & Takeuchi, Y. (Eds.). (2009). *Indigenous knowledge and disaster risk reduction: From practice to policy*. Hauppauge, NY: Nova Science.
- Te Puni Kōkiri. (1992). *Review of civil defence* [Submission].
- Te Puni Kōkiri. (2011, June). *Arohakitētangata—Māori wardens newsletter*. Retrieved from <http://www.tpk.govt.nz/en/in-print/our-publications/newsletters/maori-wardens-newsletter----june-2011/download/tpk-maoriwardensnews-june2011.pdf>
- Thomas, J., Mora, K., Murray, S., Walton, D., & Dravitzki, V. (2011, April). *Community resilience, latent resources and resource scarcity after an earthquake: Is society really three meals away from anarchy?* Paper presented at the Proceedings of the Ninth Pacific Conference on Earthquake Engineering: Building an Earthquake-Resilient Society, Auckland, New Zealand. Retrieved from <http://www.resilience.org.nz/publications/download/54>
- Thornly, L., Ball, J., Signal, L., Lawson-Te Aho, K., & Rawson, E. (2013). *Building community resilience: Learning from the Canterbury earthquakes. Final report to Health Research Council and Canterbury Medical Research Foundation*. Retrieved from http://www.lincoln.ac.nz/conversation/maori-resilience/files/2013/04/Building_Community_Resilience_report-March_2013.pdf
- Tory, W. I. (1979). Anthropological studies in hazardous environments: Past trends and new horizons. *Current Anthropology*, 20, 517–541.
- Trosper, R. L. (2002). Northwest coast indigenous institutions that supported resilience and sustainability. *Ecological Economics*, 41(2), 329–344.
- United Nations Housing Rights Programme. (2007). *Indigenous peoples' right to adequate housing: A global overview*. Nairobi, Kenya: Author. Retrieved from <http://www.ohchr.org/Documents/Publications/IndigenousPeoplesHousingen.pdf>
- United Nations Human Settlements Programme. (2010). *Urban indigenous peoples and migration: A review of policies, programmes and practices*. Nairobi, Kenya: Author. Retrieved from <http://mirror.unhabitat.org/pms/listItemDetails.aspx?publicationID=2916>
- Vatsa, K. S. (2004). Risk, vulnerability, and asset-based approach to disaster risk management. *The International Journal of Sociology and Social Policy*, 24(10/11), 1–48.
- World Bank, & United Nations. (2010). *Natural hazards, unnatural disasters: The economics of effective prevention*. Washington, DC: Author.
- Yanicki, S. (2013, 13 February). *East side stories: Cases of quake-related innovation*. Christchurch, New Zealand: Ministry of Social Development; University of Canterbury.