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Using the Living Standards Framework to Analyse the Drivers of Social Resilience in a Disaster Management Context

Abstract

Resilience concepts now underpin the global strategic approach to risk mitigation. However, operational challenges have emerged which stem from problems with measurement. Many key drivers of social resilience are intangible and difficult to measure, which can result in their exclusion from consideration in institutional decision-making structures. Drawing upon a case study – the Hurunui district – which recently experienced multiple adverse events, we argue two points. First, disaster management outcomes can be improved by better accounting for intangible factors in decision-making processes. Second, the Living Standards Framework, and the capital concepts embedded within it, provide a solid foundation for systematically categorising intangible factors and rendering them visible to policymakers.

Keywords resilience, disaster management, wellbeing, measurement, multi-capital frameworks

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Modern institutions traditionally rely upon measurement – targets and indicators – to demonstrate progress and accountability (Stiglitz, Fitoussi and Durand, 2018; Hallegatte and Engle, 2019; Copeland et al., 2020). Applying such an approach to operationalise resilience concepts has resulted in the realisation that many drivers of resilience, especially in a social context, are intangible and difficult to measure (Cutter et al., 2008; Cutter, 2016; Copeland et al., 2020). This presents a significant challenge for the institutional operationalisation of resilience concepts for disaster risk reduction (Wither et al., 2021; Wither, 2021).

One promising solution to the problem of measurement is the use of multi-capital frameworks, which synergise with resilience approaches, to account for intangible sources of value (Tanner et al., 2015, Wither et al., 2021). Multi-capital frameworks aim to capture all types of value that drive human development by subdividing value into social, human, natural and physical capital domains. Thus, intangible sources of value can be

given visibility, providing an evidence base for effective and holistic policy development.

Drawing upon the experiences of a rural community in the Hurunui, North Canterbury, which recently lived through multiple adverse events in short succession, we illustrate the 'problem of measurement' in a New Zealand context and analyse the value of the use of multi-capital frameworks as a tool for systematically accounting for intangible qualitative phenomena. The first section covers resilience, the use of measurement for accountability, and the role multi-capital frameworks can play in addressing the problem of measurement. The study design is then described, followed by two results sections. In the discussion, we first demonstrate that accounting for intangible sources of value in institutional decision-making processes improves resilience outcomes. Second, we argue that multi-capital frameworks hold significant potential for systematically addressing the challenges of measuring social resilience. We conclude that the implications of this research reach beyond disaster management and have significance for institutional decision-making processes more generally.

Table 1: Indicators of social resilience

Structural indicators	Cognitive indicators
Educational attainment	Outcome expectancy
Pre-retirement age	Action coping/self-efficacy
Transportation access	Critical awareness
Communication capacity	Responsibility
(English) language competency	Trust
Food provisioning capacity	Place attachment
Non-special needs	Sense of community
Health insurance coverage	Community participation
Health care capacity	Empowerment

Source: Kwok et al., 2016

Background

Resilience describes the long-term persistence of a system in the face of unexpected shocks (Holling, 1973). In essence it illustrates how a system must adapt, change and transform in the face of adversity, so as to maintain its functions and feedbacks (Folke, 2016). Social resilience focuses on the human dimensions of resilience (Ungar, 2018). Importantly, early resilience research placed significant emphasis on accounting for qualitative factors – such as intangible relationships – alongside the quantitative (Holling, 1973). However, the institutional implementation of resilience thinking has been dominated by a quantitative orientation, with little emphasis placed upon the qualitative (Hallegatte and Engle, 2019; Copeland et al., 2020; Wither et al., 2021). Consequently, challenges related to normative factors have emerged (Cote and Nightingale, 2012; Cretney, 2014; Brown, 2014), which are collectively referred to as the 'problem of measurement' (Wither et al., 2021). In addition to the inability to measure key factors, the problem of measurement also problematises the mindset a singular focus on quantification has engendered.

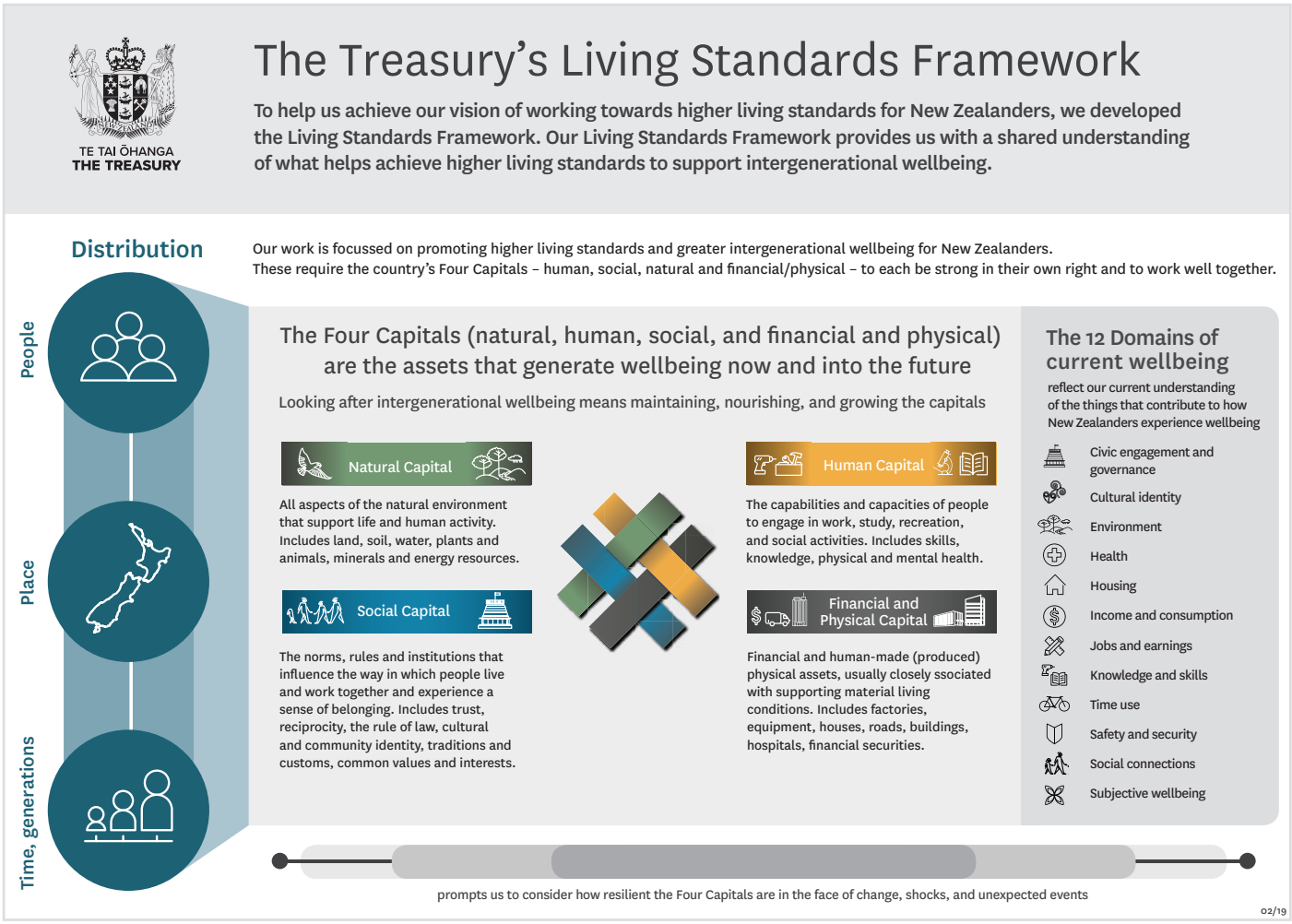
Not all drivers of resilience are easily quantifiable, which commonly results in the omission of key social considerations from decision-making processes. Various social resilience metrics have been proposed to address this shortcoming (Cutter, 2016). Kwok et al. (2016) synthesised common indicators for social resilience and divided them into two categories, structural and cognitive (Table 1). Structural factors tend to be more easily quantifiable, while cognitive factors are often intangible and more difficult to measure. Challenges in measuring what we value have significant implications for how we operationalise resilience, which is reflected in the latest Global Assessment Report on Disaster Risk Reduction. The summary for policymakers states: 'when systems are not collecting the right data, key assets are undervalued in decision-making and learning opportunities are missed' (United Nations Office for Disaster Risk Reduction, 2022b, p.12). This is further emphasised in the full report as a 'tendency to exclude key values … from economic balance sheets and governance decision-making' (United Nations Office for Disaster Risk Reduction, 2022a, p.5).

Kahneman (2012) describes a cognitive bias – 'what you see is all there is' – which provides a mechanistic explanation for 'the problem of measurement'. Kahneman demonstrated that humans generally only consider what they know or 'see' right in front of them in their decision making. This is particularly problematic in a policy context reliant on quantifiable indicators. As Stiglitz (2018, p.13) notes: 'What we measure affects what we do. If we measure the wrong thing, we will do the wrong thing. If we don't measure something, it becomes neglected, as if the problem didn't exist.' The broad implication is that the inability to 'see' intangible sources of value results in their exclusion from consideration in decision-making structures, which, as this article will demonstrate, is problematic in disaster response scenarios.

Contemporary thinking about measurement as a primary tool for governance had its institutional genesis in the New Public Management, which emerged as the favoured approach to public management during the neo-liberal structural reforms of the 1980s (Hood and Lodge, 2006; Larner, 1997). Many countries significantly transformed their public services to focus on evidence-based decision making during this period, and New Zealand pursued the reforms with a speed, breadth and depth that was unparalleled in the developed world (Kelsey, 1995). Consequently, decision making in New Zealand's public services became contingent on measurement to inform policymaking, and to establish the success or failure of new policies. However, this reliance on objectivity and standard transferable ways of thinking has resulted in a lack of consideration for context at an institutional level.

In the 40 years since these reforms were initiated, significant concerns about livelihoods and wellbeing have prompted political pressure for the New Zealand Treasury to better account for social, human and environmental value alongside economic value in policy design (Robertson, 2019). As a part of that effort, the Treasury developed a policy framework – the Living Standards Framework – based on a multi-

Figure 1: The Living Standards Framework[1]



Source: New Zealand Treasury, 2018

capital approach (Figure 1). Multi-capital frameworks emerged from development studies as a practical solution to account for the needs of populations to which aid was being provided and have strong synergies with a resilience approach (Scoones, 1998; Morse and McNamara, 2013; Tanner et al, 2015; Frieling, 2018; Wither et al., 2021). Noting that development aid rarely generated desirable outcomes (Morse and McNamara, 2013), multi-capital frameworks sought to encapsulate what was valuable for human development (Scoones, 1998) and generalise it into a heuristic comprised of separate 'capitals'. At the top level, these capitals generally comprise social, human, natural and physical capital, and can also include cultural, political and other capitals as contextually required (Frieling, 2018). Importantly, the framework accounts for both qualitative and quantitative dimensions, which helps institutions 'see' intangible factors when quantification is difficult.

In this article, we draw specifically on social and human capital concepts because they are best able to represent and account for the intangible sources of value related to social resilience. Social capital refers to connections between people, and is categorised into three types, bonding, bridging and linking (Field, 2016). Bonding social capital refers to close connections such as family, and bridging social capital describes broader community connections (Putnam, 2000). Linking social capital refers to connections between people operating in different contexts which gives access to resources otherwise unavailable (Woolcock, 2001): for example, connections between a community affected by an adverse event and a government agency or official overseeing the response. Linking social capital has been described as a critical factor for positive outcomes in disaster response scenarios (Aldrich, 2012; Aldrich and Meyer, 2014). Human capital refers to people's physical and mental health, as well as their knowledge, skills and capacity to enact change (Morse and McNamara, 2013). In a resilience context, the multi-capital framework helps delineate the factors that affect people's capacity to act and adapt (Tanner et al., 2015; Wither et al., 2021). Lastly, while we draw upon social and human capital, in reality, all 'capitals' are intertwined and related.

Study design

We present empirical data from research designed to understand how institutional responses to adverse events affected the social resilience of a farming district in North Canterbury. The Hurunui district (Figure 2), encompassing an area of 8,646 km^2 with a population of approximately 12,000 people, experienced two proximate adverse events – a drought and a coincident earthquake.[2] Both events, and the responses to them, were unique, which provides a basis for comparison allowing for deep insights into the drivers that led to a range of positive and negative outcomes.

The research approach applied a vertical analysis which sought to understand the perspectives of those directly affected at the local community level alongside those of the agencies and organisations that responded in a disaster management capacity. Insights were sought from three groups: affected farmers in the Hurunui; response agencies at the local and regional level; and national-level response and support agencies. Fieldwork was conducted in 2018–19, with semi-structured interviews (n = 47) and one focus group (n = 9) providing the data. The focus group was conducted at the local level and made up of farmers and local government representatives. Interview questions differed between groups, but generally all were asked to reflect on their experience of the adverse events and the responses which were put in place, with a focus on what went well and where improvements could be made. Interview data was analysed thematically, and this article discusses emergent themes related to the role which social capital played in these outcomes. Comprehensive analysis of all themes is available in Wither (2021).

Table 2 describes the participants and organisations interviewed, but omits certain small-scale organisations to preserve respondent confidentiality. Gender distribution was 40% women and 60% men. In the table, the number of participants in each group does not add up to the total number of participants, because many held multiple roles (for example, local government representatives were often also farmers).

Research participants were identified using purposive and snowball sampling methods which reflected a social-ecological inventory of the local players and organisations (Cradock-Henry, Buelow and Fountain, 2019). The approach was inductive and sought to identify key actors across all scales. Existing networks were used to identify two key informants in each group prior to data collection; they were interviewed first, and were asked to provide a list of people whom they thought would be suitable for the research. Those whose names were mentioned frequently or emphasised by others were selected for interviews. Referrals to others were often

Figure 2: Map of the Hurunui district

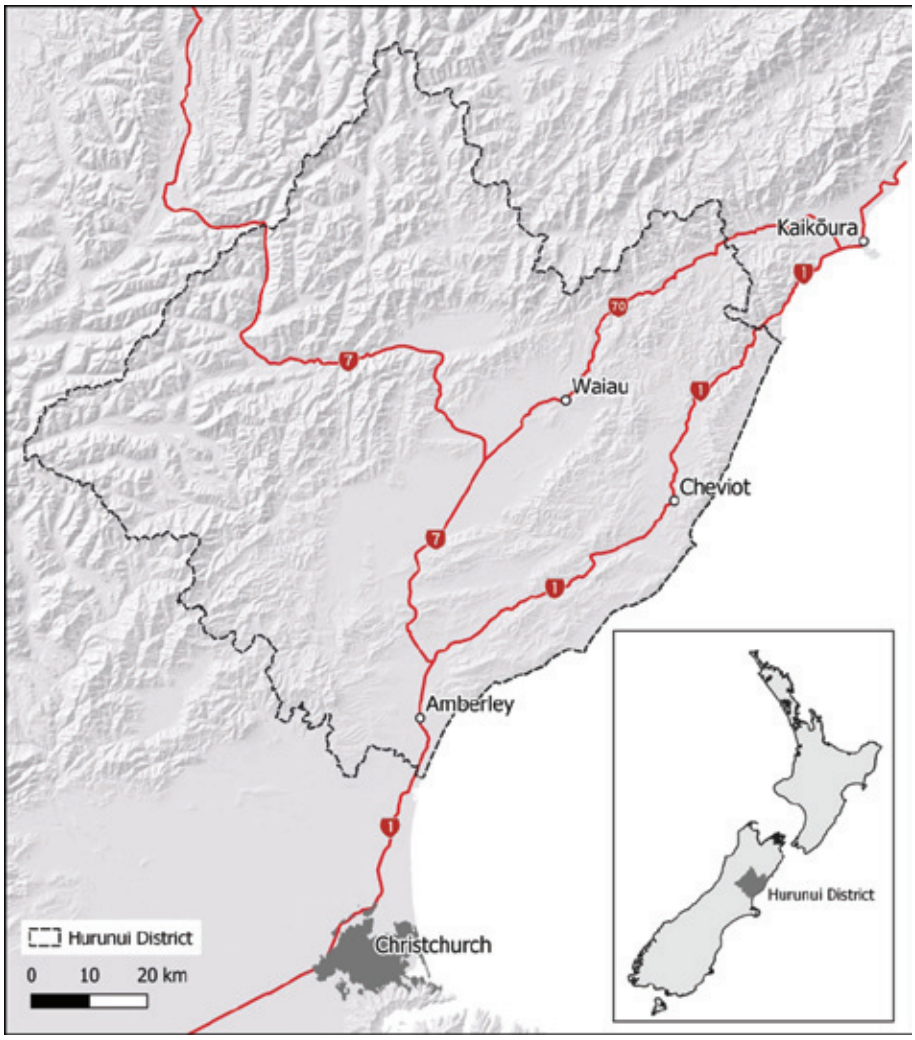


Table 2: Vertical clusters of research participants across local, regional and national scales

Groups	Participants	Types of organisations
Group 1 – farmer households	20	Farmers
Group 2 – local and regional government agencies, public and private support agencies, and farmer advocacy organisations	28	Rural Support Trust, local councils, regional councils, Civil Defence Emergency Management, farmer advocacy organisations
Group 3 – national government and farmer advocacy organisations	23	MPI, Treasury, NEMA (formerly MCDEM), Beef + Lamb New Zealand, DairyNZ, Federated Farmers

across scales: for example, contact with one farmer participant led to contact with a regional expert, which then led to a central government official, which in turn led to a key informant at the highest levels of government. Many of these informants would not have been accessible through formal communication channels.

The next two sections will demonstrate the role social and human capital played in each of the disruptive events in the Hurunui. The social and physical impacts of each event are first briefly described, followed by a discussion of the drivers of positive and negative outcomes during the disaster response.

Drought

The 2014–17 Hurunui drought persisted through two winters, making it one of the longest droughts in recent history. Local precipitation fell from an average of 200+ mm per year to 60 mm; grass growth slowed, and the cost of supplemental feed rose dramatically due to increased demand. Farmers substantially reduced stock numbers due to feed shortages, and in some instances completely destocked

(Mol, Tait and Macara, 2017). The financial implications of the drought, combined with significant impact on animal welfare, resulted in considerable personal and household stress for farmers, which intertwined to create a complex set of challenges.

The experience of farming during a drought was described by research participants as one of the most challenging adverse events to deal with because of the lack of predictability of rainfall and the impacts that uncertainty had on decision making. The New Zealand government, in conjunction with local stakeholders, played an important role in supporting farmers and farming communities both during and after the drought. There were two primary response mechanisms: the Ministry of Primary Industries (MPI) provision of funding for the Rural Support Trust; and the establishment of a Drought Committee to coordinate the response at the local and regional levels. Importantly, while some funding came from the national level, both the Rural Support Trust and the Drought Committee were focused on supporting farmer and community wellbeing and did not seek to apply quantitative approaches to measure and evaluate their progress. Local and regional-level organisations worked in close coordination with the community and stakeholders and, as will be demonstrated, proactively accounted for intangible factors during the response.

The Rural Support Trust is a network of farmer support groups that operate independently nationwide, with 14 chapters, made up of volunteers who are often retired farmers. They are primarily funded by the government to provide support where needed during business as usual, and especially in times of crisis. While additional support is provided during and after adverse events, the government also funds the Rural Support Trust to maintain the capacity (human capital) to respond. Under the Primary Sector Recovery policy, MPI classified the drought as a medium-scale event, which triggered $400,000 in funding support for the local Rural Support Trust to use for response activities.

The contrast between the drought and earthquake responses clearly illustrates that accessing and utilising intangible sources of value – such as local knowledge and networks – improved response outcomes.

A representative from the North Canterbury Rural Support Trust described the nature and ethos of their work: 'Our philosophy in the trust is that we have an 0800 number, and if someone calls that, we have someone there in person within an hour.' During the drought the trust conducted approximately 1,100 farm visits to support farmers, with a focus on the people rather than the business. Many farmers described having someone to help work through their challenges as invaluable. The support provided was holistic and addressed many types of need, including emotional support, drought management strategies, stock management, feed provisioning and financial considerations. The impact, importance and effectiveness of the Rural Support Trust was noted by many participants at all levels, local, regional and national. Participants described the trust's local knowledge, capacity (human capital) and connections (social capital) as a crucial component of the drought response, all of which are intangible or difficult to measure.

In addition to the work done by the Rural Support Trust, a Drought Committee was established which brought together all major stakeholders, such as Federated Farmers, Beef + Lamb New Zealand, DairyNZ, the Rural Support Trust and MPI. The purpose of the Drought Committee was to provide a coordinated approach to decision making that was inclusive of local rural voices. The Drought Committee met weekly or fortnightly to discuss emerging problems faced by farmers and work towards finding solutions. Its role involved developing needs assessments, advising farmers on drought mitigation and destocking, and coordinating with the Rural Support Trust to ensure that those in difficult situations received mental health support. It organised highly effective local events to facilitate knowledge sharing by farmers with past experience of droughts, which was then distributed through community networks to build human and social capital resources within the farming community.

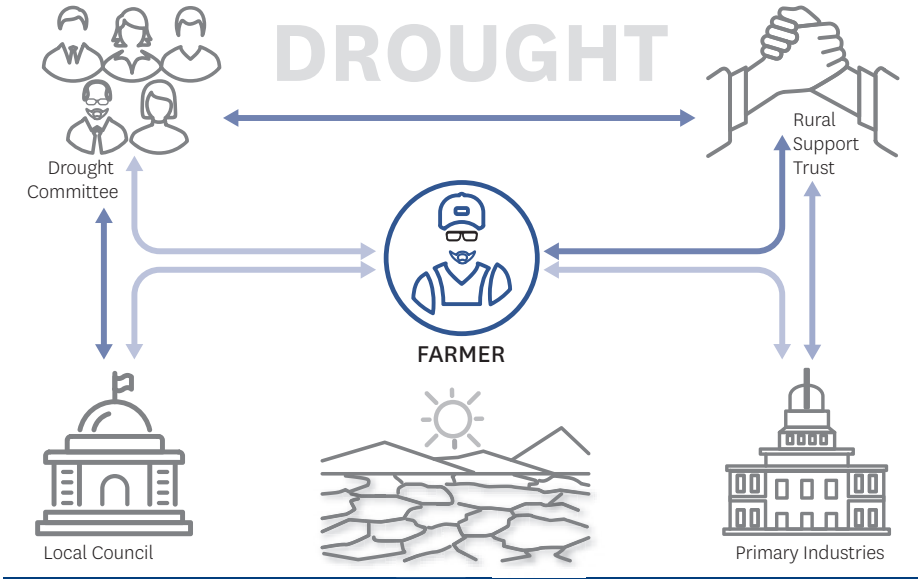
Most farmer participants described the drought response as effective, especially in contrast to the earthquake response. The rallying of the community and the sustained effort to ensure effective adaptation helped many farmers pull through with their businesses intact. Crucially, response activities provided support that brought together knowledge and skills (human capital) and coordination between multiple stakeholder groups (linking social capital). One regional-level respondent compared the response to a similar drought in Waimate:

> Now, the outcome from that was disastrous, there was a collapse in families, a lot of people went broke. A heap of psych and related medical problems. All told, financially it was a disaster for the district. These things didn't happen up here in a virtually similar drought situation, and I'm convinced that the difference is [the way the response was enacted].

Figure 3 presents the organisational network involved in the Hurunui response, illustrating the importance of strong, positive relationships, as depicted by the arrows. The different shades of the arrows draws on a subjective interpretation of the interviews to represent the importance of the connections during the response.

The drought response also demonstrated how capital stocks are intertwined. The Rural Support Trust and Drought Committee were highly effective conduits for the transfer and co-development of considerable knowledge and expertise (human capital) to support farmers, as well as providing strong connections into the Hurunui community (bridging and linking social capital) to underpin government response efforts. Establishing the drivers of the positive outcomes during the drought response provides a basis for comparison. The next section outlines the earthquake response, which contrasted with the approach taken to the drought in a number of important ways.

Figure 3: Connections between different organisations during the drought response (stronger relationships have bolder arrows)



Earthquake

At two minutes after midnight on 14 November 2016, a major (M_w7.8) earthquake struck the Hurunui region. The timing of the earthquake during the height of the drought led to compounding physical and social impacts for the community. The Hurunui–Kaikōura earthquake, as it became known, had its epicentre in the district and involved 21 faults rupturing over an area of 200 km^2 (Kaiser et al., 2017). Large ground motions resulted in significant damage, with thousands of co-seismic landslides, resulting in the closure of much of the main arterial route through the district – State Highway 1 – for over a year (Stevenson et al., 2017). Distributed infrastructure such as water and electricity was also disrupted, including a significant quantity of stored stock water, with damage to pipes and tanks. There were significant flow-on effects for the entire economy, in particular tourism, primary sector productivity and wellbeing (ibid.; Fountain and Cradock-Henry, 2019; Cradock-Henry, Buelow and Fountain, 2019).

The sheer scale of damage to infrastructure and farms across the upper South Island demanded a coordinated response by multiple government agencies, to a much greater extent compared with the drought response (Trotter and Ivory, 2019). The Ministry of Civil Defence and Emergency Management (MCDEM, now the National Emergency Management Agency) activated the National Crisis Management Centre to support the Civil Defence Emergency Management (CDEM) groups' response to the earthquake. Canterbury CDEM delivered the regional response, supported by the National Crisis Management Centre. The CDEM response was coordinated in Christchurch, without strong pre-existing connections into the Hurunui district, unlike the locally driven drought response.

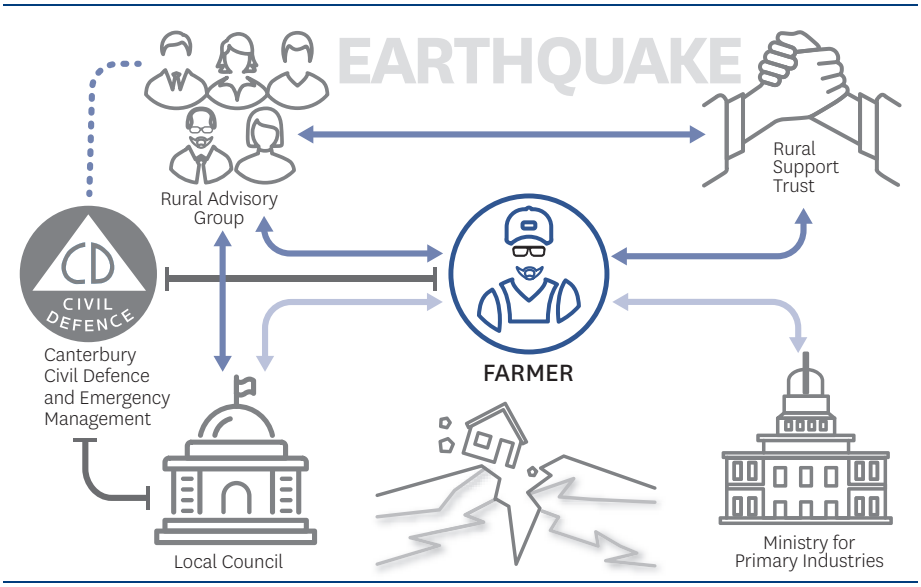
From the beginning, the CDEM response caused friction with local communities. While local participants praised the initial community response to the earthquake, the decision making by regional and national-level agencies was seen as frustrating and confusing. Respondents in our study described a systematic lack of engagement by response agencies with the local community. One local participant who was actively engaged in the immediate response described how multiple attempts to coordinate with the regional CDEM response were left frustrated. Notably, the regional response displayed no understanding of the local context and often created more problems than it solved. The inability to establish linking social capital generated significant problems across the district in the early days.

One example was road access across the district, which became strictly controlled by CDEM one week after the event. Some members of the local community were suddenly unable to access their properties by road, which caused significant stress, particularly for families who were separated and for farmers trying to provide stock welfare. The mayor of the district, Winton Dalley, described the problem from his perspective:

> They had absolutely zero understanding of what we were doing. They had quite a bit of understanding about what was happening in Kaikōura village, because it was kind of an urban event … But all the rural areas in this district, Marlborough, Kaikōura and ourselves … CDEM didn't really have a clue about us. We actually were fighting them because they were stopping us from doing stuff and creating access issues, including cordons, because they believed they knew what they were doing, but they didn't know what the effect of their actions were having on the rural areas. So we had a lot of scraps.

Representatives from Canterbury CDEM and the ministry acknowledged the initial lack of linking social capital, the subsequent problems this caused, and the eventual successes when connections were established. With time and persistence, the local community eventually managed to establish a channel of communication with response leaders, which allowed for problems at the local level to be addressed in a manner suitable to both parties. For example, problems with the road closure were solved by having community

Figure 4: Connections between different organisations during the earthquake response



representatives help staff the checkpoint so that safe access to property was available for locals. Local community members described their gratitude when these communication problems were resolved.

The CDEM response to the earthquake highlights how the initial inability to integrate local knowledge into institutional decision-making processes resulted in negative outcomes for the local community. It also provided an example of how rapid incorporation of local knowledge can occur in an adaptive and agile manner, which improves the response as it unfolds. Over time, there were common and consistent examples where both sides communicated with each other, resolved differences, and generated better outcomes by developing working relationships (bridging and linking social capital). A major initiative was the transformation of the Drought Committee into the Rural Advisory Group to create a connection between the local communities and the responders. The Rural Advisory Group was given a formal seat at the decision-making table with CDEM, as a rural voice with a mandate to provide the same connection and stakeholder coordination services as it did during the drought response. The effectiveness of this specific integration was widely recognised and has subsequently led to a nationwide programme of rural advisory groups in districts around the country to serve the same purpose. The value this provides is not easily quantifiable, but it can be captured at an institutional level using social and human capital concepts.

Figure 4 illustrates the connections between the different actors across the earthquake response. The arrows show connections, with the different shades of the arrows again denoting importance. The lines with bars at the end show relationships that lacked connection, and the dotted line highlights how the Hurunui Rural Advisory Group was formally integrated into Canterbury CDEM in order to bring local knowledge into decision-making processes.

Lastly, the institutional challenges that emerged for government during the two adverse events were described by several high-level respondents as a reflection of the institutions' inability to learn past lessons. Two participants with significant central government experience described how government responses often failed to connect bottom-up and top-down approaches during decision making. One participant reflected that 'we never seem to get the people side of responses right', while another confided that they were 'deeply concerned about New Zealand's inability to learn from past mistakes'. These comments from participants with a long history in disaster management suggest that the problem of measurement is a systemic issue in need of a structural solution.

Discussion and conclusions

The New Zealand institutions charged with implementing a resilience approach to managing disaster risk have traditionally had a strong quantitative orientation. Consequently, attempts to operationalise resilience have met with challenges related to the problem of measurement – an inability to account for intangible factors. We make two key contributions in this article. First, we have demonstrated that accounting for intangible sources of value can improve adverse event responses; and second, we argue that multi-capital frameworks hold significant potential for systematically addressing the challenges posed by the problem of measurement.

The contrast between the drought and earthquake responses clearly illustrates that accessing and utilising intangible sources of value – such as local knowledge and networks – improved response outcomes. The drought response was supported and driven by organisations that prioritised social wellbeing, knowledge sharing, and using strong local and regional networks. In contrast, the earthquake response was primarily driven from a national and regional level without access to pre-existing networks, and showed how an inability to account for intangible factors generated negative outcomes. Subsequent adaptations during the response, such as the integration of the Rural Advisory Group into Canterbury CDEM, reprioritised linking social capital, which generated more positive outcomes.

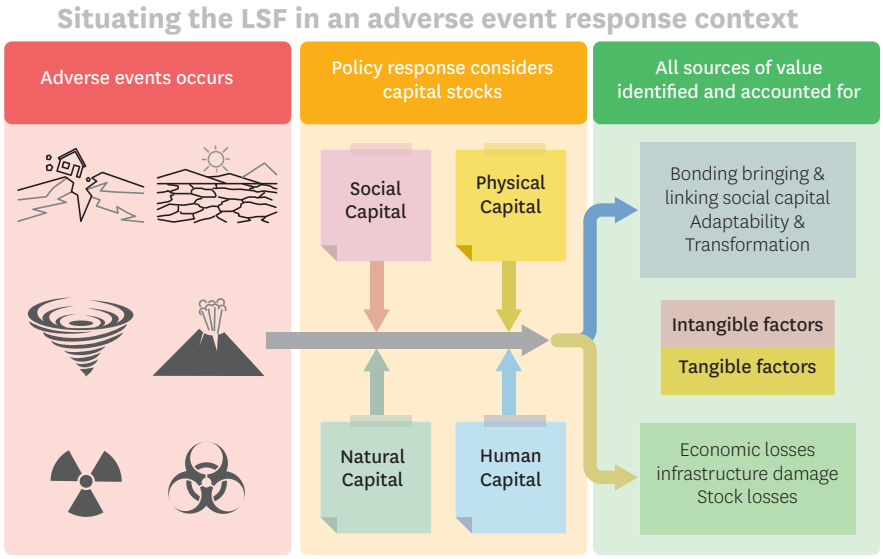
The problem of measurement stems from a cognitive bias – 'what you see is all there is' (Kahneman, 2012; Wither et al., 2021). Modern institutions have traditionally relied upon measurement – targets and indicators – to demonstrate progress and accountability, which is problematic when key drivers of resilience are intangible. At the institutional level, new tools are required to better 'see' and recognise intangible factors proactively and reactively. We propose that multi-capital frameworks – already adopted by the New Zealand government through the Living Standards Framework – hold significant potential to render these intangible factors visible on a structural level. All the intangible factors present in the drought and earthquake responses were able to be described and analysed using the social and human capital concepts within the Living Standards Framework, despite an inability to quantify them.

Figure 5 presents how the Living Standards Framework can be incorporated into decision-making processes as an abstraction layer which guides attention to key sources of value. With the Living Standards Framework, decision makers do not need to quantify all aspects of resilience or understand resilience theory; rather, they simply need an appreciation of the importance of social and human capital, and willingness to consider related intangible factors.

The most significant limitation of this study, and an area where further research would be useful, is that interview data at the local level was limited to one region. Participants from all groups identified the Hurunui as having strong pre-existing social and human capital stocks prior to these adverse events, which may not be the case in other regions. Repeating this research in regional communities with different levels of capital stocks – and different demographic and cultural attributes – would provide useful information about the importance of intangible factors in different contexts.

Resilience broadly refers to the long-term persistence of a system in the face of change. The Sendai Framework for Disaster Risk Reduction (United Nations Office for Disaster Risk Reduction, 2015) calls for engagement from all of society, and all state institutions, for implementing a resilience approach, because all sectors have a role to play. Qualitative intangible factors, represented through the Living Standards Framework, have proven value in underpinning effective response to adverse events. However, the challenges associated with the problem of measurement are not unique to disaster management; similar issues exist in other institutional contexts (Stiglitz, Fitoussi and Durand, 2018). Our research approach and framing using the Living Standards Framework is designed to be transferable between contexts and applicable beyond disaster management. We illustrate the problem of measurement as a systemic problem for institutions generally, and multi-capital frameworks as a foundation to enable a promising, transferable set of solutions. As we move into an increasingly uncertain future, beset by geopolitical and climate challenges, we must design better institutional approaches to decision making which account for qualitative, intangible factors across all of society.

Figure 5: The Living Standards Framework as an abstraction layer for policy development



1 The Living Standards Framework has been updated since this research was conducted: explicit capital framing has been removed, but the underlying concepts they represent remain.

2 Additionally, the Hurunui (and rural New Zealand more broadly) experienced a third major event after the drought and earthquake, the *Mycoplasma bovis* outbreak, which is beyond the scope of this article. The full analysis of the M. bovis response is provided by Wither, 2021, and summarised in Wither et al., 2021.

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