# Post-Disaster Recovery Efforts in Japan and New Zealand: What worked well? What hasn't?

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# Abstract

Natural disasters present significant threats to the infrastructure, economy, and most importantly, people. Land-use planning is fundamental to post-disaster management and the effects are often reflected in the efficiency of the policies and regulations in place. Post-disaster management in Japan is arguably regarded as the state of art, and this research seeks to evaluate the planning frameworks and policies that were developed in response to the 2011 Earthquake and Tsunami in Tōhoku, Japan. Disaster management comes in four stages: Mitigation, Preparedness, Response and Recovery. Mitigation measures can include a soft or hard approach. A softer approach can include maintaining the protective natural features such as sand dunes, wetlands and forests. A harder approach ranges from building retaining walls on hillslopes to sea walls in the coastal environments. Preparedness on the other hand, include educating the communities in case of an emergency; and responses to a disaster are often short-term measures such as providing food and water. This research intends to focus on the final stage of disaster management- recovery. The recovery stage involves responses to not just the physical destruction, but also the social and economic repercussions from natural disasters. This requires major financial and scientific inputs from a range of sectors, including the national government. A comparison of the disaster management frameworks between Japan and New Zealand is carried out to determine whether these policies have been effective in practice and to identify where improvements can be made to disaster management in New Zealand following the 2016 Kaikōura Earthquake.

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# Chapter 1: Introduction

Human activities increase the risk of disasters from natural hazards. Climate change amplifies the frequency and probability of these events, and poor land use choices, for example, could exacerbate these effects and turn it into a catastrophe (Keller and DeVecchio, 2015). Alongside the linkages between natural hazards, this presents significant threats to the infrastructure, economy, and most importantly people. This all comes down to land-use planning and the effects are often reflected in the efficiency of the policies and regulations in place (Keller and DeVeccio, 2015).

Disaster management comes in four stages- Mitigation, Preparedness, Response and Recovery (Asghar *et al*., 2006). Mitigation measures can include a soft or hard approach. A softer approach can include maintaining the protective natural features such as sand dunes, wetlands and forests. A harder approach ranges from building retaining walls on hillslopes to sea walls in the coastal environments (Roggema and Yan, 2017). Preparedness on the other hand, include educating the communities in case of an emergency; and response to a disaster are often short-term measures such as providing food and water (MCDEM, 2019).

This research intends to focus on the final stage of disaster management- Recovery. The recovery stage involves responses to not just the physical destruction, but also the social and economic repercussions from the natural disasters. This requires major financial and scientific inputs from a range of sectors, including the national government (MCDEM, 2019).

Japan is arguably regarded as the pioneer in disaster management. A Comparison between the recovery models in Japan and New Zealand on the national, regional and local scale would contribute to creating a more resilient community.

## Research scope

In order to contextualise and provide a comparative narrative, this research consists of an international and local scale examination on the post-disaster recovery planning. The concept surrounding disaster recovery planning will be explored through a review of the literature, policy and planning documents in place. This creates a theoretical framework and allows an in-depth understanding of the values of the post-disaster recovery environment and how they

are reflected in the legislative environment. This is highly valuable in evaluating the post-disaster recovery frameworks in Japan and New Zealand. On an international scale, a case study of the post-disaster recovery efforts in Tōhoku was conducted to demonstrate their approach to disaster management. In addition, on a local scale, a case study on examining the post-disaster recovery efforts in Kaikōura was carried out in order to compare and contrast the approaches between the regions. This research seeks to evaluate the two case studies and by identifying the gaps and challenges, and thus, contributing to the understanding of post-disaster management from the lessons learned from the two events.

## Research questions and aims

The overall aim of the project is evaluating disaster planning frameworks and policies in Japan and New Zealand to identify whether improvements can be made to disaster management in New Zealand. To achieve the aim, this study will answer the following questions:

1. Is post-disaster management in Japan the state of the art?
2. What are the gaps and challenges of post-disaster recovery management? Are there ways through which they could be filled?
3. What is the best step forward to managing post-disaster recovery efforts?

All three questions are informed by primary research consisting of a paper-based review, site observations and key informant interviews. This involves collecting primary data and analysing the planning environment in the Tōhoku and Kaikōura context. This investigation will explore the approaches taken to manage post-disaster recovery in Tōhoku and Kaikōura. The findings of these questions will provide useful insights into post-disaster recovery management in each region, thus, allowing an assessment of the recovery frameworks in place. From there, recommendations to managing future post-disaster events can be explored.

## Thesis structure

This thesis is presented in a linear structure. The topics are initially explored at the macro level, which are then funnelled down into the focus and outcomes.

The theoretical review relevant to this study are discussed in Chapter 2, where it illustrates the main components of post-disaster recovery and their influence on the development of this research.

Chapter 3 presents an assessment of the policies and planning documents in the Tōhoku and Kaikōura region.

Chapter 4 outlines and discusses the methodology utilised in this research. Data was obtained through qualitative research methods and included several key informant interviews, site observations and paper-based review.

Chapter 5 contains the results of the research around the Tōhoku and Kaikōura region. This chapter is organised into themes based on findings and observations made while in the field.

Chapter 6 comprises a discussion of the findings with reference to the paper-based review. The chapter provides an interpretation and implications of the findings and seeks to address the research questions proposed for the study.

Chapter 7 presents the concluding remarks of this research on the implications of the post-disaster recovery frameworks in Tōhoku and Kaikōura.

# Chapter 2: Theoretical Review

This chapter seeks to introduce the key concepts surrounding post-disaster recovery process on which this study will be focussed. The first section will introduce the concepts of post-disaster recovery as a whole. The following sections explore post-disaster recovery at a local level with regard to the ideas of resilience, community participation, collaboration, resource availability, awareness and the implications of disaster waste. Figure 2-1 below shows the overall structure of the theoretical review.
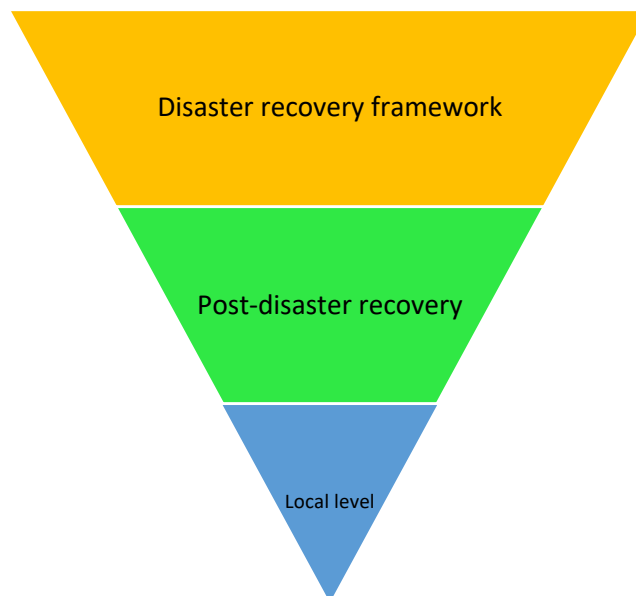


*Figure 2-1 This diagram illustrates the structure of the literature review. This first section discusses the overarching post-disaster recovery framework, and the following section narrows down and explores post-disaster recovery at a local level.*

## Introduction to post-disaster recovery

Disasters disrupt the functioning of a community and affect the social, economic and environmental spheres of a region (Becken and Hughney, 2013). Hazard analysis and vulnerability assessments provide a platform to restore the status quo post-disaster as quickly and as efficient as possible (Oloruntoba *et al.*, 2017). The assessments can include environmental, economic and social factors like employment, income and livelihoods (Hayashi, 2012; Oloruntoba *et al.*, 2017). Conversely, the recovery process involves physical and intangible elements. The physical elements involve the natural and built environment while the intangible elements involve the social and economic environment (Jensen, 1998; Oloruntoba *et al.*, 2017). Community participation is increasingly seen as an element of the

recovery process as community processes contribute to the economic and social resilience at a local level (Kwok *et al.*, 2016). An effective recovery management process needs to be adaptable and be looked at on a long-term scale (Oloruntoba *et al.*, 2017). Due to the complex nature of the recovery process, a central coordinating group such as the local, state or national government may be inaugurated to managing the decision making the process for the recovery process (Kwok *et al.*, 2016; Oloruntoba *et al.*, 2017). Thus, there is a growing need to achieve a coordinated and collaborative recovery process (Oloruntoba *et al.*, 2017).

## The relationship between pre-disaster planning and post-disaster recovery

Pre-disaster planning reduces the risks of natural disasters (Saunders *et al.*, 2007; Strusińska-Correia, 2017). It plays a crucial role in mitigating post-disaster effects and involves structural and non-structural measures including risks assessments, land-use management, asset management and other risk-reduction projects (Jensen, 1998; Godschalk *et al.*, 1999; Saunder *et al.*, 2007). Even though infrastructural measures are constructed with extreme events in mind, there are limitations to structural protection barriers (Koshimura *et al.*, 2014). Many studies have shown that the sole reliance on structural protection against natural disasters is not recommended (Koshimura *et al.*, 2014; Plümper *et al.*, 2017), and this is exemplified by the case study below. Thus, the focus is shifting from infrastructural investments towards educational investments (Strusińska-Correia, 2017; Plümper *et al.*, 2017). In other words, there is focus on mitigation measures in a longer term, shifting from reactive to proactive approaches for natural emergency management policy (Godschalk *et al.*, 1999).

*Case Study: The Tōhoku Earthquake vs Protection Barriers (adopted from Plümper et al., 2017)*

*Many Japanese towns have built tsunami walls to protect against tsunami disasters. The physical barriers gave the community a sense of safety, and as a consequence, people were tempted not to take individual precautionary measures. The Tōhoku Earthquake was larger than expected, and the protection barriers failed to protect the communities as a result.*

Many studies have shown that educational initiatives are practical approaches to the recovery process. The educational initiatives include measures at the local level (Roggema and Yan,

2017) that consists of community engagement and involvement; as well as a shift in the decision-making process and can be reflected in the policy formation process (Lun and Ohba, 2012). However, development of policies, in turn, has complications within and the case study below illustrates the argument by Mochizuki and Komendantova (2017). The ideas introduced by Mochizuki and Komendantova (2017) are reinforced by the research conducted by Goto *et al.*, (2012) and Stimpson (2011), where geomorphic features could inform disaster frequency and occurrence. In conclusion, pre-disaster planning has significant impacts on the post-disaster recovery process, and as mentioned, it involves both physical and intangible elements (Kwok *et al.*, 2016). The following section provides an overview of what post-disaster recovery is and explores the main themes that emerged from the literature research.

*Case study: Proposed changes to policy making following the 2011 Tōhoku Earthquake (adopted from Mochizuki and Komendantova (2017)*

*A sound emergency management is reflected in the underlying policy in place. Many scholars have emphasised on the importance of planning policies when it comes to emergency management, but Mochizuki and Komendantova (2017) argues otherwise. They claim that the current method of policy drafting has an overreliance on documented hazard risks. Mochizuki and Komendantova suggest that policies should be based upon scientific facts. There seem to be limited interactions between decision and policymakers and the scientific community, and the authors argue that it is part of the reason why the government failed to anticipate the catastrophic event in Tōhoku. In order to incorporate lessons learned from the event, they proposed revisions on earthquake and tsunami risks that includes ancient historical texts, tsunami deposits, and other scientific records.*

## Post-disaster recovery framework

A framework that coordinates internal and external collaboration is warranted to implement post-disaster recovery efforts (Roggema and Yan, 2017). It is essential that the framework promotes cross-sectoral integration and partnerships and captures all segments of communities (Kwok *et al.*, 2016). This is because the effectiveness of a framework is tightly intertwined to the economic and social resilience, which itself, is synonymous to the ideas of sustainable management, economic growth and social development (Kwok *et al.*, 2016). In other words, stakeholder collaborations and community involvement are crucial in shaping the reconstruction framework in the economic, environmental, cultural and social environments of

a region (Saunders and Becker, 2015; Mochizuki and Komendantova, 2017; Strusińska-Correia, 2017).

Local contexts also come into play for the post-disaster recovery framework. This includes geographical features and social elements, namely hazards vulnerability, population rate and economic productivity (Strunsińska-Correia, 2017). Besides, the transportation network can also influence decisions on emergency management regarding evacuation routes and infrastructural capacity (Tomsen *et al.*, 2014). Moreover, this presents an opportunity for the framework to utilise the local knowledge and pre-existing social relationships, and thus, strengthening the resilience at a local level and contributing to a more effective recovery framework (Becken and Hughney, 2013; Kwok *et al.*, 2016). However, multiple studies have shown that there is a lack of community focus when it comes to recovery efforts. This is due to poor leadership and minimal collaborations at different levels (Kawata *et al.*, 2018). This has significant implications on the local economy and social capital, and thus, diminishing the resilience factors of a region (Kwok *et al.*, 2016; Kawata *et al.*, 2018). The following sub-section pertain to the importance of post-disaster recovery at a local level.

### Local level post-disaster recovery

Strong community networks and involvement, combined with an enforcing policy framework that is adaptable and open to reviews and adjustments are key to building resilient communities (Shimizu, 2013; Roggema and Yan, 2017). The policy environment influences the recovery process, and it is of concern that few policy documents focus on the concept of resilience (Shimizu, 2013). Resilience is an idea that has been mentioned by multiple scholars. It is defined as the capacity of a system to adapt to disturbance while maintaining its status quo (Chowdhury *et al.*, 2018). Apart from the natural environment, other factors that relate to resilience include the economic environment and the social capital of a community, which is a critical factor in disaster recovery (Jensen, 1998; Kwok *et al.*, 2016). In short, the social capital is closely related to the economic and natural environments and a resilient community is built through a collaborative and inclusive decision-making process (Kwok *et al.*, 2016; Becken and Hughney, 2013). The social environment can be difficult to quantify, but it is important as it highly impacts the quality and speed of the recovery process (Alipour *et al.*, 2015). As mentioned by Kawata *et al.* (2016), there is an unequal focus between physical reconstruction efforts and social restoration in a post-disaster recovery environment. Therefore, in order to

minimise post-disaster community disruption, there is an emphasis on developing social resilience in communities (Hatton *et al.*, 2017). In addition, it promotes community responsibility and self-reliance and thus, improving resilience towards potential disasters (Jensen, 1998). Based on these findings, it became apparent that a top-down approach is neither sustainable, nor it is effective. Thus, it emphasises on the importance of community engagement and establishing functioning community spaces (Kwok *et al.*, 2016).

Community participation is the driving force for the post-disaster recovery process (Chang *et al.*, 2011). However, there is a lack of community engagement and involvement when it comes to post-disaster management (Kawata *et al.*, 2018). This leads to the importance of communication as it plays a key role in influencing community response for the post-disaster recovery process. It is the role of the authorities in charge to distribute relevant and timely information (Jensen, 1998). These include aspects of community recovery, such as resource lists, public information, and rebuild updates (Jensen, 1998; Anikeeva *et al.*, 2014). Community spaces act as a place for post-disaster information distribution and promote health and well-being during the recovery phase (Kwok *et al.*, 2016). Moreover, the social media platform is a powerful form of communication as it provides up-to-date information and reaches a wide scope of demographic. It also acts as a platform for communities to voice their concerns and experiences of the disaster (Anikeeva *et al.*, 2014). In other words, communication goes both ways, and this is crucial when it comes to the post-disaster recovery process. This local-level information exchange between stakeholders and community provides a platform to incorporate the community values in the reconstruction process and utilise local-level knowledge (Becken and Hughney, 2013; Roggema and Yan, 2017). Additionally, it strengthens the community bonds and reinforces the trust between decision-makers and the local community, thus, increasing social resilience (Kwok *et al.*, 2016; Roggema and Yan, 2017). Although participative processes create a platform for community education and strengthens resilience level both on spatial and temporal scales, it can be complex and time-consuming (Roggema and Yan, 2017) The diverse range of stakeholders also means a diverse range of views and priorities, which poses as another challenge in practice. Conversely, the portrayal of negative media would influence the recovery process (Becken and Hughney, 2013).

Collaboration is also a key concept discussed by multiple scholars. There are strong arguments that collaboration provides a platform for data collection and exchange (Hatton *et al.*, 2017)

and strengthens the relationships amongst the stakeholders involved in the recovery process (Karunasean and Amaratunga, 2016). Intergovernmental collaboration is essential when it comes to emergency management in terms of development of policies (Godschalk *et al.*, 1999). However, local level involvement is equally important and this is also one of the major gaps identified in the literature. There is a lack of collaboration at the local level (Kawata *et al.*, 2018) and decisions are made at a high level that are often not inclusive of the vulnerable sectors (Becken and Hughney, 2013). Local level mitigation measures are important and this needs to be addressed as collaboration creates a dialogue between people (Godschalk *et al.*, 1999; Nguyen *et al.*, 2017) and it plays an important role when it comes to resourcing for post-disaster recovery efforts (Chang *et al.*, 2011).

Resource availability is a key theme discussed by multiple authors. This is because the availability of resources is regarded as the driving force for the success of a recovery process (Singh and Wilkinson, 2008; Chang *et al.*, 2011). There is a variety of resources needed after a disaster. This includes human, financial, logistical and administrative support (Shimizu, 2013). The commitment of resources for post-disaster management needs to be put in place in policies and strategies to ensure effective and efficient management in an emergency environment (Jensen, 1998). Coordination of the resources from the different stakeholders is also vital in a post-disaster recovery environment (Chang *et al.*, 2011). Additionally, there is an emphasis on integrating local resources into post-disaster recovery efforts because it improves resilience in the community (Roggema and Yan, 2017). However, resources are often limited, and it can be difficult for post-disaster management, especially when the complex and uncertain nature of disasters is added into the equation (Shimizu, 2013). Besides, the lack of resources has an impact on pre-disaster reduction initiatives (Becken and Hughney, 2013), and thus, affecting the quality of the recovery process (Kwok *et al.*, 2016).

Awareness is another crucial factor in the post-disaster recovery process. It is of utmost importance because raising awareness promotes a higher level of preparedness, which, as mentioned, is vital for post-disaster recovery (Jensen, 1998). Moreover, lessons learned from previous events could be incorporated into emergency policies to better manage future disasters (Lawson *et al.*, 2018). Thus, there is a need for flexible and adaptable policies that integrate and coordinate the knowledge and process in a post-disaster recovery environment (Shimizu, 2013). This addresses the uncertainty and complexity of future events and thereby, increases the resilience of a community (Shimizu, 2013). The media also plays a role when it comes to

raising awareness of the community (Kawata *et al.*, 2018). The local authority is also playing a vital role in promoting public awareness through risk-reduction activities at a local level (Jensen, 1998; Roggema and Yan, 2017). The communication at the local level allows for better coordination of emergency management (Lawson *et al.*, 2018). Thus, leadership plays a vital role when it comes to connecting community networks and prioritising recovery activities that contributes to medium and long-term recovery (Becken and Hughney, 2013; Kwok *et al.*, 2016).

Disaster waste is also increasingly seen as an important field of research for post-disaster recovery. Roggema and Yan (2017) discussed the complexity of disaster wastes and how that affected the recovery process. Hayashi (2012) conducted similar research on disaster wastes and its implication on the local industries. One of the key themes discussed by the scholars is the economic damage from disaster wastes. Even though there is an economic boost during the reconstruction phase, there are long term economic and psychological impacts that persists long after a disastrous event (Hayashi, 2012). The case study below illustrates the nuclear disaster in the Tōhoku region.

*Case study: Implications of disaster wastes in the Tōhoku region, Japan [adopted from McCurry, 2011 and Hayashi, 2012]*

*In 2011, the Tōhoku region in Japan was severely impacted by a threefold disaster event consisting of an earthquake, tsunami and a nuclear power plant accident. The meltdown of the nuclear power plant in Fukushima lead to contaminations of radioactive materials in the surrounding areas. Apart from the psycho-social impacts, this has significant effect on the local industries (agriculture and fishery) as communities were evacuated from the affected regions. The effects were evident when consumers were hesitant purchasing food and products produced in the in the Fukushima area, even when government officials and international health experts have deemed it safe to consume.*

## Chapter Summary

This analysis of the academic literature has presented the key concepts and debates around post-disaster recovery. As discussed, pre-disaster management highly impacts post-disaster recovery process in the social and economic environments. A bottom-up recovery process is vital to improving the resilience of the communities. The main points discussed in this chapter are intertwined and include community engagement and involvement and how that comes into play with awareness and resource availability (Figure 2-2). There are several case studies included to illustrate some of the concepts introduced in the literature.



*Figure 2-2 The diagram above shows the key themes emerged from the academic literature review.*

# Chapter 3: Assessment of Policy and Planning Documents

This chapter presents the policy and planning context in place for post-disaster recovery management in New Zealand and Japan. The first section consists of a content review of the policies and planning documents in order to evaluate the post-disaster recovery environments in the Tōhoku and Kaikōura regions. The results of the content analysis are discussed at the end of the section. The documents were selected on the basis on their influence and application in the recovery process in the respective regions (Table 3-1). This is to assess the effectiveness of the plans and policies in place and to corroborate with the findings from the key informant interviews.

*Table 3-1 The table below lists the policies and planning documents reviewed.*

| Japan | New Zealand |
|---|---|
| • Basic Act on Reconstruction in Response to the Great East Japan Earthquake (2012)<br>• Act on Special Measures for the Reconstruction and Revitalisation of Fukushima (2012)<br>• Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake in the "Reconstruction and Revitalisation Period (2016)<br>• Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake (2011)<br>• Outline of the System of Special Zone for Reconstruction (2011)<br>• Towards Reconstruction "Hope beyond the Disaster" (2011) | • Resource Management Act (1991)<br>• National Coastal Policy Statement (2010)<br>• Recovery Management- Director's Guidelines for CDEM Groups (2005)<br>• National Civil Defence Emergency Management Plan Order (2015)<br>• Hurunui/Kaikōura Earthquakes Recovery Act (2016)<br>• National Disaster Resilience Strategy (2019) |

## Introduction

The Japanese government consists of a three-tiered administration: the national government, prefectures and municipalities (Ogata, 2016). The Minister of State for Disaster Management is appointed to the Cabinet. The Disaster Management Bureau is involved in the development of disaster management plans and overall coordination on the response to disasters (Ogata, 2016). The Reconstruction Agency was established to implement government policies and to manage reconstruction strategy and initiatives following the 2011 Tōhoku Earthquake. This involves allocating financial assistance and implementing guidelines and plans by the Government for the recovery process in the Tōhoku region (Reconstruction Agency, 2019). The Agency is temporarily established within the Cabinet and headed by a Minister to administer reconstruction efforts for a period of ten years (Figure 3-1).
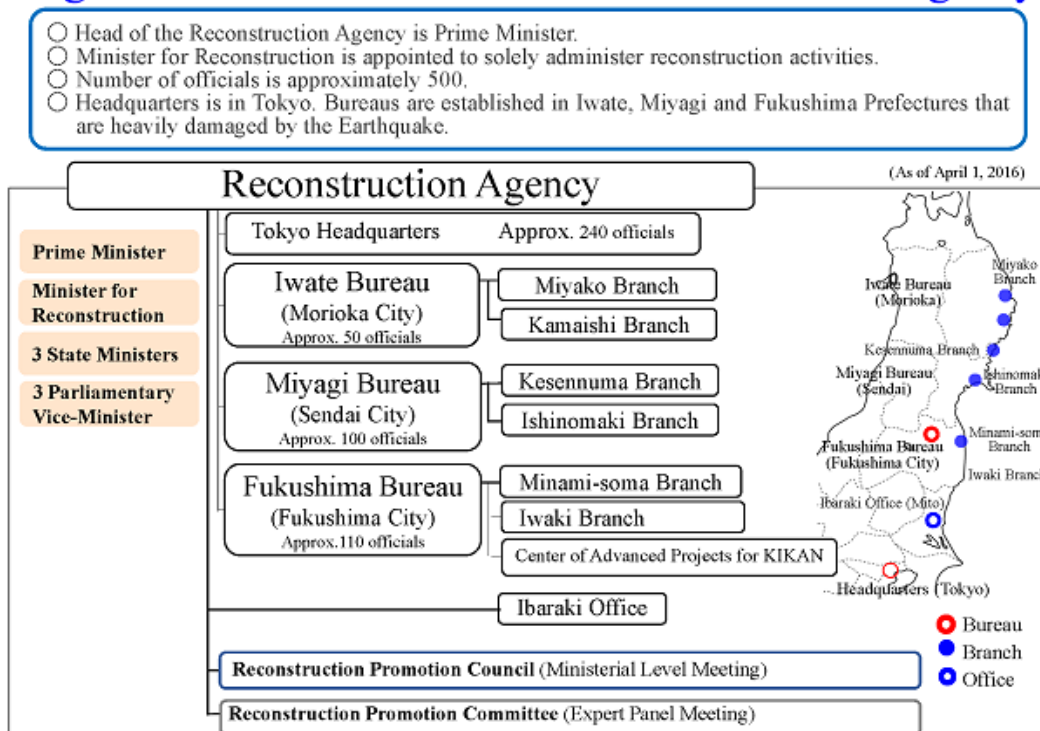


*Figure 3-1 The structure for the recovery process in Tōhoku, Japan. The Agency was set up to accelerate structural reconstruction and revitalisation of the affected regions in Tōhoku.[sourced from Reconstruction Agency, 2019]*

Similarly, the governance structure in New Zealand consists of the national, regional and local government. In the Kaikōura context, a national recovery management structure was placed upon the Kaikōura District Council. This is because the Kaikōura District Council declared the

event as a national emergency (Woods *et al*., 2017). The national agencies coordinate the efforts working with the CDEM groups and the task groups/ subtask groups to promote parallel arrangements between the local, regional and national levels (Figure 3-2). The ministers may meet as the Domestic and External Security Coordination (DESC) Committee to monitor the responses and provide strategic level oversight. ODSC supports ministers in developing high-level strategic direction, policy and priorities and in authorising additional resources to deal with the disaster. This is to achieve timely, effective, whole-of-government responses with minimal interference to the statutory powers and responsibilities of ministers and departments. The recovery coordinators are appointed by the Minister on the recommendation of MCDEM's director, who are involved with the local-level management.
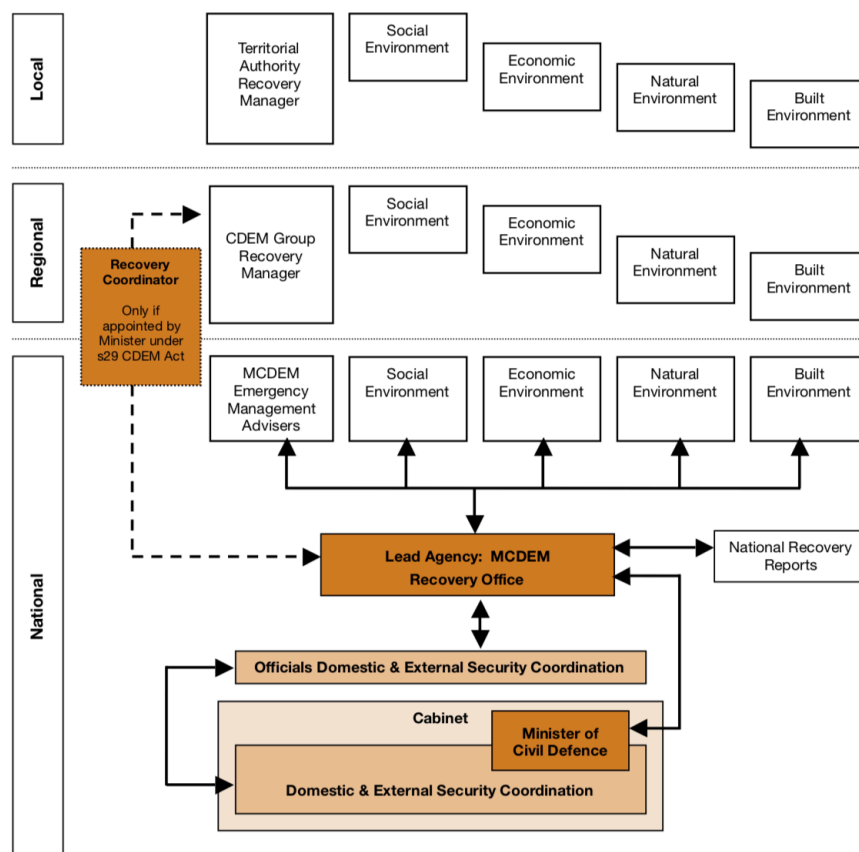


*Figure 3-2 The diagram shows the recovery structure following the Kaikōura Earthquake in 2011. [sourced from Recovery Management- Director's Guidelines for CDEM Groups, 2005]*

## Policy and Planning Documents in Japan

There is a number of planning documents and policies pertaining to post-disaster recovery in Japan. These documents were selected for their influence on the reconstruction process in the Tōhoku region. It is important to note that the documents are discussed in the order of higher-ranking policies to lowest ranking to illustrate the provisions of the statues. The documents were translated by from the Reconstruction Agency, thus, providing more ground and credibility.

### Basic Act on Reconstruction in Response to the Great East Japan Earthquake (2012)

The Act describes the reconstruction process following the 2011 Tōhoku Disaster. The purpose of the Act is to provide smooth and prompt reconstruction from the Great East Japan Earthquake and revitalising the image of a vibrant Japan. The document presents the basic philosophy to achieve an effective reconstruction process. It also provides provisions on financial resources for reconstruction. Additionally, the Act creates the system of Special Zone for Reconstruction, by which the details will be outlined in later sub-sections.

Article 2 presents the Basic Philosophy of which the reconstruction process will be based upon. This includes economic and social recovery; promoting collaboration; community participation; innovative reconstruction; economic opportunities; cultural and social restoration and management of nuclear accident. Overall, the article sets out the aims to revitalise the economy, promotes collaboration between central and local government, emphasises community involvement and encourages innovative measures that address demographic changes and shifts in the socio-economic climate.

The Act also sets out the responsibilities of the government, local government and the importance of community participation. As mentioned, the Act also creates a System of Special Zone for Reconstruction. The document outlines that the Reconstruction Headquarters will manage the reconstruction process in response to the Great East Japan Earthquake. The Headquarters old the jurisdiction for planning, drafting and the overall coordination of the Basic Guidelines for Reconstruction. The Act also provides provisions on the establishment of the Reconstruction Agency and Reconstruction Design Council.

## Act on Special Measures for the Reconstruction and Revitalisation of Fukushima (2012)

This Act is established to facilitate the reconstruction and revitalisation of Fukushima following the nuclear disaster. This consists of guidelines and special measures for the reconstruction. It also includes measures for revitalising regions where evacuation orders have been or are to be lifted. The Act incorporates aspects from public health, economy and social inclusion to assist independence and autonomy of local governments in Fukushima. It also lays out the roles and responsibilities (delegated authority) of the Prime Minister, Governor of Fukushima Prefecture, Cabinet and other governmental bodies. It also includes provisions for agricultural activities and the Port and Harbour Facilities, Road Act, Coast Act. This also includes living environment improvement projects, special housing, financial support and Council Stabilisation of Housing to assist evacuees due to the effects of the Nuclear Disaster. The document also outlines research and development concerning the effects of radiation on human bodies, contamination surveys, public health and initiatives contributing to the creation of new industries. The Act also provides details on strengthening international competitiveness in the industry through the use of renewable energy sources.

## Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake in the "Reconstruction and Revitalisation Period" (2016)

This guideline was enacted in response to the 2011 Tōhoku Earthquake. The guideline provides details of the role of the Japanese Government regarding post-disaster recovery efforts. The first section of the guideline outlines the current state of the reconstruction as of 2016. To quickly summarise, there is a 10-year reconstruction plan and the first five years leading up to 2015 was categorised as the "intensive reconstruction period". There was a heavy focus on the structural restoration around the affected regions. It includes constructing permanent housing complexes and decontamination from the nuclear plant disaster around Fukushima. Furthermore, the guideline focusses on the restoration of the local industries and livelihoods of the affected communities. The scale of the damage of the affected areas parallels with the progress of the reconstruction efforts. In other words, the bigger the damage, the longer it takes for restoration efforts. As the reconstruction advances, more support is needed for the local communities and individuals affected by the disaster. Thus, the latter five-year of the reconstruction phase is allocated as the "reconstruction and revitalisation period". This recovery phase emphasises the social aspects of the recovery process. This phase of recovery

focuses on responding to the challenges and needs drawn from the experiences and lessons learned as the reconstruction progresses. This is achieved by creating a local revitalisation model that emphasises on self-reliance and forming community networks in disaster-affected areas.

In terms of financial support, the government have allocated 32 trillion yen over the ten-year reconstruction period for the recovery and reconstruction projects around the Tōhoku region. These funds are intended to support reconstruction activities and promote the rebuilding of cities and towns that are more resilient to future disasters. The government addresses mid- to long-term issues such as population and economic decline in the affected areas. There is also an aim to promote the affected areas as destinations for both tourists and residents, creating the image of a "New Tōhoku". The document also outlines specific initiatives in each sector, namely, psycho-social recovery, structural restoration, revitalisation of industry and livelihoods, management of the nuclear plant, and creation of "New Tōhoku". This consists of a range of public-private partnerships and involves a variety of stakeholders, including non-profit organisations. The document also describes the development of a national model when it comes to post-disaster management. The national model involves utilising human resources of both national and local governments, as well as human resources from private sectors like non-profit organisations and universities. An example of a specific initiative is leveraging from events like the 2020 Tokyo Olympics and the 2019 Rugby World Cup to help revitalise the image of the Tōhoku region.

As mentioned, psycho-social recovery is one of the critical foci outlined in this document. This includes all demographics and involves physical restoration measures such as relocation from temporary to permanent housing located upland to minimise effects from future disasters. Assistance is also provided to affected individuals to form community bonds and integrating with the existing communities. Reconstruction efforts also include revitalisation of towns, restoring transportation networks, developing and rebuilding medical and educational facilities. It is important to note that the restoration of critical infrastructure services like roads, water and sewerage services have been prioritised in the "intensive reconstruction period" following the 2011 disaster. The recovery and reconstruction work outlined in this document focusses on finalising the transportation and logistical networks.

Besides, the document details the restoration of agricultural activities along with the move towards a more disaster-resilient economy and community. As outlined in the guideline, this is supported by the Reconstruction agency of the municipalities through human and financial resources. As mentioned, self-rebuilding of residential properties is promoted and financial support is outlined in the Schedule for Housing Reconstruction. About the reconstruction of local industries, there is a focus on creative reconstruction. This focusses on tourism and restoring fishery processing facilities. There is also a push for self-reliant, sustainable, dynamic and productive local industries, which is outlined in the Strategy for Creation of Industrial Reconstruction. The guideline also mentions the Special Zone for Reconstruction. These are areas with specific regulations and support measures to revitalise affected industries and residents' livelihoods. Furthermore, the document summaries different forms of financial supports and includes provisions on grants allocation to struggling local authorities.

The guideline also provides details on international and local support for the nuclear plant disaster. These include evacuation orders, reconstructing and revitalising the Fukushima Prefecture, promoting cooperation between prefectures and decontamination of the nuclear wastes. In terms of the management of nuclear wastes, this is achieved by research, safe handling of contaminated materials, and management of disposal sites. The document also proposes establishing hubs for international and industrial and academic collaboration to investigate avenues of renewable energies, agricultural, forestry and the fishery sectors. Assistance is also provided to the evacuees to promote a stable living environment. The document concludes by stating that there will be archiving of data to make sure the lessons learned are passed down and help develop a more proactive attitude towards disaster management.

### Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake (2011)

This Guideline outlines the measures for recovery and reconstruction over ten years following the 2011 Tōhoku Earthquake, in terms of economic and disaster prevention and reduction measures. The support for reconstruction is listed and includes the incorporation of local-level resources. This input of resources would be from the local governments and private sectors unaffected by the disaster. The document also discusses the revision of the administrative systems. This consists of amendments to procedural measures and offering financial support and human resources. The Guideline also introduced the System of Special Zone for

Reconstruction, which is established to assist affected communities concerning regulations and administrative procedures; economic aid packages; and streamlining multiple authorisation processes to accelerate reconstruction efforts. The document also details the flexibility in government grants for the local governments. This is related to subsidiary projects like road and school construction. It also includes provisions on regional government securing funding by selling state-owned properties; reducing governmental expenditures; and temporary taxation measures.

The document also provides details on reconstruction efforts through private sectors. There would be the utilisation of private sector funding and knowledge for the reconstruction process. It also focusses on building disaster-resistant and resilient regions that would respond to the challenges of aging communities. To summarise, this includes prioritising infrastructures based on selection and population concentration, community safety, promoting renewable energy and environment, utilising local resources and disaster reduction measures with a combination of soft and hard measures. The regional conditions like geography and topography will also be taken into account. Furthermore, the document encapsulates local level measures which include providing secure and stable residence for affected communities; offering human resources assistance to support for the planning of municipalities; and aiding reconstruction projects.

The document also introduces an employment measure called "Japan as One". This assists employment issues and opportunities and lifestyle stability of the affected communities. In addition, the Guideline also promotes education by rebuilding schools. To address the issues, the government also provides financial assistance and offers to counsel to children affected by the disaster. In terms of economic activities, the document gives priority to early recovery logistic infrastructure. This includes roads, ports, harbours and seaside railways. As mentioned, the document promotes renewable energy sectors and social inclusion and introduces the idea of "Cool Japan Initiatives". This provides a platform for the promotion of a positive image for the Tōhoku region. International examples are also drawn to assist in the recovery process. To better prepare for future disasters, the Guideline suggests establishing a standard system which can be utilised nation-wide. This would include improvement on disaster observation, monitoring and forecasting. The document also stresses on a review of the emergency policy to improve the response capacity of the fire department, police and coast guards and promotes the concept of tsunami resilient community-building. The Guideline creates a framework for disaster-prevention education, incorporating the idea of escape measures and developing the

capacity of security forces. In addition to the structure of government for reconstruction and the follow-up mechanisms, the Guideline also presents provisions for research and record on nuclear management.

## Outline of the System of Special Zone for Reconstruction (2011)

This document presents the process of a Special Zone for Reconstruction following the 2011 Tōhoku disaster. This includes a variety of incentives like tax breaks, funding, and deregulation and simplified procedure in areas identified as Special Zone for Reconstruction (Figure 3-3). This document outlines the mechanisms to support reconstruction efforts by local governments. In terms of regulations and procedures, there are reduced requirements for residential properties and industry development. For example, special permits would be issued for developing in exclusive zones; and there would be minimal procedures required for facilities related to food, forestry, biomass energy. This is to facilitate businesses for manufacturing and retail in the affected regions (Figure 3-4). Furthermore, the planning document details the restructuring of land use; along with tax breaks and grants to promote investments and employment opportunities through reconstruction projects. Figure 3-5 summarises the framework of the law for Special Zone for Reconstruction.
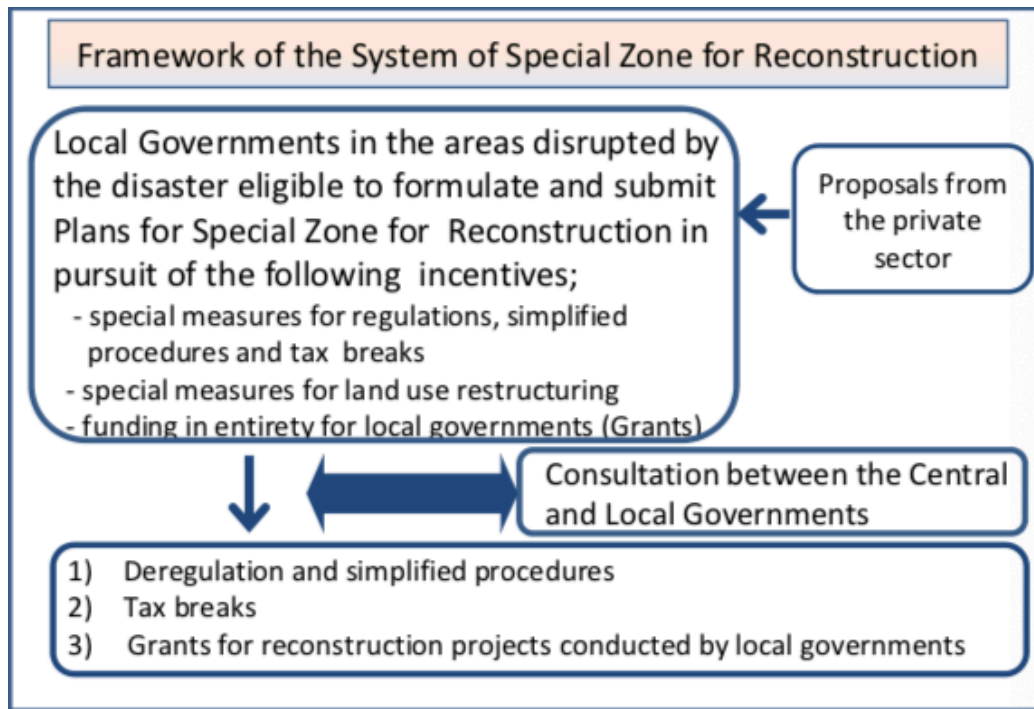
*Figure 3-3 The diagram shows the Framework of the System of Special Zone for Reconstruction in the Tōhoku region in response to the 2011 disaster. It shows the process of assigning affected areas into Special Zone for Reconstruction. [Sourced from Outline of the System of Special Zone for Reconstruction, 2011*



*Figure 3-4 The diagram above illustrates three examples of the reconstruction plan and projects for areas allocated as Special Zone for Reconstruction. [Sourced from Outline of the System of Special Zone for Reconstruction, 2011*

## Framework of the law for Special Zone for Reconstruction

Municipalities located in the "disaster afflicted zones", stipulated in the Act on Special Provisions of Article 3 of the Public Finance Act, can formulate plans on the Special Zone for Reconstruction to be submitted to the Government for the package of special arrangements.

**Basic Guidelines for the Special Zone for Reconstruction (To be decided by the Cabinet)**
- Significance of smooth and swift reconstruction in the Special Zone for Reconstruction
- Basic guideline for necessary assistance and other measures to be taken by the Government for afflicted municipalities for smooth and swift reconstruction in the Special Zones
- Basic elements of approval system of Reconstruction Acceleration Plans
- Special measures and arrangements to be taken in the Special Zones

**Consultative body of Central and Local Governments**

established in each Prefecture, held in regions affected by the disaster and directed by the future Reconstruction Agency to discuss proposals from local authorities on special arrangements and other related elements (working groups can be set up by region)

Add and/or enhance special arrangements

**Reconstruction Acceleration Plan**

Plan to apply for special measures and arrangements involving deregulation, reduced procedures, tax incentives and other special measures.

Formulated by Prefectures and municipalities separately or jointly. Private enterprises are entitled to make proposals.

**Approval by the Prime Minister**

- Special deregulation and reduced procedures covering housing, industry, town- building, medical services, nursing care and others.
- Tax incentives to promote employment and industrial activities
- Interest substitute for loan lenders

**Land Restructuring Plan**

Plan to apply for special arrangements involving approval, procedures, etc. for land restructuring

Formulated by municipalities alone or jointly with Prefecture.

- Public hearings, announcement and inspection when necessary
- Consultation and agreement in the process of consultation on restructuring

Disclosure of Plans

**Special arrangements for land use restructuring**
- Special arrangement of concession necessary for projects
- Integrated "one-stop" procedures
- Creation of new types of project system related to land use.

**Reconstruction Grant Projects Plan**

Plan involving grant projects (projects for reconstruction in areas severely affected by the disaster)

Formulated by municipalities alone or jointly with Prefecture.

**Submission to the Prime Minister**

**Reconstruction Grant to support regional reconstruction**
- Unified subsidy projects for municipalities (originally 40 projects at different ministries)
- Secure resources with flexible use for local governments
- Central government will finance all the local expenditures
- Flexible implementation and simplified procedures

*Figure 3-5 The diagram shows the framework of the Law for Special Zone for Reconstruction in the Tōhoku region. It outlines the key process within the framework for areas assigned as Special Zone for Reconstruction. [Sourced from Outline of the System of Special Zone for Reconstruction, 2011]*

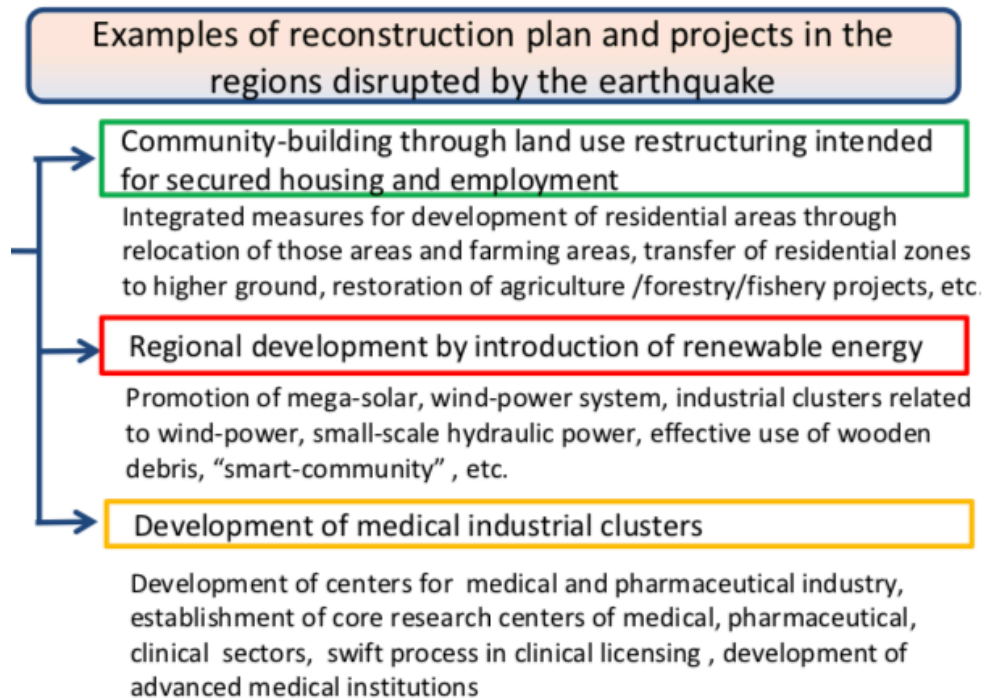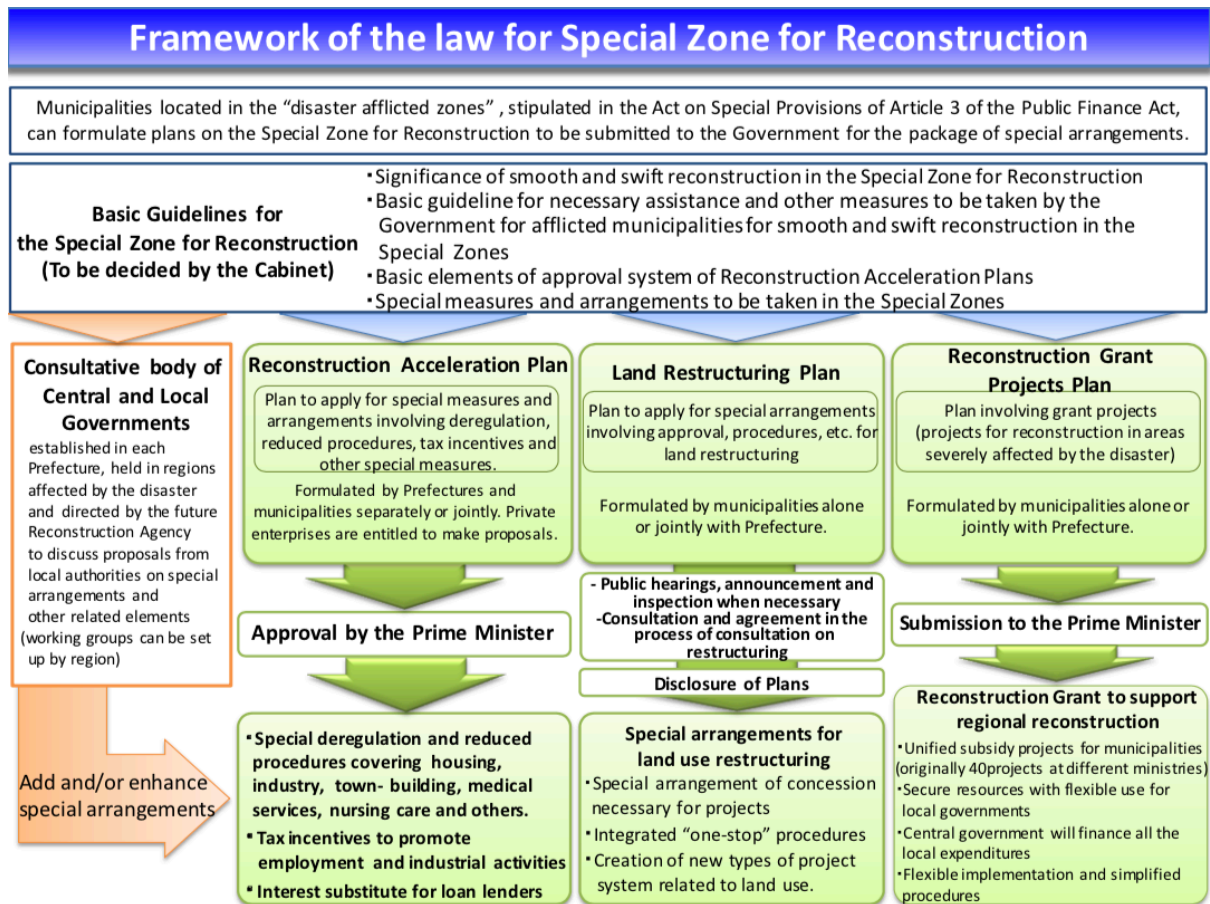Towards Reconstruction "Hope beyond the Disaster" (2011)

This document outlines the "Seven Principles for the Reconstruction Framework" for the Tōhoku region following the 2011 Tōhoku Earthquake. The following table outlines the principles and is sourced from the document. These principles were formulated by the Reconstruction Design Council to act as the guiding philosophy for the report.

*Table 3-2 The table below outlines the Seven Principles for the Reconstruction Framework sourced from Towards Reconstruction "Hope beyond the Disaster" (2011).*

| Seven Principles for the Reconstruction Framework | |
|---|---|
| Principle One | For us, the surviving, there is no other starting point for the path to recovery than to remember and honor the many lives that have been lost. Accordingly, we shall record the disaster for eternity, including through the creation of memorial forests and monuments, and we shall have the disaster scientifically analyzed by a broad range of scholars to draw lessons that will be shared with the world and passed down to posterity. |
| Principle Two | Given the vastness and diversity of the disaster region, we shall make community-focussed reconstruction the foundation of efforts towards recovery. The national government shall support that reconstruction through general guidelines and institutional design. |
| Principle Three | In order to revive disaster-afflicted Tohoku, we shall pursue forms of recovery and reconstruction that tap into the region's latent strengths and lead to technological innovation. We shall strive to develop this region's socioeconomic potential to lead Japan in the future. |
| Principle Four | While preserving the strong bonds of local residents, we shall construct disaster resilient safe and secure communities and natural energy-powered region. |
| Principle Five | Japan's economy cannot be restored unless the disaster areas are rebuilt. The disaster areas cannot be truly rebuilt unless Japan's economy is restored. Recognizing these facts, we shall simultaneously pursue reconstruction of the afflicted areas and revitalization of the nation. |
| Principle Six | We shall seek an early resolution of the nuclear accidents, and shall devote closer attention to support and recovery efforts for the areas affected by the accidents. |
| Principle Seven | All of us living now shall view the disaster as affecting our own lives, and shall pursue reconstruction with a spirit of solidarity and mutual understanding that permeates the entire nation. |

The document outlines a list of recommendations that involves drawing lessons and commemorating the disaster; community focussed reconstruction; tapping into local strengths to promote technological innovation; preserving strong community bonds; restoring the economy, and resolution for nuclear accidents. The document presents a comparison amongst the Great East Japan Earthquake, the Great Kanto Earthquake and the Great Hanshin-Awaji Earthquake. The challenges compounded by the nuclear accident was also detailed in the document. The plan introduced a new concept for rebuilding and reconstruction. This focuses on the local communities and emphasises on the concept of disaster reduction. This also includes building communication networks and revitalising the local community. Additionally, the document discusses a long-term outlook regarding population changes, landscapes, public transportation and energy conservation.

There are targeted recommendations specific to the regions. The extent of damage of each region was assessed and categorised into different scales, from low lying areas to inland areas damaged by liquefaction. This document also integrates existing land-use planning procedures and coordinates reconstruction with existing land-use planning systems. There are also adjustments proposed for land usage through planning projects and land improvement projects. The roles of the national, municipal and prefectural governments were laid out in the document. The national government is responsible for setting the overall policy for the reconstruction efforts but focussing on municipality-led reconstruction. This local-level reconstruction process incorporates local resources and knowledge, whereby support is provided for struggling municipalities by the national government.

The document also outlines efforts on restoring life and livelihoods of the affected communities. This is discussed with regard to culture, health, the revival of local economic activities, connecting infrastructure to the local economy (e.g. renewable energy) and allocating special zones for reconstruction. Moreover, the document presents recommendations for the management of the nuclear accident in 2011. These include reconstruction efforts in terms of responding to future disasters and managing the health of the communities. There is also an emphasis on open reconstruction where it consists of the participation of the local communities, drawing lessons from international communities and information sharing and research on post-disaster recovery. The document also noted that the legislation had been formulated in response to the disasters, and there is currently no general system or structure created to respond to future tsunami disasters.

## Policy and Planning Documents New Zealand

Apart from the *Hurunui/Kaikōura Earthquakes Recovery Act (2016),* the other documents assessed in this chapter are non-specific to the Kaikōura recovery efforts. However, these documents were selected on the basis of their influence on the recovery process in the region. These documents are related to the legislative framework and recovery guidelines that informed the recovery process in Kaikōura. The documents will be discussed in chronological order of the oldest to latest.

### Resource Management Act 1991

The Resource Management Act is the primary environmental statue in New Zealand. The purpose of the Act is to promote the sustainable management of natural and physical resources in New Zealand. This includes managing the use, development and protection of natural and physical resources which allows people and communities to provide for their social, economic, and cultural wellbeing. The Act defines the jurisdiction over decision-making. It does not specifically address the issues of the post-disaster recovery process, but it defines the "management of significant risks from natural hazards" as one of the "matters of national importance" under part 2. It states the roles and functions of the territorial authorities in "avoiding or mitigating" the effects from natural hazards. In addition, it creates a framework for policy statements and planning documents, taking into account the social, cultural, built and natural environments.

### Recovery Management- Director's Guidelines for CDEM Groups (2005)

This Guideline provides a coordinated framework for recovery planning and management in New Zealand. It is designed to help CDEM Groups with the recovery process and development of recovery plans. The document states that a management framework that incorporates management of national, regional and local level is required. It emphasises the importance of recovery activities and describes that recovery activities begin while the response activities are still in progress. This is because the decisions made during the response phase will have an influence on the recovery action plan. It also notes that community involvement and communication are two important factors of the recovery process. Additionally, it stresses on the importance of having an exit strategy (i.e. marking an end to the support during the recovery

period) in place, allowing a smooth transition from formal recovery assistance to business-as-usual.

The document provides a comprehensive guideline for the development of CDEM Group Plans in relation to coordination of resources, community rehabilitation, reduction measures, economic revitalisation, environmental restoration and social recovery. This includes a range of measures, from land-use planning to public education. The Guideline also provides details on the governance structure in a recovery environment. It consists of the roles and responsibilities at the national, regional and local level. Within the governance structure, task groups may be set up, and within the task groups there may be subtask groups depending on the scale of the emergency. There is the recovery management group, which reports to the CDEM Group; the social environment task group; economic environment task group; built environment task group, and the natural environment task group.

## New Zealand Coastal Policy Statement 2010

The New Zealand Coastal Policy Statement (NZCPS) is a national policy statement under the Resource Management Act 1991. The purpose of the Act is to state policies in relation to the coastal environment of New Zealand. One of the key fields the Act focusses on is promoting sustainable management in "activities in the coastal environment that are susceptible to the effects of natural hazards such as coastal erosion and tsunami, and those associated with climate change".

Objective 5 of the NZCPS states that coastal hazard risk, taking account of climate change are managed by land-use planning measures; risk-reduction measures; and protecting or restoring natural defences to coastal hazards. The NZCPS also notes the need for integrated management of natural and physical resources in the coastal environment. This also include identifying areas that are potentially affected by coastal hazards, and in those areas, development would be limited and managed to minimise the adverse effects from coastal hazards.

## National Civil Defence Emergency Management Plan Order (2015)

The National Civil Defence Emergency Management Plan Order became operative on 1st December 2015. The purpose of the plan is to define the guiding principles and states the roles

and responsibilities for Civil Defence Emergency Management (CDEM) across the reduction, readiness, response and recovery phases (4 Rs) at the national level. This is so all agencies and CDEM Groups could:

- *Understand the hazards and risks; and*
- *Work to reduce those hazards; and*
- *Build resilience in respect of those hazards; and*
- *Build capability and capacity to provide co-ordinated, integrated, and effective response to, and recovery from, emergencies.*

*Sourced from Part 2 of National Civil Defence Emergency Management Plan Order 2015*

As stated in the plan, the audience for this plan is for agencies and CDEM Groups during a state of national emergency, a national transition period, or an emergency requiring co-ordination and support at the national level. This plan creates a framework to managing hazards and risk at a national level. The list of hazards (either singular or in combination) includes earthquake, volcanic hazards, tsunamis, wildfires and urban fires, animal pests and diseases and infrastructure failures. This plan can be used to address the consequence of an emergency arising from any hazards. Possible consequences include displacement, isolation, loss of lifeline utility services, structural damage, economic losses, environmental and cultural degradation. The Plan also provides recommendations for risk management standard and coordinates resources needed for the local management of emergency. The role of each agency and CDEM Group is stated and include monitoring development and evolving trends in hazards. It also consists of assessing risks and communities' vulnerability and implementing measures across the 4 Rs.

The Plan sets out the structure of emergency management under the Act. It allows the declaration of a state of national emergency, which gives power to the National Controller with a delegation under section 10 of the Act. The National Controller will co-ordinate, direct and control the resources during the transition period. In addition, the Act creates an Officials Committee for Domestic and External Security Coordination (ODESC) system, which provides policy oversight and governance of national security issues. It operates at the National Security Committee of Cabinet level, which is the main decision-making body of executive government for coordinating and directing national responses in case of a national emergency. Furthermore, part 5 of the Act states the roles and responsibilities of government agencies at

the national, regional and local level. The agencies include Ministry of Civil Defence and Emergency Management, CDEM Groups and Clusters (e.g. telecommunication provides, welfare services, science and research providers, international assistance providers).

The Plan is prescriptive and defines the objectives and principles across the 4 Rs. For the purpose of this research, details regarding the recovery phase is provided. As defined in part 9 of the Act, recovery involves "the co-ordinated efforts and processes used to bring about the immediate, medium-term, and long-term holistic regeneration and enhancement of a community following an emergency". The objectives of the recovery phases include minimising the consequences of emergency; restoring the social, psychological, economic, cultural, built, and natural environments; introducing opportunities to adapt to future needs of the community and reducing effects of future events. The principles of recovery involve the four environments, namely, social, economic, natural and built. The Act states that recovery processes should be adaptable and flexible. The recovery measures should also be implemented "as soon as practicable" to enable "individuals to continue functioning as part of the wider community".

## Hurunui/Kaikōura Earthquakes Recovery Act 2016

The purpose of this Act is to assist in response and recovery processes for the councils and communities affected by the Hurunui/Kaikōura Earthquake in 2016. The assistance provided will be in relation to the following.

1. *Provide for economic recovery;*
2. *Provide for the planning, rebuilding, and recovery of affected communities and persons, including-*
   a. *The repair and rebuilding of land, infrastructure the repair and rebuilding of land, infrastructure, and other property of affected communities or of any affected persons; and*
   b. *safety enhancements to, and improvements to the resilience of, that land, infrastructure, or other property; and*
   c. *facilitating co-ordinated efforts and processes for short-term, medium-term, and long-term recovery; and*
   d. *facilitating the restoration and improvement of the economic, social, and cultural well-being, and the resilience, of affected communities or of any affected persons; and*
   e. *facilitating the restoration of the environment.*

   *Sourced from part 1 of the Hurunui/Kaikōura Earthquakes Recovery Act 2016*

Part 2 of the Act sets out the provisions for the Orders in Council. It is important to note that these have been repealed on 1st April 2018, which emphasises the short-term, event-specific nature of the legislation. To summarise, the Act describes the roles and functions of the Governor-General, relevant Minister and the Hurunui/Kaikōura Earthquake Recovery Review Panel. The  Minister must appoint Recovery Review Panel of up to 6 persons in relation to environmental protection; mātauranga Māori and tikanga Māori; law, public administration or local government; and the nature of the affected communities (e.g  rural or urban). It also outlines the related supporting documents, which includes the *Building Act 2004*; *Conservation Act 1987*; *Civil Defence Emergency Management Act 2002*; *Local Government Act 1974*; *Land Transport Act 1998*; and *Social Security Act 1964*.

## National Disaster Resilience Strategy (2019)

The National Disaster Resilience Strategy defines the goals and objectives for Civil Defence Emergency Management. It aims to incorporate lessons learned from the 2011 Canterbury and 2016 Kaikōura Earthquake, along with other events in New Zealand and overseas. This document sits alongside a range of supporting documents, including the *National CDEM Plan and Guide, the National Security Handbook, CDEM Group Plans*. There are three priorities set out for the Strategy and a list of key focus of each priority is provided (Table 3-3).

The Strategy has a focus on wellbeing and resilience. It looks beyond quantifiable costs of damage and rebuild and addresses a web of social and economic disruption. This is important as it leads to a flow-on effects to businesses and employment, psychological trauma, dislocation of communities, creation and exacerbation of social issues, disruption to normal lives and livelihoods, and uncertainty in the future. The document defines resilience as the ability to anticipate and resist disruptive events. It is achieved by minimising adverse impacts and respond effectively to maintain or recover functionality while adapting in a way that allows for learning and thriving. It is crucial to develop tolerance to a wide range of disasters and have the ability to remain effective across a range of future conditions. As stated in the Strategy, resilience requires an inclusive approach and involves all tiers of government (central, regional and local), the relevant stakeholders and the wider public.

| The priorities for the National Disaster Resilience Strategy | |
|---|---|
| 1 **Managing risks**: what we can do to minimise the risks we face and limit the impacts to be managed if hazards occur; | • Understanding risk scenarios<br>• Establish organisational structure<br>• Raising awareness<br>• Fill in gaps in risk reduction policies<br>• Promote sound development and investment practices<br>• Assess economic impact of disaster and disruption |
| 2 **Effective response to and recovery from emergencies**: building our capability and capacity to manage emergencies when they do happen; and | • Provide for safety and wellbeing of communities<br>• Building relationships with iwi<br>• Improve national leadership<br>• Clearer delegation roles and responsibilities<br>• Develop capability and capacity of emergency management workforce<br>• Encourages informed decisions |
| 3 **Enabling, empowering, and supporting community resilience**: building a culture of resilience in New Zealand so that everyone can participate in and contribute to communities'- and the nation's- resilience. | • Empowering individuals<br>• Promotes social connectedness<br>• Introduce resilience<br>• Address capacity and adequacy of critical infrastructure<br>• Recognises long-term priorities<br>• Develop a culture to resilience |

Furthermore, the Strategy outlines a number of plans and policies relevant to disaster management, including the *Sendai Framework for Disaster Risk Reduction 2015- 2030* and the *CDEM Act 2002*. In short, the CDEM Act 2002 promotes sustainable management of hazards and contributes to the safety and wellbeing of the communities. The Act encourages wide participation at all levels and provides for planning and preparation of emergency events. It requires local authorities to coordinate reduction, readiness, response and recovery activities through regional groups. Moreover, it provides a basis for the integration of national and local

planning through national strategies and plans. Overall, the National Disaster Resilience Strategy 2019 describes the importance of the resilience in communities and promotes a wide, whole-of-society, participatory and inclusive approach when it comes to disaster management.

## Analysis of the contents of policy and planning documents

The *Sendai Framework for Disaster Risk Reduction 2015-2030* is a global agreement developed in relation to post-disaster management. The framework provides a list of ideas and priorities at the global, national and local levels. This include risk assessments; managing risks; and introducing the idea of inclusive approach. This is to improve disaster risk reduction measures and the Sendai Framework plays a crucial role in the development of the post-disaster management strategies of the participating countries.

The planning documents and policies were selected to assess the post-disaster recovery process in the legislative environment in Tōhoku and Kaikōura. The following table lists the documents reviewed in this chapter (Table 3-1). The assessment criteria of the documents are derived from the key themes that emerged in the academic literature review and the Sendai Framework. This includes community participation, resilience level, raising awareness level, collaboration, and allocation of resources. An overall evaluation of the documents in place will be provided. This is done through a ranking system, which consists of a scale from 0 to 2. The documents will be assessed against the five criteria mentioned above.

*Table 3-1 The table below lists the policies and planning documents reviewed*

| Japan | New Zealand |
|---|---|
| <ul><li>Basic Act on Reconstruction in Response to the Great East Japan Earthquake (2012)</li><li>Act on Special Measures for the Reconstruction and Revitalisation of Fukushima (2012)</li><li>Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake in the "Reconstruction and Revitalisation Period (2016)</li><li>Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake (2011)</li><li>Outline of the System of Special Zone for Reconstruction (2011)</li><li>Towards Reconstruction "Hope beyond the Disaster" (2011)</li></ul> | <ul><li>Resource Management Act (1991)</li><li>National Coastal Policy Statement (2010)</li><li>Recovery Management- Director's Guidelines for CDEM Groups (2005)</li><li>National Civil Defence Emergency Management Plan Order (2015)</li><li>Hurunui/Kaikōura Earthquakes Recovery Act (2016)</li><li>National Disaster Resilience Strategy (2019)</li></ul> |

The first component is community participation. It was chosen as it is a vital element in the post-disaster recovery process, as identified by the scholars in Chapter Two. As discussed in the sources, an effective post-disaster recovery framework transpires at a local level. Communities form the base of local-level planning, and the role they play has been recognised as the main factor in post-disaster recovery. While it has been stated that there is currently a lack of community participation in the current recovery climate, it is crucial to consider the ramifications of community participation in post-disaster recovery within each plan. As mentioned, a scoring system will be introduced to assess the components raised in the academic literature review. In short, a score of 2 will be given if a plan gives effect to community participation when it comes to post-disaster management. If a plan takes community participation into account, a score of 1 will be given. Alternatively, a plan will be given a score of 0 if there is no mention of community-level consideration in a post-disaster recovery environment. Table 3-4 below illustrates the scoring key for community participation within each plan.

*Table 1-4 The table shows the scoring system for Component 1: community participation in a post-disaster environment.*

| 1 | | **Community participation** |
|---|---|---|
| | 2 | Explicit consideration to community participation for post-disaster recovery |
| | 1 | General recognition to community participation |
| | 0 | Not identified |

The second component relates to the idea of resilience. This includes economic, social and structural resilience. As identified by the sources, resilience is a recent but crucial topic introduced to developing disaster management policies. Since resilience determines the quality and speed of recovery, it is vital to consider the amount of recognition within each plan. A scoring system of 0 to 2 is given to assess the weight given to the idea of resilience within each plan. If a plan stresses the importance of resilience in all environments, a score of 2 is given. A score of 1 is given if a plan mentions the idea of resilience, but only in a particular sector. A plan will be given a score of 0 if the idea of resilience is not introduced in the document. Table 3-5 below summarises the key for the scoring system for Component 2.

*Table 3-5 The table below identifies the key for Component 2: Resilience*

| 2 | | **Introducing the idea of resilience in a post-disaster recovery environment** |
|---|---|---|
| | 2 | Explicit recognition to resilience in a post-disaster recovery framework |
| | 1 | General recognition to the resilience in any environments |
| | 0 | Not identified |

The third component consists of the awareness level within each plan. This component is arguably the most difficult to achieve as it requires investments in education and promotional initiatives. As detailed by multiple authors, there are two main tiers of which awareness plays a role in, namely, the higher-level, decision-making tier; and the lower-level, community-based tier. Awareness level in both tiers plays critical roles in post-disaster recovery as it is a process that requires input from both decision-makers and community members. Similarly, a scoring system of 0 to 2 is proposed for awareness level within each plan. A score of 2 will be given to the plan if it emphasises on the importance of educational and promotional initiatives. On the other hand, a score of 1 will be given if there are general comments about the matter. A score of 0 will be given if it is not identified in the documents. Table 3-6 below lists the scoring system for awareness level within the documents listed for review.

*Table 3-6 The table shows the scoring system for Component 3: Awareness level*

| 3 | | **Raising awareness level in post-disaster recovery efforts** |
|---|---|---|
| | 2 | Explicit recognition to raising awareness level through educational and promotional activities |
| | 1 | General recognition to the importance of raising awareness level |
| | 0 | Not identified |

The fourth component involves the emphasis on collaboration within each plan. As mentioned by the Godschalk *et al*. (1999), collaboration amongst the stakeholders is an essential element in the post-disaster recovery process. Similar to the awareness level, this includes high-level intergovernmental collaborations, as well as collaborations at the community-level of the varying sectors. In order to evaluate this component, a score of 0 to 2 will be given to indicate the level of importance within each plan. If a plan explicitly states collaboration at both levels, a score of 2 will be given. If a plan gives a general idea of collaboration at either level, a score of 1 will be given. A score of 0 will be given If a plan does not specify collaboration at any

level. The table below summaries the scoring points for collaboration in the documents in Table 3-7.

*Table 3-7 The table below identifies the key to Component 4: Collaboration*

| 4 | | **Collaboration amongst the key stakeholders** |
|---|---|---|
| | 2 | Explicit recognition to the collaboration in a post-disaster recovery environment |
| | 1 | General recognition to collaboration at either the decision-making level or community level or both |
| | 0 | Not recognition to collaboration |

The fifth and final component considered in the policy and planning document review is the allocation of resources in the legislative environment. This can come in any forms of support, including human, financial and logistical support. This support often comes from organisational authorities that can include either the government or non-governmental bodies. To assess whether a plan has considered the allocation of resources in cases of an emergency event, a score of 0 to 2 is proposed to indicate the level within each plan. A score of 2 will be given if the plan emphasises on the allocating resources in an emergency environment. Conversely, a score of 1 is given if there is a vague recognition to the importance of allocating resources after a disaster. If a plan does not indicate or requires allocation of resources, a score of 0 is given. The table below summaries the scoring system for the allocation of resources in the documents reviewed.

*Table 3-8 The table below shows the key to Component 5: Allocation of resources*

| 5 | | **Allocation of resources in a post-disaster recovery environment** |
|---|---|---|
| | 2 | Explicit recognition to the importance of resource allocation |
| | 1 | General recognition to allocation of resources |
| | 0 | Not identified |

The following table summarises the results of the content analysis. The component scores of each document are weighted out of a total score of 10. This is to assist the overall comparison between the documents reviewed in recognising the five components.

*Table 3-9 The table below summarises the results of the content analysis. Component 1 stands for community participation. Component 2 stands for introducing the idea of resilience. Component 3 stands for raising awareness level. Component 4 stands for promoting collaboration. Component 5 stands for allocating resources to the affected regions.*

| Document | Component | | | | | Total score |
|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | |
| Basic Act on Reconstruction in Response to the Great East Japan Earthquake (2012) | 2 | 1 | 1 | 2 | 2 | 8 |
| Act on Special Measures for the Reconstruction and Revitalisation of Fukushima (2012) | 1 | 2 | 2 | 2 | 2 | 9 |
| Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake in the "Reconstruction and Revitalisation Period" (2016) | 1 | 2 | 1 | 2 | 2 | 8 |
| Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake (2011) | 1 | 2 | 1 | 2 | 2 | 8 |
| Outline of the System of Special Zone for Reconstruction (2011) | 1 | 1 | 1 | 1 | 2 | 6 |
| Towards Reconstruction "Hope beyond the Disaster" (2011) | 2 | 2 | 1 | 2 | 1 | 8 |
| Resource Management Act (1991) | 2 | 2 | 1 | 2 | 1 | 8 |
| Recovery Management- Director's Guidelines for CDEM Groups (2005) | 2 | 1 | 1 | 2 | 1 | 7 |
| New Zealand Coastal Policy Statement (2010) | 2 | 2 | 1 | 2 | 1 | 8 |
| National Civil Defence Emergency Management Plan Order (2015) | 1 | 2 | 2 | 1 | 2 | 8 |
| Hurunui/Kaikōura Earthquakes Recovery Act (2016) | 2 | 2 | 1 | 2 | 1 | 8 |
| National Disaster Resilience Strategy (2019) | 2 | 2 | 2 | 2 | 1 | 9 |

## Chapter Summary

This chapter has presented an assessment of the policy and planning documents relevant to the recovery process in the Tōhoku and Kaikōura region. The *Basic Act on Reconstruction in Response to the Great East Japan Earthquake (2012)* governs the overall recovery process in Tōhoku. In the case of Kaikōura, the overarching legislation that specifically governed the Kaikōura recovery process was the *Hurunui/Kaikōura Earthquake Recovery Act (2016)*. Both legislative documents recognised the importance of community participation; raising awareness level; and promotes collaboration amongst the stakeholders. However, it appears that Tōhoku had a heavier emphasis on resource allocation while Kaikōura had a heavier emphasis on introducing the idea of resilience. Overall, as outlined in Table 3-9, the documents in place demonstrate reasonably high level of recognition to the community participation; idea of resilience; raising awareness level; collaboration; and resource allocation to the affected communities. Chapter 6 concludes the content analysis of these documents by examining these factors with reference to the informant interviews and academic literature findings.

# Chapter 4: Methodology

## Introduction

This chapter presents the qualitative methods utilised in the study to address the research questions. The key informant interviews alongside an analysis of policy and academic literature act as a foundation to inform the research.

## Research Approach

This research project used a qualitative approach to achieve the aim of the study and to address the research questions. Interviews and focus groups were selected as they allow evaluation of the current post-disaster recovery framework through the perspectives of the key stakeholders involved. Primary research involves semi-structured interviews, a focus group and site observations of the study area. The secondary research method consisted of a literature review and an analysis of the policy and planning documents. The combination of these methods provided a platform for a comprehensive evaluation of the post-disaster recovery framework in Japan and New Zealand.

Qualitative research quantifies human environments, individual experiences and social processes within social, cultural, economic, political, and environmental contexts (Hay, 2010). It highlights the related issues and establishes a link between personal experiences and conceptual theories (Hay, 2010). Due to the nature of the research, this approach was chosen to create meaningful dialogues between the participants and the interviewer. It allows the researcher to fill in gaps that other methods like site observation and use of available data are unable to bridge adequately (Hay, 2010). It also provides access to a diverse range of information about opinions and experiences and allows reflection of individual experiences (Hay, 2010).

The aim of the project is evaluating disaster planning frameworks and policies in Japan and New Zealand to identify whether improvements can be made to disaster management in New Zealand. This shaped the research design to answer the following research questions (Table 4-1):

*Table 4-1 The table below outlines the research questions of the study.*

| | |
|---|---|
| Research Question 1 | Is post-disaster management in Japan the state of the art? |
| Research Question 2 | What are the gaps and challenges of post-disaster recovery management? Are there ways through which they could be filled? |
| Research Question 3 | What is the best step forward to managing post-disaster recovery efforts? |

Participants were chosen for their expert knowledge and involvement in post-disaster management in either the Kaikōura or Tōhoku region. Participants from a wide range of backgrounds were sought to ensure broader representation of the varying perspectives of different participants (Table 5-2). As the field of work influence what the key informants say, they are split into four categories, specifically council staff (CS); consultants (C); Academia(A) and Other (K). There is also one focus group (C3); and it provided a platform for participants to bounce off ideas during the interviews and produce data in a collective space (Dal Forno et al., 2017).

It is important to note that an Ethics A application was sought and approved for the field research around Tōhoku, Japan (included in appendix), while an Ethics B application was sought and approved for the field research around Kaikōura, New Zealand (included in appendix).

*Table 5-2 List of Key Informants and their Field of Work*

| Key Informant | Council Staff (CS) | Consultants (C) | Academia (A) | Other (K) |
|---|---|---|---|---|
| 1 | Community Services and Development Team | Previously: Planning Team at Council Now: Planning Consultant | Research Fellow and Deputy Director | Communications Team |
| 2 | Recovery Team | Regional Relationships | Professor | Business Chamber |
| 3 | Planning Team | Environmental Assessment Team (Focus Group) | Professor | International Environmental Technology Team |
| 4 | Planning Team | Environmental Assessment Team | | Civil Defence Team |
| 5 | | Engineering Team | | |

## Data collection

Data collection was conducted prior to and during fieldwork in the Kaikōura Region (New Zealand) and Tōhoku Region from July 2019 to August 2019. Primary and secondary data were collected to inform the study. The Tōhoku and Kaikōura regions were chosen for the similarities in geographical and recovery contexts. An evaluation of the recovery framework between the two regions would offer useful insights into post-disaster management in any setting.

Twelve semi-structured interviews were conducted in Kaikoura, Christchurch, Queenstown, Sendai and Osaka; four interviews were conducted through Skype video calls and phone calls.

Multiple scholars have conducted research on post-disaster recovery process through a qualitative research method. Chang *et al.* (2011) based their research on a combination of field observations, questionnaires and semi-structured interviews. As part of their study, the data from the questionnaire survey were verified by the key informants from the interviews. This is to interpret the data collected and gain the perspectives of the informants on the findings yielded from the sorbet. Similarly, Oloruntoba *et al.*, (2018) adopted a qualitative research strategy, but also carried out a case study approach to develop a framework to answer the research questions. In addition, they used an iterative triangulation strategy to link the findings from the study to the research questions for data interpretation and analysis. Karunasean *et al.* (2016) also adopted similar approach for their research. They collected data through interviews, case studies and surveys regarding post-disaster waste management.

In this study, semi-structured interviews were conducted to allow for a more conversational approach. This triggers discussions and allows reflection of opinions and perspectives from the participants (DeLyser and Sui, 2014). The pre-structured questions were split into three main sections (included in Appendix):

1. regulation and legislation;
2. community response;
3. way forward.

It provides a guide and allows the interviewer to steer the interview into a specified direction while allowing insights into personal perceptions and personal histories of the participants (Entrikin and Tepple, 2006). The data collected from the interviews were analysed through text transcripts to seek out prominent themes. These key themes are coded and distilled to assist data analysis.

Site observations were carried out in Kensennuma and Kaikōura to gain an understanding of the recovery functions in both regions. This helped highlight the rebuild projects in each town and gave an idea of the construction process raised by multiple key informants.

## Secondary Research

As part of the background research to inform the research questions, an academic literature review of post-disaster recovery was done. This focussed on a broad array of factors which included the built, social, economic and natural environments. Accompanying was an analysis of the policies and planning documents regarding the post-disaster recovery frameworks in Tōhoku and Kaikōura (Table 3-1).

*Table 3-1 The table below lists the policies and planning documents reviewed.*

| Japan | New Zealand |
|---|---|
| • Basic Act on Reconstruction in Response to the Great East Japan Earthquake (2012)<br>• Act on Special Measures for the Reconstruction and Revitalisation of Fukushima (2012)<br>• Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake in the "Reconstruction and Revitalisation Period (2016)<br>• Basic Guidelines for Reconstruction in response to the Great East Japan Earthquake (2011)<br>• Outline of the System of Special Zone for Reconstruction (2011)<br>• Towards Reconstruction "Hope beyond the Disaster" (2011) | • Resource Management Act (1991)<br>• National Coastal Policy Statement (2010)<br>• Recovery Management- Director's Guidelines for CDEM Groups (2005)<br>• National Civil Defence Emergency Management Plan Order (2015)<br>• Hurunui/Kaikōura Earthquakes Recovery Act (2016)<br>• National Disaster Resilience Strategy (2019) |

## Ethical Considerations

The interview process takes a semi-structured conservational approach and involves collecting data that might be personal and sensitive. Issues that are upsetting and potentially psychologically damaging may be raised during the interview. However, participants were reassured that the data collected is of their overall experience of the situation, rather than a

personal one. Informed consents were sought from the participants through consent forms, and information sheets were handed out to the participants and privacy and confidentiality is emphasised throughout the sheets to ensure the participants are comfortable with sharing their personal experiences. Interviews may unfold in an unpredictable nature, but this is compensated as the anonymity of the participants is maintained in the written report.

The interviews were audio-recorded to assist with transcribing and writing up the report. It also allows the interviewer to focus on a conservational interview-style without the distraction of note-taking (Hay, 2010). It also allows more time to organise the next prompt to maintain the flow of the conversation (Hay, 2010). However, participants may inhibit responses while being recorded. However, they are reminded at the start of the interview, that this is to assist the researcher with writing and transcribing. As mentioned, the utmost effort will be kept to preserve the participants' anonymity.

Permission was also obtained to undertake fieldwork in Japan from the University of Otago Human Ethics Committee through an Ethics A application. A participant information form and a participant consent form were produced as part of the ethics application.

## Positionality

It is important to note that the results of this research are reflective of the recovery structures following the Tōhoku and Kaikōura Earthquake. Some elements can be transferable to any setting, but some aspects like socio-economic contexts are specific to the respective regions. There is no definite solution to managing post-disaster situations as it is highly context-specific. In other words, the recommendations proposed in the research may not be directly applicable to other settings. The main findings and recommendations of this research provide vital insights into the post-disaster management framework, particularly in a relatively lower socio-economic setting.

# Chapter 5: Post-disaster recovery framework in Tōhoku and Kaikōura

This chapter examines the post-disaster recovery structure with reference to the key informant interviews conducted in Japan and New Zealand. The Tōhoku Earthquake and the Kaikōura Earthquake have been selected as case studies as they share similar post-disaster legislative structures, and in some ways, similar socio-economic contexts. A brief overview of the Tōhoku and Kaikōura regions is included to provide context to the chapter, as summarised in Table 5-1.

*Table 5-3: The Great Eastern Earthquake (Japan) vs. Kaikōura Earthquake (New Zealand)*

|  | Tōhoku [1] | Kaikōura [2] |
|---|---|---|
| Date | 11 March 2011 at 0546 UTC | 13 November 2016 at 1102 UTC |
| Magnitude | 9.0 | 7.8 |
| Affected area | Rural | Rural |
| Scale of events | • Earthquake<br>• Tsunami<br>• Nuclear accident | • Earthquake<br>• Tsunami |
| Damage | Coastal areas damage by tsunami | Surface deformation by earthquake |
| Casualties | 19451 (80% drowned) | 2 |
| Economic damage | ¥30tn or 6% of GDP | $500m or 0.12% of GDP [3] |
| Economic Activities | Primary industries and tourism [4] | Primary industries and tourism |

*1. Adapted from Hayashi (2012)*

*2. Adapted from Cradock-Henry et al. (2018)*

*3. Sourced from Ministry of Transport (2018)*

*4. Adopted from Tōhoku Bureau of Economy, Trade and Industry (2016)*

## Local context
### Overview of the Tōhoku Region

The Tōhoku region is situated in the north-eastern portion of the Honshu Island in Japan. It accounts for 7.1% of the national population at with 8.98 million, by which the working-age and elderly groups make up the majority of the population (Tohoku Bureau of Economy, Trade and Industry, 2016). Overall, the region predominately consists of primary industries and contributes 6.3% to the Gross Domestic Product (Tohoku Bureau of Economy, Trade and Industry, 2016). Figure 5-1 below summarises the economic sectors around the region.
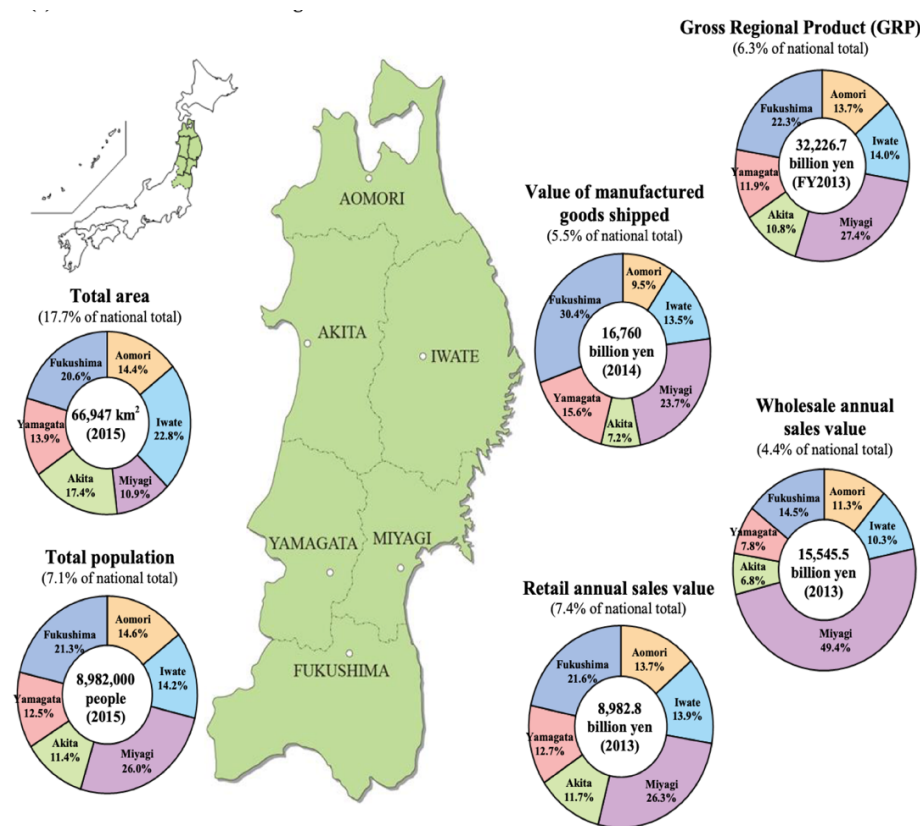


*Figure 5-1 This diagram shows the economic indicators for the Tōhoku Region. [adopted from Tohoku Bureau of Economy, Trade and Industry]*

In 2011, Tōhoku was hit by the largest ever mega-earthquake recorded in Japan that ruptured the undersea megathrust fault between the Pacific Plate and the North American Plate, triggering tsunami across Iwate, Miyagi and Fukushima Prefectures (Figure 5-2) (Stimpson, 2011; Chini, 2013). The Tōhoku Earthquake caused many casualties and extensive structural damage to the Tōhoku coastline. The tsunami waves generated exceeded 10 m in height and reached up to 5 km inland from the Tōhoku coastline (Chini, 2013). Besides, several landslides

were also triggered by this earthquake, with some concentrated in the Fukushima and Miyagi Prefectures (Wang, 2014). There were also liquefaction effects extending throughout the Tōhoku and Tokyo Bay region (Chini, 2013; Kagawa 2015). The tsunami also resulted in power and water cut and blocked the corridors up with debris (McCurry, 2011). The three-fold event included the meltdown at the Fukushima Daiichi Nuclear Power Plant Complex that resulted in the emission of radioactive materials in the air and the sea, displacing the residents (Hayashi, 2012; Aldrich, 2017). The economic damage that arose following the disaster had significant implications on the primary industries in Tōhoku, mainly agriculture, forestry and fishery.



*Figure 5-2 The diagram shows the affected prefectures in the Tōhoku region. [adopted from McCurry, 2011]*

The Japanese Government proposed a recovery plan for the Tōhoku region, whereby a reconstruction agency was set up to manage the restoration projects. The first five-year period between 2011 and March 2016 was declared by the Japanese Government as the intensive reconstruction period (Rob and Yan, 2017). That consisted of both physical and social restoration and reconstruction, which includes community and industrial development in the region. Individual and industrial support has been provided to the affected communities. As of 2017, the number of evacuees has decreased rapidly where a majority of evacuation orders lifted in the Fukushima Prefecture. There are more than 140,00 of private and public houses

either being relocated to upland or rebuilt; 83% of tsunami-affected farmland restored; 92% of the fishery facilities resumed operation; and development of transportation network (Reconstruction Agency, 2017).

From 2016 to 2020, the reconstruction and revitalisation period are allocated to further assist with the physical redevelopment in the region, with an emphasis on the social revitalisation for the affected communities. There is also significant tourism support to assist in the recovery process around the region (Reconstruction Agency, 2016). Conversely, there is a shift towards tertiary industries due to the reconstruction work in the region. The shift prompted economic growth in Tōhoku, mostly through wholesale and retail trade and construction (Tohoku Bureau of Economy, Trade and Industry, 2016). In terms of the Fukushima Daiichi Nuclear Power Plant, there is a decommissioning plan in place to address the risks of nuclear power in the region (Nuclear Regulation Authority, 2015). Figure 5-3 below summarises the progress of the reconstruction process around the region.
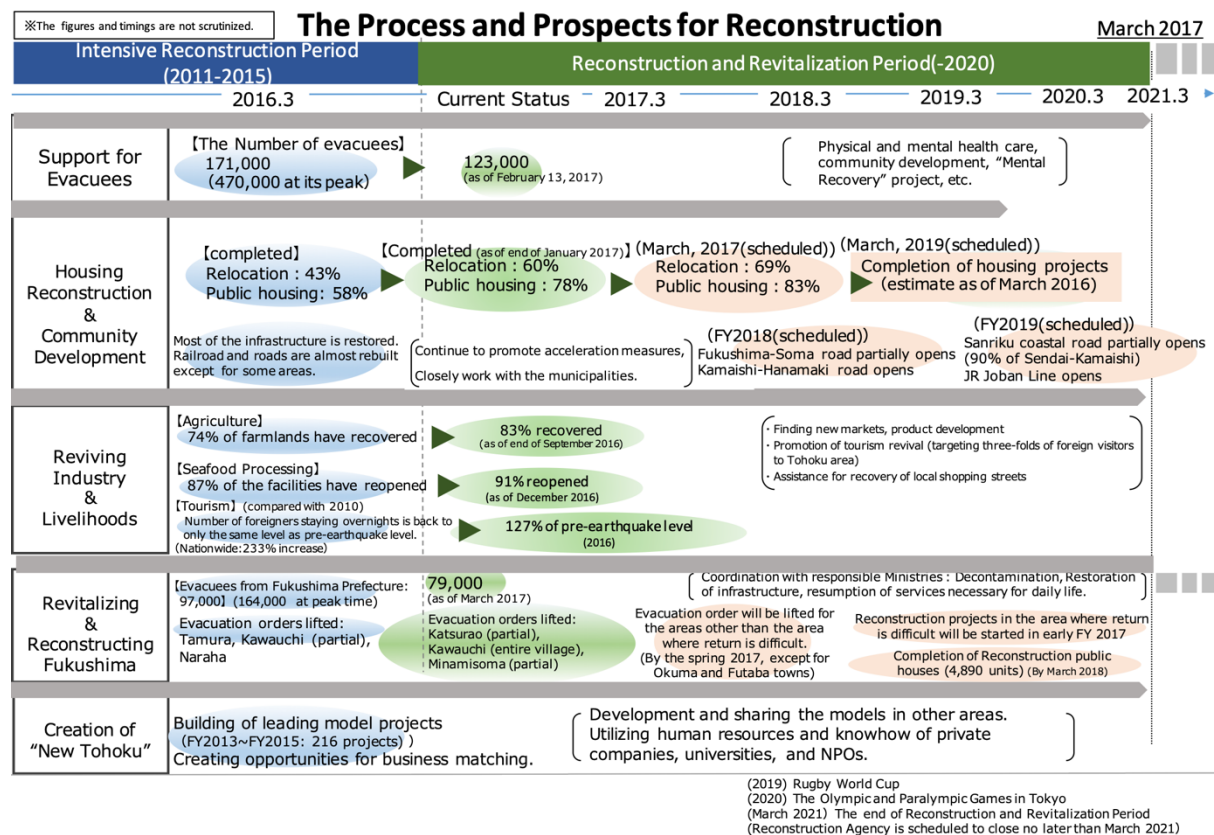


*Figure 5-3 The Process and Prospects for Reconstruction in Tōhoku shows the reconstruction progress in the region following the 2011 Tōhoku Earthquake. [adopted from the Reconstruction Agency, 2017]*

The governmental structure in Japan is based on a unitary system involving parties at the national, prefectural and municipal level (Furukawa, 2000). The Reconstruction Agency was established to accelerate the reconstruction process through reconstruction strategy and initiatives following the 2011 Tohōku Earthquake (Reconstruction Agency, 2019). At the national level, the Reconstruction Headquarters provides guidelines for reconstruction policies and measures, coordinate the reconstruction activities and provide financial and human resource support to the local governments (Reconstruction Agency, 2011). The Regional Offices for Reconstruction provide "one-stop service" whereby they provide guidance and assistance to the afflicted local governments (Government of Japan, 2012). Reconstruction planning occurs at a local level and has to be in line with the policies and guidelines set out by the national government (Reconstruction Agency, 2011). There are communication channels at all three levels, which also involves community participation and academic collaborations (Reconstruction Agency, 2011). Figure 5-4 below illustrates the recovery structure in the region following the 2011 Tōhoku Earthquake.
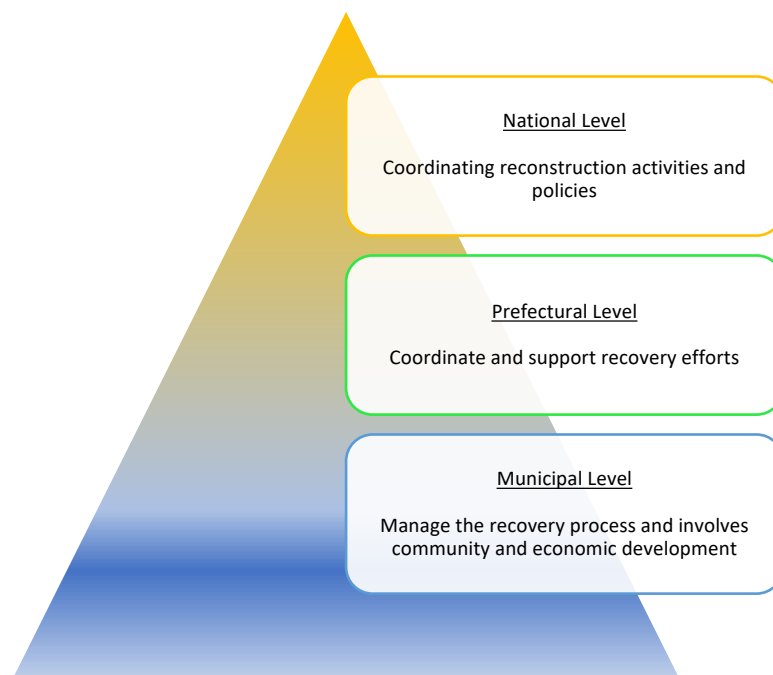


*Figure 5-4 The Recovery Structure in Tōhoku. The diagram above illustrates the three-tiered system of the recovery structure in the region following the 2011 Tōhoku Earthquake. It also outlines the key roles and functions at the national, prefectural and municipal level.*

Kaikoura is located in the North Canterbury region of the South Island in New Zealand. It is bounded by an inland range to the west and the Pacific Ocean on the east (Cradock-Henry *et al.*, 2018). The main economic driver in the region is tourism, and the primary industries consist of agriculture, forestry and fishing (Cradock *et al.*, 2018). Kaikōura has a population of approximately 3,552 and accounts for less than 1% of the population in New Zealand (Stats NZ, 2013). The median age in Kaikōura is 45.6 years with 19.4% of residents aged 65 years and over (Stats NZ, 2013).

In 2016, an earthquake occurred between the southern Hikurangi Subduction Zone and the continental collision along the Alpine Fault. The Kaikōura Earthquake was one of the largest ever instrumentally recorded earthquakes in New Zealand at an estimated moment magnitude (M$w$) of 7.8 (Cesca *et al.*, 2017; Gusman *et al.*, 2018). The earthquake sequence initiated surface deformations that included uplift and surface ruptures both inland and offshore, which triggered a modest tsunami around the region (Cesca *et al.*, 2017; Gusman *et al.*, 2018). There were two fatalities alongside the extensive damage to many residential and commercial properties. The earthquake also led to road and rail closures due to a combination of landslips and uplift, which cut-off access into and out of Kaikōura (Hatton *et al.*, 2017). In addition, there were disruptions to the water and power supplies and telecommunications around the region (Cradock-Henry *et al.*, 2018). Aside from Marlborough, Hurunui and Kaikōura, Wellington was also affected by the earthquake in terms of structural damage and water supply (Figure 5-5) (Cradock-Henry *et al.*, 2018). The event resulted in an ongoing disruption to the tourism and agricultural industries in Kaikōura, with estimates for repair and rebuild as high as NZ$3 billion (Cradock-Henry *et al.*, 2018).
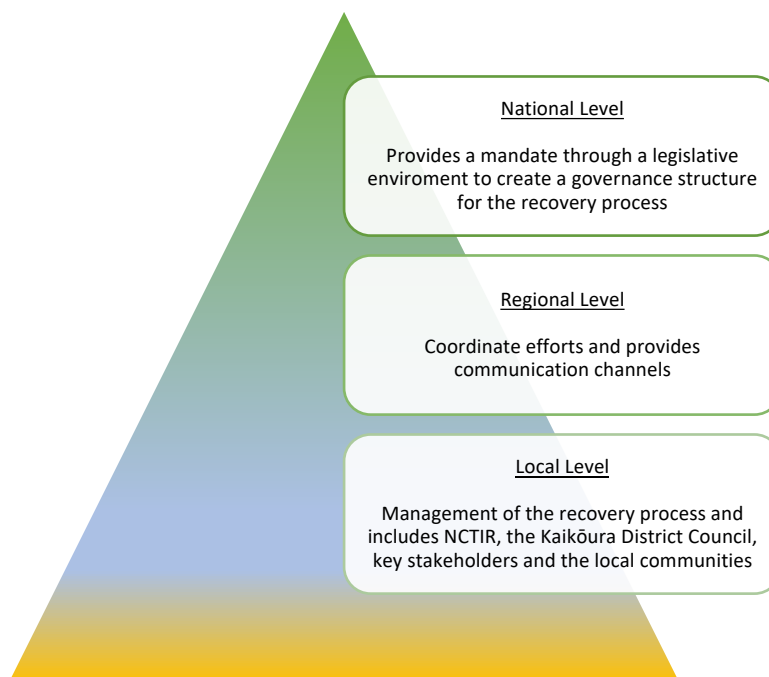
*Figure 5-5 This diagram illustrates the affected regions by the 2016 Kaikōura Earthquake. [adopted from Hatton et al., 2017]*

An Order in Council has been signed to assist recovery from the Kaikōura Earthquake. This is a special legislation to remove the legislative barriers (e.g. resource consenting process) until March 2018, accelerating the rebuild for the reinstatement of State Highway 1 road and rail line, which was cut off post-earthquake (Ministry of Transport, 2018). There are also environmental, ecological and cultural elements within the special legislation to ensure that the relevant issues are addressed during the rebuild around the region (Hurunui/Kaikōura Earthquakes Recovery Review Panel, 2016). The project is managed by the North Canterbury Transport Infrastructure Recovery alliance, which was set up to restore the road and rail networks in the region (NZTA, 2019). The alliance is a partnership between the New Zealand Transport Agency, KiwiRail, Downer, Fulton Hogan, HEB Construction and Higgins (NZTA, 2019). This provided communication channels at the national, regional and local level and

created a platform to develop relationship amongst the key stakeholders, and thus, improving resilience capacities around the region (Wotherspoon *et al.*, 2018).

There is national-level involvement for the recovery process in Kaikōura as it was declared a national emergency (Woods et al., 2017). At the national level, the emergency legislation established provides a governance structure, by which the central government coordinates short-, medium- and long-term recovery activities. During this transition period, there is an appointed recovery manager who manages recovery functions in the social, natural, economic and built environment (MCDEM, 2005; Woods et al., 2017). At the regional level, there have been prior strategic planning for recovery, which provided guidance and support to assist and create a more seamless recovery process in the region (MCDEM, 2016). The recovery functions are delegated to the regional and local authority and involve key stakeholders, including the local community in the region (MCDEM, 2016). Figure 5-6 below summarises the key roles and functions at the national, regional and local level.



**National Level**

Provides a mandate through a legislative enviroment to create a governance structure for the recovery process

**Regional Level**

Coordinate efforts and provides communication channels

**Local Level**

Management of the recovery process and includes NCTIR, the Kaikōura District Council, key stakeholders and the local communities

*Figure 5-6 The diagram above illustrates the key functions and roles of the recovery process following the 2016 Kaikōura Earthquake  at the national, regional and local level.*

## Evaluating the recovery structures in Tōhoku and Kaikōura

This section presents the findings from the key informant interviews. Due to the vast amount of data, this will be split and discussed in four main sections, namely, effects of local context on post-disaster recovery; comments on the legislative environment; effectiveness of post-disaster recovery structure; and suggestions to managing future post-disaster events.

### Effects of local context on post-disaster recovery

In a general sense, K3 felt that disaster management is very context-specific and further described how some aspects of disaster management needed a top-down approach (Figure 5-7). K3 explained it using tsunami warnings as an example, whereby an international long-range tsunami detection system has to be in place before a national warning system. The informant further added how some aspects of disaster management like escape routes needed to be local. The level of assistance required, whether it be local, city, state, national or international, is highly dependent on the availability of resources and the local context concerning the social, economic and structural resilience, K3 said.
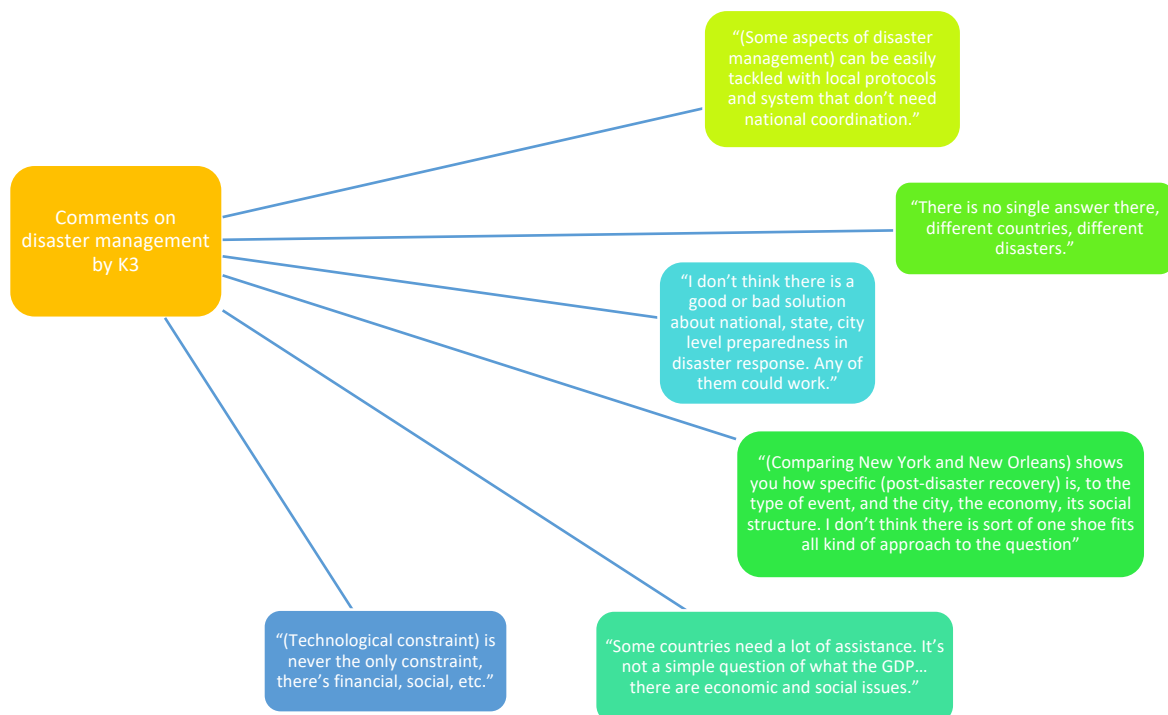


*Figure 5-7 The figure illustrates the comments on disaster management by K3.*

In the case of Kaikōura, C1 also described that the local context is essential. The informant described the post-disaster situation in Kaikōura. Since the staff were under much pressure in their own lives as well as working, it "puts a whole different framework on how you cope", the informant said. C1 commented on the difference in the recovery process between Hurunui and Kaikōura. The informant stated that external support was necessary due to the lack of human resources in Kaikōura.

> *"It was like living in a war-zone and you still had to*
> *function in this… because there was so much to do."*
> *C1*

Also, C2 raised the point of considering the local context as well as the perspectives from the animals. Since Kaikōura is a farming district, it was important to get health care to the animals as they were impacted too, the informant said.

> *"So, it's wider than just the human the community is,*
> *you have to think about the different communities that*
> *are there, there're farming communities, there're urban*
> *communities, the tourism, the freight community. So,*
> *there's all this community groups which have different*
> *needs and different requirements that you need to think*
> *about." C2*

In the case of Tōhoku, A3 commented on how the local context affects the recovery process. There is prioritisation of financial aid by the Japanese Government based on the economic contribution of the cities, the informant said.

> *"Because if (the Tōhoku Earthquake) happened in*
> *Osaka or Tokyo, they would make the recovery*
> *process quick, it's related to the economic heart of*
> *Japan" A3*

Both in Tōhoku and Kaikōura, many key informants commented on the complexities of the disasters. Figure 5-8 below illustrates some of the key comments on the scale of events by the informants on the Tōhoku and Kaikōura Earthquake.



*Figure 5-8 The diagram outlines the comments on the scale of events by the informants.*

Comments on legislative environment

*Pre-disaster legislation*

In the case of Kaikōura, CS4 indicated that the established council regulations pre-disaster already provides a solid foundation to minimising and mitigating the effects of natural hazards. The informant suggested that significant resource consent process is required if development were to occur on an area identified as hazardous. However, CS4 questioned the value of the process. All that is required is to provide qualified evidence for the application to get through, the informant said (Figure 5.9).

> "(Areas being identified as being hazard prone) immediately throws up significant barriers to actually being able to develop that land." CS4

> "When it comes to fault-line, it's kind of ridiculous scenario that we've got, if a line drawn 15 years ago, on your property in a residential area, and not your neighbour's property, it has no significance to their resource consenting process, and a very significant effect on your process." CS4

*Figure 5-9 The diagram above shows the positive and negative comments of the pre-disaster legislation in place by CS4.*

In the Tōhoku context, A3 also mentioned that prior established regulations on tsunami restoration and recovery had minimised the effects of natural hazards. A3 described the legislative structure of the Japanese Government. Funding is provided mainly by the central government, but strategic plans are dependent on the local government via community engagement and involvement. The informant reinforced this by stating that Sendai, unlike multiple cities around the Japan Coast, has no massive tsunami walls. It is the decision of the local government on how they cope with disasters, A3 said. However, A3 added on stating that this is one of the reasons for the slow recovery process around the area.

> *"Well, the central government mainly control the budget… but local government has their own control." A3*

*Advantages and disadvantages of the recovery structure*

As mentioned, national governmental support meant that a governance structure is placed upon the affected communities. Key informant interviews revealed that the recovery legislation established following the Tōhoku and Kaikōura Earthquake had both positive and negative impacts on the recovery process in the respective regions (Figure 5-10). A few of the key informants applauded the emergency legislative environment, particularly in terms of the faster consent process. C5 felt like there was a "massive turnaround with consents". The informant added on though "we could push something quick but doesn't mean that we would" and said that the design process was dealt with judiciously. C5 further mentioned that the Order in Council created a restoration liaison group consisted of DOC, NZTA, KiwiRail, local Iwi,

Hurunui Council, Marlborough District Council, Kaikoura District Council, Fish and Game, and other key stakeholders involved with the recovery process. K1 applauded the legislative environment, which allowed the road and control authority to get the consents and decisions passed for the rebuild works without any delays. CS2 also praised the Order in Council and the power it gives to the recovery manager, who is crucial during the transition period. Both C2 and C3 applauded the alliance in Kaikōura and that it provides a platform for effective communication and information exchange.
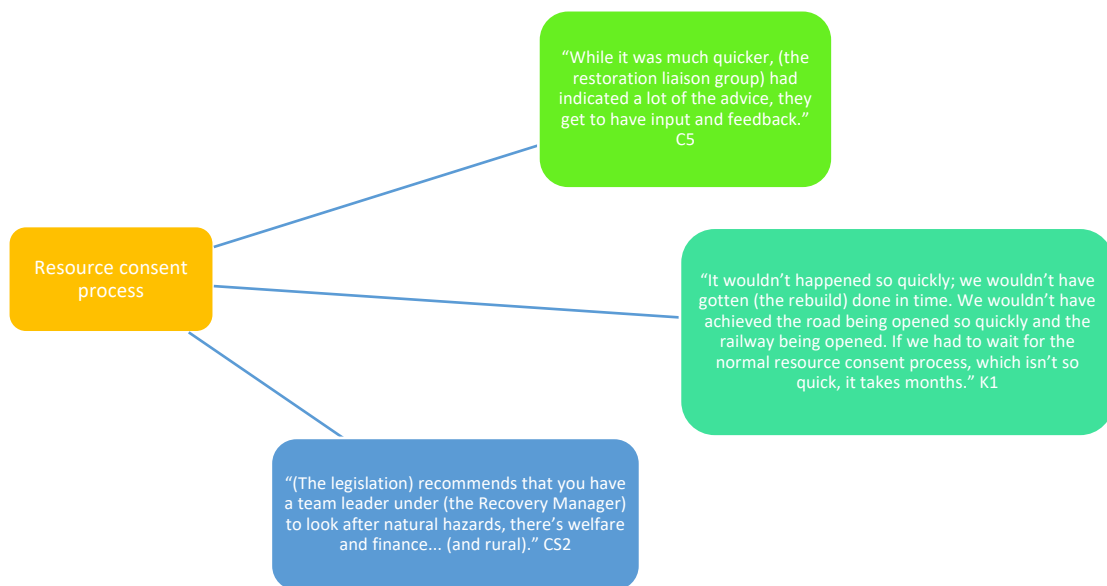


*Figure 5-10 The figure outlines the key comments on the resource consenting process as a result of the introduction of the Order in Council in Kaikōura.*

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Recovery structure and time constraint

C4 shared similar views to C5 and K1, but raised the fact that minimal environmental impact assessment was what has allowed for a quicker resource consent application process. The council could only impose conditions to the applications; they could not refuse the applications, C4 said. The informant further stated that time was a significant factor in terms of the consenting process. "It was that trade-off between having to build something within a certain budget and timeframe versus having to having strong mitigation measures," C4 said. Similarly, C3 commented on the streamlined consenting process with the Order in Council but also felt like the environmental assessment were more of a "tick boxes exercise". The application was going to be processed regardless of the effects, C3 said. C3 felt like the process was "so fast-tracked"

that there was "no luxury" to go in and do the environmental assessments to understand the values of the natural systems around the construction site. Additionally, C2 and C5 brought up the time pressure of the rebuild process.

CS3 also mentioned the truncated resource consent process and had a similar outlook. "It was a three-day process, not a three working day process" CS3 added. The informant said that the key thing in recovery was assessing the consents against the legislation. This essentially meant that the council could flag certain bits and pieces but had to grant the resource consent to allow their works of the rebuild of the state highway, CS3 said. CS3, CS4 and C4 all raised concerns about the long-term effects from the short-term benefits of emergency protocols. National government support is required. However, it is difficult if "you're just cutting red-tape and basically making it to people that people don't need to consider fundamental matters that are important before the disaster, just because there's been a disaster, doesn't mean these matters aren't important anymore" CS4 said. The time pressure also made it difficult for the coordination of the resource consent application amongst the different teams involved in the rebuild projects. There are difficulties of waste correction and transportation when there is a time limit, A2 said. C1 commented on how the government was eager to wrap the recovery process partly due to financial factors. To illustrate, the table below summarises the key quotes on the link between recovery structure and time constraints.

*Table 5-4 The table below outlines the key comments on the recovery structure in Kaikōura. It shows the impacts of the time constraints on the recovery process in Kaikōura.*

| Rebuild works vs long-term impacts | |
|---|---|
| C2 | *"So, typically, a strategic case could take somewhere between 6 and 8 months. We did it in a week. A programme business case sort of takes 6 to 8 months, we did it in 5 weeks. So, when it's disaster recovery, it's about speed"* |
| | *"It's just we didn't have the time to dot the ice across the tease, and do the consultation stuff, and that's why I brought industry experts together, and we debated it, and challenged it, and move forward."* |
| C3 | *"It was a very challenging and difficult space to work in, compared to what we normally do. I think because the timeframe in particular that we were working to, born alluded to the fact that we were building things before they had been designed and before they had been consented."* |
| | *"It was a very challenging and difficult space to work in, compared to what we normally do. I think because the timeframe in particular that we were working to, born alluded to the fact that we were building things before they had been designed and before they had been consented."* |
| C4 | *"I wouldn't call it environmental recovery of such, it's just construction really, and management of ecological effects during construction."* |
| | *"When somebody has worked on one aspect and somebody on the other, at the end they have to meet and make sure design works for both aspects and that wasn't necessarily the case, and things had to be redone, but because there was such a tight timeframe, people had to work on things simultaneously."* |
| | *"It was really important to open that corridor, if there was a question on what was more important, that's the one that really trumps."* |
| C5 | *"That's been the background of 3 ¾ billion dollars' worth of work. I would've liked to have some people helped us out. But it was m and another KiwiRail engineer and one NZTA engineer. That was pretty full on we had to make those call so quick."* |
| CS3 | *"We had projects up and down the coast to get the road opened, and we have effectively undertaken earthworks prior to the design being completed, just to allow the project to speed the construction of the project."* |
| | *"So, effectively, it was a process where the council review the application [within three days], the road and control authority would accept or reject the comments the council made, and then council would issue a decision based on what the roading authority had stated. So, it was a very truncated process."* |
| CS4 | *"(Disaster management) not necessarily meeting the desired outcomes of the emergency legisltaion and also having some undesirable planning outcomes becasue group planning was over-ridden by these emergency protocols."* |

C1 also applauded the recovery legislation and said it was effective in getting in regional and national resources into an emergency affected area. It is a rigorous governance structure, but it lacks a "local voice". Hurunui got away with it because they refused the government's funding on that basis, the informant said. C1 further raised the point that the funding meant a restructuring of local council staff with the introduction of government-funded staff on the rebuild projects. Figure 5-11summarises the key quotes made by C1 on the implications of the recovery legislation in Kaikōura.



*Figure 3-11 The diagram above illustrates the comments made by C1 on the recovery structure in Kaikōura. The informant mentioned that the recovery legislation failed to acknowledge the local level thinking.*
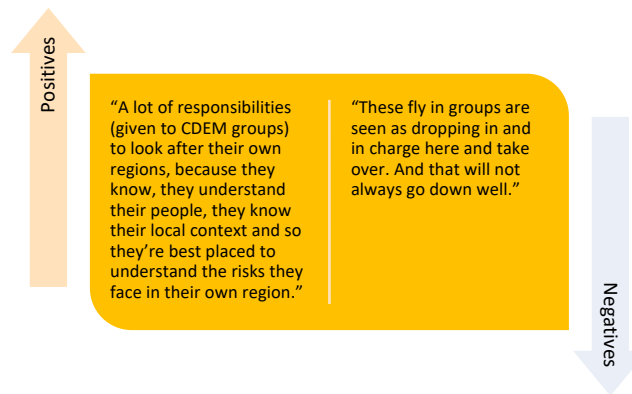
On the other hand, CS1 expressed dissatisfaction with the top-down management approach in Kaikōura. CS1 described that the rigorous structure came with financial assistance, but it affected the recovery process in Kaikōura. Hurunui was much more flexible for their disaster recovery and recovered much quicker than Kaikōura did, CS1 said. The informant raised the point that Hurunui is in a better financial position than Kaikōura is, which ultimately affected the recovery process. K2 also commented on the external top-down support and is uncertain about the long-term impacts of it.

> *"We did ask for some financial help from the central government and what we learned is be careful what you asked for." CS1*

A1 commented on the legislative implications and the power it comes with when a state of emergency is declared. However, the informant added how there are significant responsibilities

at the local level. There are conflicts between the national and local government, but there are no simple solutions, A1 said. To illustrate, figure 5-12 summarises the key quotes made by the informant on the postivies and negatives of the governance structure.

> *"Regional groups know their regions best… but sometimes, a regional group isn't going to cope with a South Island wide event, they need to be able to coordinate across those groups… (Governance structure) criticised about being top-down in terms of central government coming in and starting to impose on how they go, but it's never perfect post-disaster. I don't think anyone will ever do a perfect recovery." A1*

Positives

"A lot of responsibilities (given to CDEM groups) to look after their own regions, because they know, they understand their people, they know their local context and so they're best placed to understand the risks they face in their own region."

"These fly in groups are seen as dropping in and in charge here and take over. And that will not always go down well."

Negatives

*Figure 5-12 The diagram above illustrates the comments on the governance structure made by A1. The informant raised the positives and negatives of having a national governance structure in place to assist in the recovery process.*

## Recovery structure and disaster waste management

K3 described the high volume of waste a disaster generates and emphasised on the importance of disaster waste management. The streets have to be cleared off in order to get help from the responders, K3 said.

> *"You get 10 years' worth of waste in one day… It's mixed. Some of it is useful, you want to save, some of it is highly toxic." K3*

A2 described the waste categorisation system and the complexity of it by the Japanese local government. There are different regulations by different ministries for the different type of wastes produced, and it made it difficult for the treatment of disaster waste, the informant said.

## Effectiveness of the post-disaster recovery structure

The previous section outlined the results on the relationship between local contexts and the post-disaster recovery framework. This section will present the findings in terms of the effectiveness of the post-disaster recovery structure. This will be discussed in two main sub-sections; exploring the solutions that people are working on, and examining some the constraints hindering the implementations of those solutions?

### *Solutions that people are working on*

### Comments on capacity and connectivity

CS4 talked about the preventative measures currently being undertaken with regards to building standards, hazardous area identification, and building redundancies into the transportation networks and major services in case of isolation. K4 also suggested that "what we've got isn't broken" and said that there should be more of a focus on reduction works, which includes building capacity in terms of structural standards, the informant said.

C5 brought up how connectivity was necessary with recording and assessing the damage post-earthquake. The informant explained how incorporating technology (e.g. iPads) into the recording system provides more functionality where reports are more streamlined and meaningful than paper-based reports. Besides, K1 commented on the connectivity the North Canterbury Transport Infrastructure (NCTIR) Alliance provide. The Alliance allowed recovery work to be conducted in the most efficient manner, the informant said. In terms of local businesses, K2 also brought up the benefits of businesses working collectively to assist the recovery process in Kaikōura. Figure 5-13 below illustrates the comments on connectivity by K1 and K2.
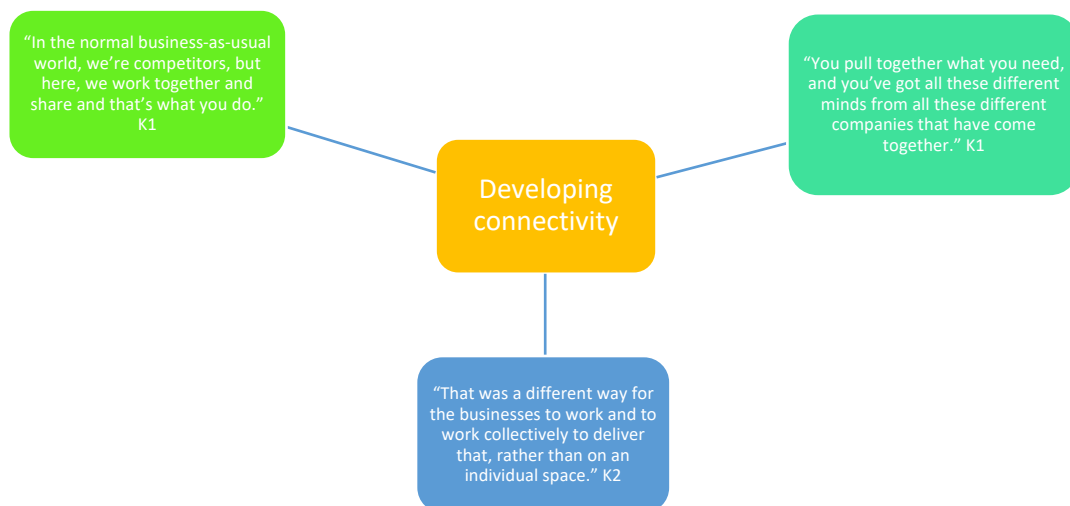
*Figure 5-13 The diagram above illustrates the key quotes by K1 and K2 on the importance of connectivity in a recovery environment. The reconstruction process in Kaikōura provided a platform that links up multiple businesses which would not have happened otherwise.*

Also, K4 emphasised on the importance of developing "high trust working relationships" with the key stakeholders pre-disaster. We rely on key relationships around the board for human resources, K4 said. The informant also raised the point that navigators play in a pivotal role in the recovery process. The navigators are people the community trusted, which encouraged the community to talk about the issues they are facing. This helped the community to be in charge of their recovery, K4 said. In the Tōhoku context, A2 also shared similar views with K4 on forming relationships when it comes to post-disaster management (Figure 5-14). A2 described that the "window" into the local and prefectural government acted as a conduit between the government and the researchers, who were both needing information about managing disaster wastes. The informant added that this prompted the central government to develop a more streamlined and efficient tool of communication called D-waste Net.



*Figure 5-14 The diagram shows the importance of establishing relationships amongst the key stakeholders is crucial for post-disaster management, as mentioned by K4 and A2.*

## Comments on field experts

C5 raised the importance of having field experts when it comes to post-disaster management. The informant recalled how prior disaster experiences had better equipped the team in Kaikōura to cope with the 2011 earthquake. In order to get the railway reopened, assessing and recording the size and scale of the damage was crucial before construction began. Sending crews out for small fixes is not going to make any difference to how quickly the road is going to reopen, and it was a dangerous and uncontrolled area, the informant said. Similarly, C2 recalled on the benefits of prior experiences in alliancing, which helped with the establishment of NCTIR in Kaikōura. The informant also mentioned that having a capable and competent support team is essential when it comes to post-disaster management, as exemplified in Figure 5-15.



*Figure 5-15 This diagram illustrates the key comments made by C2 and C5 who mentioned the importance of prior experiences of C2 and C5. The informants stated that this allowed better management of the recovery efforts in Kaikōura. C5 raised the importance of initial damage assessment for the restoration work while C2 talked about the benefits of establishing an alliance for post-disaster recovery.*

C5 also applauded the amount of human resources provided for the construction management process by the NCTIR alliance. This contributed to the development of a new level of service and principle requirements and standards, the informant said. CS2 also applauded NCTIR for their contribution to the recovery of the local community by keeping the hospitality industry alive during the period of isolation. The workers occupied the available accommodation and had meals prepared by the local cafes and restaurants, the informant said.

In addition, CS1 emphasised on the importance of developing a well-functioning community space pre-disaster. This is so that during or post-disaster, the community would have access to all the community services at times of crisis to support the social and environmental recovery, the informant said. K2 also commented on the lack of a well-established community space in Kaikōura, but regarding the support for the business association (Figure 5-16).
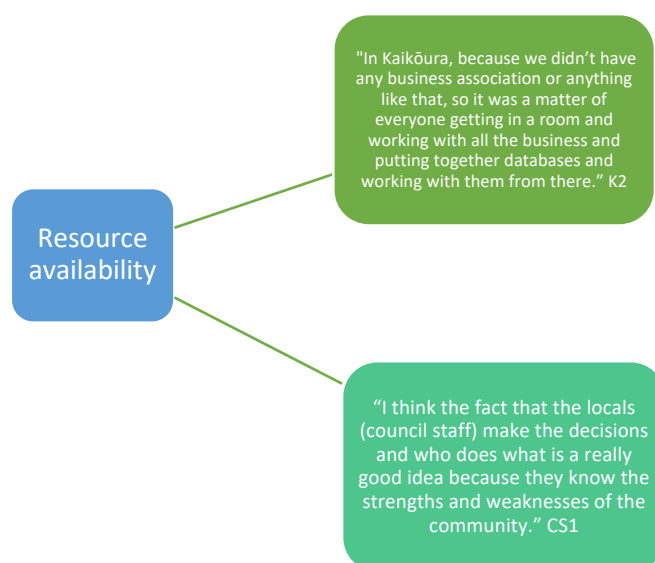


*Figure 5-16 The diagram illustrates the key informants' comments on the benefits of having adequate resources when it comes to post-disaster recovery.*

C4 described that the line of communication between NCTIR and the key stakeholders were "tightly regulated". This was necessary due to the vast scope of organisations and people involved in the Kaikōura reconstruction project, the informant said. C4 added that it is more about delivering a core message by NCTIR as an organisation, as opposed to "different views from different organisations or individual representatives". Figure (5-17) below lays out the comments made by C4 on the communication channels of the NCTIR alliance.
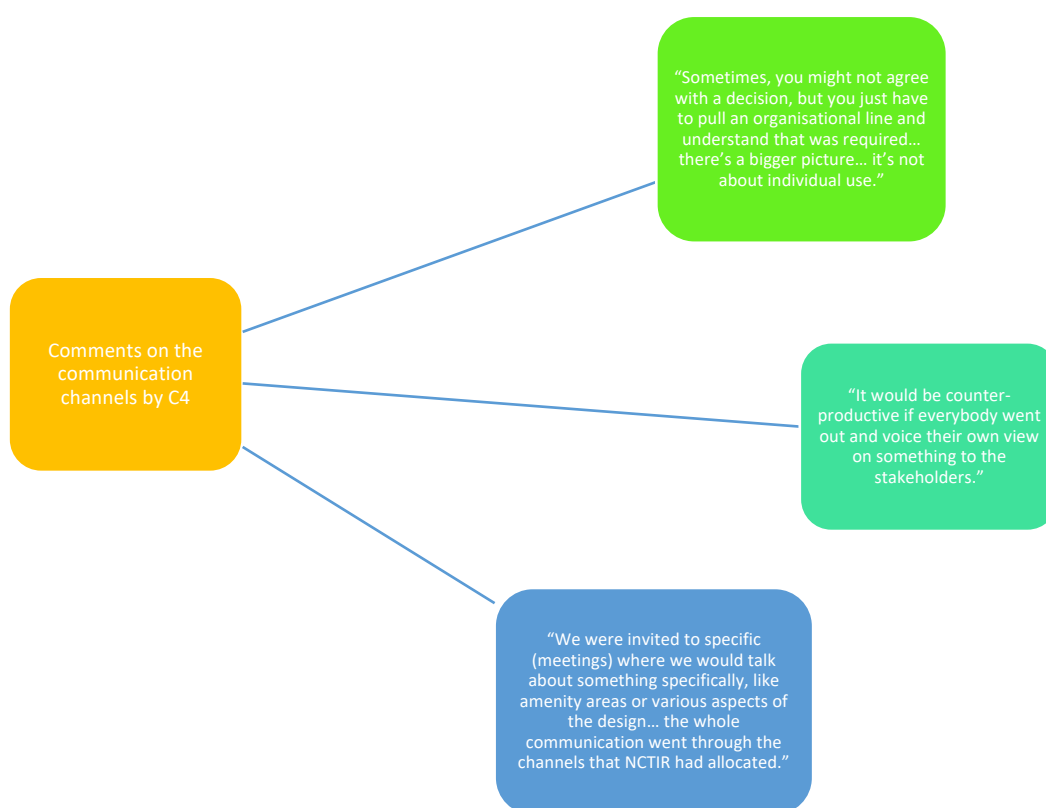


*Figure 5-17 The diagram above summarises the key quotes made by C4 on the communication channels during the recovery phase in Kaikōura. Due to the nature of the reconstruction project in Kaikōura, communication channels were regulated to ensure effective management of the restoration process.*

Similarly, C3 felt that the lines were tightly regulated but also felt like it was needed due to the scale of public interests (Figure 5-18). The informants praised NCTIR for their interaction with the community. They did really well in a really small community, and it was needed given the scale of the project, C3 said.
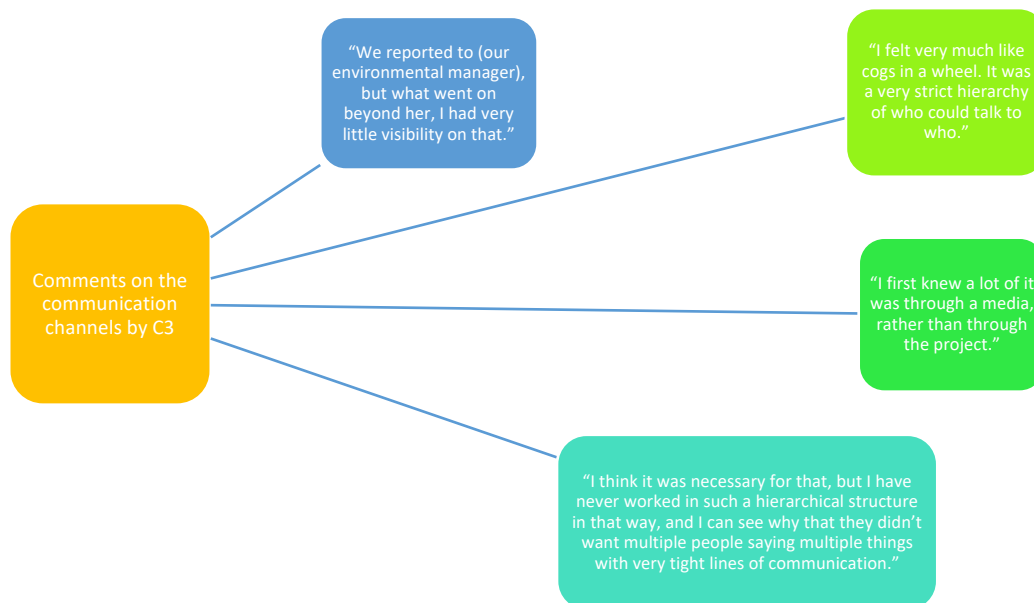
*Figure 5-18 The diagram above outlines the key comments made by C3 on the communication channels during the recovery phase in Kaikōura. As there is much publicity surrounding the reconstruction project, the communication  channels had to be monitored.*

C5 praised Civil Defence and NZTA on the excellent work that they had done in terms of distributing information. One of the examples was the office setup for the NCTIR Alliance. Having the Alliance meant that KiwiRail staff were in the same office as NZTA, which gave us a link into what is going on, the informant said. C5 added that recovery centres should not be too detached from the people out in the field. "So, when they return from the day, they can see what's being recorded," C5 said. Also, in terms of communication measures, the informant described that the NCTIR Alliance had developed a system that includes risk assessment to keep the workers safe. There was whiteboard set up with maps and photos, satellite phones, emergency beacons and emergency packs with food, blankets and cell phone chargers. This is to ensure that the workers are aware of the measures in place to keep them safe, the informant said. C5 also talked about how newsletter from NCTIR was good in keeping the community in the loop.

Similarly, K4 mentioned that they were producing situation reports to a wide range of stakeholders at the national level, the regional level and the local level. This informed the community and stakeholders of what has been done, what are some of the gaps at the time, the informant said. K4 also described the value of having face-to-face conversations with external

organisations (Figure 5-19). There were regular community meetings between the two affected townships, which was essential for information distribution and exchange, the informant said.
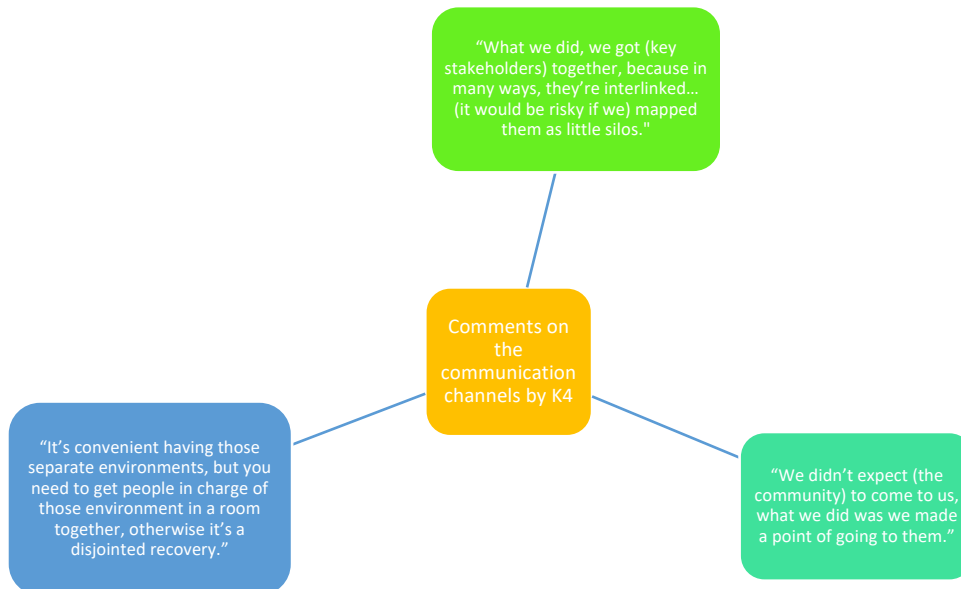


*Figure 5-19 The diagram illustrates the key comments made by K4. There were communications amongst the key stakeholders ensure information distribution and exchange, which was critical for post-disaster recovery process.*

CS2 also talked about the line of communication at a local, regional and national level. This informant applauded communication from the national government and that they were quick to respond. In addition, the informant said it was essential to bring in key people like insurance and EQC to address the people's concerns. In particular, there would be regular meetings that the council would hold to feed the information out to the general public. CS2 talked about holding expos consisting of key departments from a variety of agencies such as insurance and health departments to ensure that the community had a space for questions and for what is going on in Kaikōura. There were station set ups (e.g. booths for insurance; booths for council etc.), and that was a more effective way of getting the information out there, CS2 said.

> *(On regular meetings) "The important thing was to keep feeding, even if it's the information that you have, feed it back out, keep the community informed." CS2*

Furthermore, CS3 highlighted that the Order in Council created the Restoration Liaison Group, which included the key stakeholders and agencies involved in the recovery process, including cultural advisors. That acted as an effective forum for information flow and exchange amongst the stakeholders to discuss and voice their perspectives on the recovery process. K1 also raised the importance of communicating at the local level. This is so the community feels like the NCTIR Alliance is part of them to make sure everyone is on the same page through community meetings, newsletters and social media to target all demographics, the informant said. K1 said that it's about "finding a balance act" with the stakeholders involved. The informant said that it could be time consuming, but the Restoration Liaison Group opened up the line of communication between NCTIR and the community, including archaeologists and the cultural advisory group.

*(On distributing reconstruction updates to the public) "We'll do anything to get information out so that people feel informed." K1*

A1 emphasised that communication and good public relations management is vital in the recovery process. The informant talked about engaging the public and building awareness through social media as part of the pre-disaster work. C2 also highlighted the importance of communications at the local level. This gave the community assurance and confidence that NZTA was "doing everything possible to help them", the informant said. C2 also applauded Civil Defence on their efforts to distribute the information and keeping everyone in the loop. Besides, CS1 applauded the regular community meetings as they provided a platform for the community to voice their councils and for the council to collect the information they needed. K2 also talked about how the regular meetings provided a platform to address the challenges and concerns the businesses are facing.

*(On community engagement) "They know that people are there trying to reinstall the critical infrastructure… and this gives people confidence that something is being done about it… but also the confidence that we're her to help." C2*

In the international context, K3 emphasised on working at a local scale through local NGOs on disaster work, strategy development, stakeholder analysis and engagement on disaster wastes. The informant raised the importance of community engagement when it comes to developing plans on post-disaster management.

> *(Developing strategies and policies) "It was built on stakeholders discussion, not just high in the sky UN strategy, not what federal wanted, but built on existing community need and priority." K3*

*Constraints to implementing solutions*

Comments on human resources

CS4 suggested that it would be more helpful if the national government provided additional resources to the local authorities in case of emergencies, rather than introducing an emergency legislative environment. C5 also commented on the resourcing issue. There was a massive amount of information that had to be distributed on top of the normal workload, the informant revealed. In terms of the information distributed, the informant further described that it is crucial that they are up-to-date and of relevance. Figure 5-20 summarises the key comments made by CS4 and C5 regarding the implications of limited resources in the post-disaster recovery environment.

*Figure 5-20 The diagram above illustrates the comments on resourcing issues by CS4 and C5. Human resources is one of the key constraints listed by the informants to post-disaster recovery process. An emergency legislative environment provides additional support in a short space of time, but it also means that the council would have to cope with the loss of support after the transition period. Besides, the low number of human resources at the initial phase of the rebuild phases was evident in the lack of information distribution. C5 also stated that it was crucial that relevant and useful information was distributed to the right person.*

K4 shared similar views with CS4 and C5. Due to limited human resources, it also means that post-disaster management is more reactive, rather than proactive, the informant said. Similarly, CS3 described how the short space of time made things "a bit reactive". There were immediate problems needed to be resolved in terms of general day-to-day Civil Defence type of things, ensuring buildings are safe for people to occupy, assessing damaged properties, deciding where infrastructure will be going, and rebuilding; then, there was a need for special legislation, and a lot was going on at the same time, the informant said. Furthermore, A1 described that community engagement from public submissions and feedback are ad hoc and tend to have a short-term focus. The informant explained how community engagement for long-term issues like climate change and disasters require significant human resources which could be difficult for smaller councils like Kaikōura to achieve.

In addition, C1 also mentioned that the staff at Kaikōura District Council would have to multitask because of its small size. Likewise, CS1 expressed dissatisfaction with the lack of services in Kaikōura. The Kaikōura community had to share services with other regions around

the country because of its geographic location, the informant said. Moreover, K4 reflected on the recovery process in Kaikōura and brought up how the massive turnover of staff negatively affected the recovery process. CS2 also talked about how the senior management staff played a big role in the recovery process. The informant brought up how some council staff members were not on the same page, but it was not a significant issue. Equally, K2 made a comment on the council staff. Table 5-3 below summarises the key quotes made by C1, CS1 and K2 to illustrate the effects of human resources on the recovery process in Kaikōura.

*Table 5-5 The table below outlines the key comments made by the informants on issues regarding human resources.*

| Comments on human resources | |
| --- | --- |
| C1 | *"Being a small council, you sort of learn to be a multi-tasker, like I did five or six roles, I didn't just do one role."* |
| CS1 | *"Because we're on the brink of Marlborough, West Coast and Canterbury, we share our services… you've got to know where your people are."* |
| K2 | *"Councillors don't necessarily have that expertise, they were voted in for totally different reasons, not for disaster management."* |

## Comments on community wellbeing

C1 talked about the staff's wellbeing and that they had to "work 12 to 14 hours a day and not be able to live a normal life". C2 also raised the point of the wellbeing of the construction and emergency workers, that they also had their own families to care for. Likewise, CS4 reflected on the psychological scarring and stress of the staff involved with disaster management and that they had to put other people's need above theirs. In addition, K4 mentioned how the community had been walloped by the recent event, especially when they were still recovering from the previous event. The informant added on that "elderlies won't complain", and the reality was often worse that they had described. K4 said it is vital to support the community as they will make a difference of how they feel mentally, which could be reflected in the recovery process. The table below outlines some of the key comments by the informants on the community and workers' wellbeing in a post-disaster environment.

*Table 5-6 The table below shows the comments made by the informants on the wellbeing of the workers and community after a disaster. There are psychological impacts from a disaster and as mentioned by the key informants, these are some of the issues needed to be addressed.*

| Comments on community wellbeing | |
|---|---|
| C2 | *"The firemen, the drivers, the construction workers, they were there to assist the community, but actually, they've got their own family too that they need to care and look after… and it takes a toll on the family"* |
| CS4 | *"(Community wellbeing) is something that needs to be prioritised to providing services, whether financial or psychological. It's all too often a vacuum."* |
| K4 | *(On the community being affected by multiple disasters) "Slam dunk three years in a row is pretty tough."* |

## Comments on financial resources

CS1 said that the recovery framework is a "great thing if it comes with a price tag" and commented on the lack of money. The informant further described the impact once the recovery team and the council merged after the transition period. There were no jobs for the recovery team, everyone left, and all the knowledge was lost. There was little support from other government agencies, but they had no money, the informant said. CS1 added that the significant financial contribution from the central government was to resume the economic activity across the country, and the support for human resources was disproportionate compared to the support for the infrastructure construction.

C1 shared similar views with CS1. The informant mentioned that financial capability profoundly impacts post-disaster management. Part of the reason why support was cut off was that the recovery team was costing the council financially, the informant said. K2 also commented on the need for resources for the council and the current council structure.

## Comments on communication measures

C1 also expressed dissatisfaction of the communication between the senior management staff and the public. The informant commented on how the council did not take the community's voice into account. It felt that there was "strategic miscommunication" from the council's part and the isolated situation Kaikōura was in did not help, the informant said. Similarly, C5

expressed some dissatisfactory for the communications amongst the stakeholders (Figure 5-21).



*Figure 5-21 The diagram above shows the comments on the communication issues by C1 and C5. As mentioned by the key informants, there are communication issues at the management level as well as the community level. There seems to either be a lack of communication or miscommunication amongst the government agencies.*

CS1 gave mixed reviews towards external support from various non-profit organisations to the Kaikōura District Council. The informant revealed that some of the organisations were helpful and kept the recovery team "in the sync". Some organisations could have been a bit more helpful by tailoring their questions for the affected communities with the councils, the informant stated. In addition, CS3 also pointed out the value of having everyone in one place for communication purposes but mentioned how that was not a significant issue.

*"I think there were catch-ups, but in some ways, because the building wasn't big enough to have (the business-as-usual team and recovery team) on the same level of the building, it may be a little bit fragmented, only a little bit… In an ideal world, you would have everyone in the same office… but there's just so much going on at the same time." CS3*

C2 also talked about how the community is a crucial stakeholder but said that "you also need to think upwards as well". The informant described that the governance structure involves the national, regional and local government and is tailored to all the stakeholders. This is essential for information distribution and makes it clear what the roles and responsibilities are between the different levels regarding issues like budget, health and safety programme, risks, stakeholder engagement, network and performance, the informant said.

*"When anything turns to custard, it's normally down to poor communication right?"* C2

CS4 mentioned how the communications between the council and the key stakeholders seem to be "ad hoc" but said that it is improving and there seems to be more "organisation and regularity being built into those relationships". The informant described that there should be regular meetings to better prepare for disaster situations. There is an outreach to the public, but the uptake from the community is low, the informant said (Figure 5-22).


"They did a survey afterwards to see how many knew about (the community disaster plan), or read it, it was really low. I think 1/7 or 6 something like that." CS4

"If that level of engagement, going in and providing a document like (community disaster plan) to people doesn't work, it's difficult to think what would, other than perhaps scaring people somehow." CS4
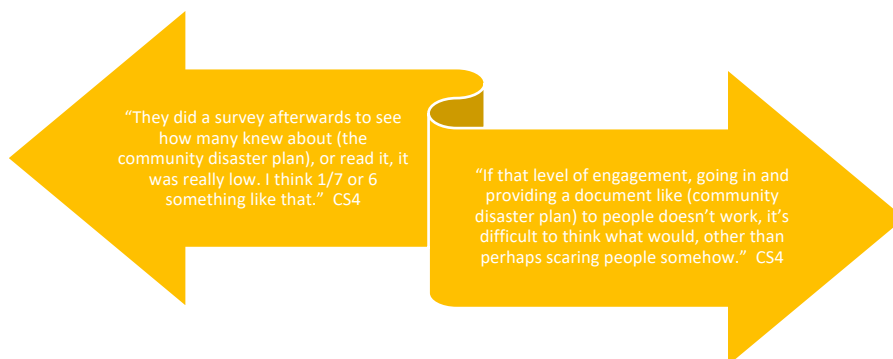
*Figure 5-22 This diagram reveals the complexity between community engagement and community involvement as public outreach does not necessarily translate into public uptake.*

### Comments on awareness and perceptions

CS1 said that some government agencies are not aware of the issues that were going on at a local level and emphasised on how the six-months recovery period was too short as Kaikōura was still isolated. The informant also mentioned that some the issues could have been dealt with better (Figure 5-23). CS4 also brought up that it was essential to raise the awareness level of the council staff to better prepare for when an event strike.
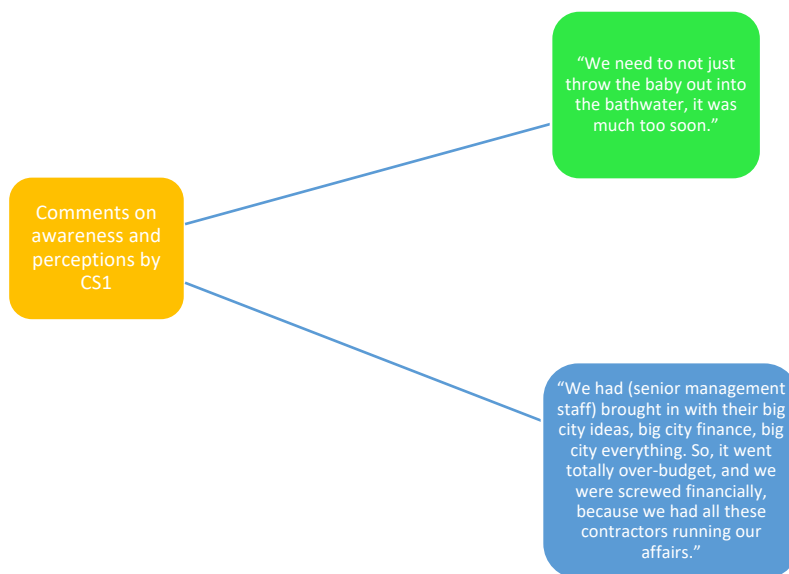
*Figure 5-23 This diagram shows the comments made by CS1 on the awareness and perceptions of the management staff. As mentioned by the key informant, the rural context of Kaikōura had to be taken into account. The informant also stated that the transition period should have been extended considering how the local community is still struggling to recover from the disaster.*

In the Tōhoku context, A3 brought up how geological records could inform the height of the tsunami. However, decision-makers tend to depend on historical tsunamis, as they deemed geological record "unreliable because the record is the 9th century". As a consequence, they underestimated the height of the tsunami, the informant said. The informant also talked about how the community had a false sense of security from the big tsunami walls, thinking that it is going to protect them, which did not help when the Japan Meteorological Agency underestimated the tsunami height. A3 also commented on the communication between different disciplines, advising decision-makers and preparing for future disasters with the idea of resilience and the cost of recovery (Figure 5-24). Furthermore, A2 mentioned how the central government provides directions and guidelines for managing disaster wastes. The informant reflects on how it is important that decision-makers are aware of disaster waste, and that it affects the recovery process.
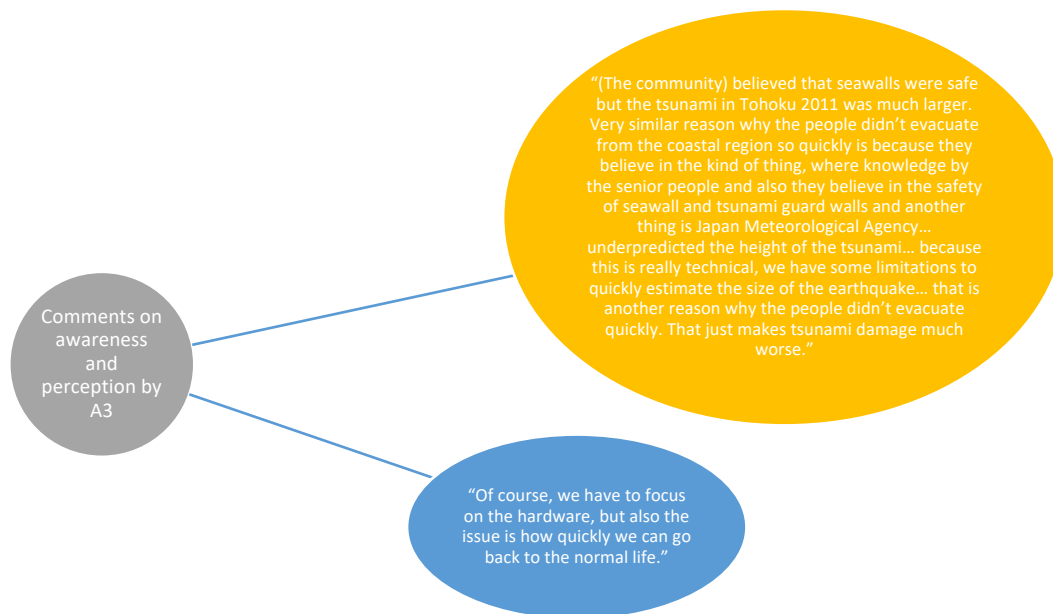
*Figure 4-24 The diagram above demonstrates the comments made by A3 on the awareness level of the management staff and the general public when it comes to disaster management.*

In an international context, K3 also brought up the issues of maladaptation in the Tohoku. The tsunami protection barriers gave people a false sense of security, and that had unintended consequences when the tsunami overrode the barrier, the informant said. The informant also talked about how New Orleans developed levees and pumps to protect the region from natural hazards, which also had unintended consequences from the disrupted sediment flows and decreased effectiveness of the natural barriers island. In addition, K3 talked about the importance of perception and explained it by giving nuclear wastewater as an example. If the government bleed that off slowly, the effects are small to negligible, but they can't do it because of political reasons and opposition. The impact would be low compared to when a new disaster strikes and all of those tanks break, it's going to be a "huge vulnerability", the informant stated. K3 further explained that as an expert in the field, he avoids buying from the nuclear affected areas even when they had been cleared. K3 also mentioned that the general public was not aware of how hazardous (e.g. toxic ash) the waste is to human health and how a disaster such as flooding could have a flow-on effect from flooded chemical plants, for example. The informant also explained how there are standards for drinking water and almost everything, but not for ambient water, which is important for irrigation for rice paddies. In comparison to drinking water, ambient water for environmental services is behind in terms of value, regulation, and monitoring, the informant stated (Table 5-5).

*Table 5-7 The table below illustrates some of the key quotes on the importance of awareness and perceptions by K3.*

| |
|---|
| *"(When developing strategies) have some thinking about disasters, can't be day to day."* |
| *"One always has to look at the potential unintended consequence of protection measures, because they endangered our sense of security which leads to higher vulnerability."* |
| *"People's livelihoods are based on perception… You shouldn't underestimate the importance of perception."* |
| *"If I'm not (buying from the nuclear affected prefectures), and I have a degree from physics, and I know that the government cleared all those peaches, what about the less knowledgeable? Perception is really important, it's not logic, government mandates and stuff only go so far."* |

### Comments on community response

C2 felt that it took NCTIR a bit of time to embed themselves into the Kaikōura community, but they inundated the area with opportunities and resources and utilised the local human resources for the rebuild projects. Correspondingly, K1 mentioned that the community response for NCTIR was positive at the initial stages when roads were being opened; and it was evident that NCTIR was driving the local economy in terms of accommodation and hospitality. K1 said however, that there had been a shift as the community is frustrated at the slow progress of the construction work. K2 also mentioned the shift in the community's response due to the uncertainty of when the building works were wrapping up. In addition, K4 also expressed that the community felt "done to them, rather than part of and having a say in (the recovery process)". The informant said it was important to have a recovery manager that has links with the community and the national and regional level. The table below outlines some of the key comments to illustrate the community response in the reconstruction process in Kaikōura.

*Table 5-8 The table below summarises the key comments made by the informants on the community response in Kaikōura.*

| Comments on community involvement | |
|---|---|
| C2 | *"So, as part of the recovery, it was important that we think about the economy of the region and utilise as many resources as we could (while keeping) the same economic injection into the region."* |
| K1 | *"It's explaining to the community, that even though it's functional, there's still stuff to finish, there's still more things to do."* |
| K4 | *"(Recovery Managers) have to be able to have relationships up in the ministry, and down with the people on the ground as well. Picking random people and throwing them in the deep end is a bit rough."* |

CS1 expressed disappointment with the council's approach to recovery, and that good leadership is important to provide a platform for the community to raise their concerns. The informant also expressed dissatisfaction regarding community engagement. The informant observed that although there is a Facebook page, internet access is not available in a lot of areas. There is a high percentage of the community who are over 65, the rural context has to be taken into account when it comes to community engagement, the informant stated. In addition, CS1 raised the point that there should be more community workshops and that it should be a two-way thing, rather than the senior management staff "talking at people the whole time".

> *"We had the potential to get it really good, with the community in there, for the first time, being involved and wanting to shape their future… Some Christchurch development and commerce people, took our ideas, took them away, and created the Re-Imagine Kaikoura document, without any consultation with us who were working in the area… it doesn't reflect what we wanted it to reflect… we can't use it… Everyone's crossed with us, and rightly so. I am too. We spent all this money, and we've got nothing to show for it."* CS1

Similarly, C1 mentioned that the community felt "really disengaged with the council and very much done to". C1 said however, despite their best efforts, that there's always going to be a sector of the community that were disengaged due to technological constraints, which

exacerbates post-disaster (Figure 5-25). Likewise, CS3 said that the community felt like "things have been done to us, as opposed to being driven by the community".
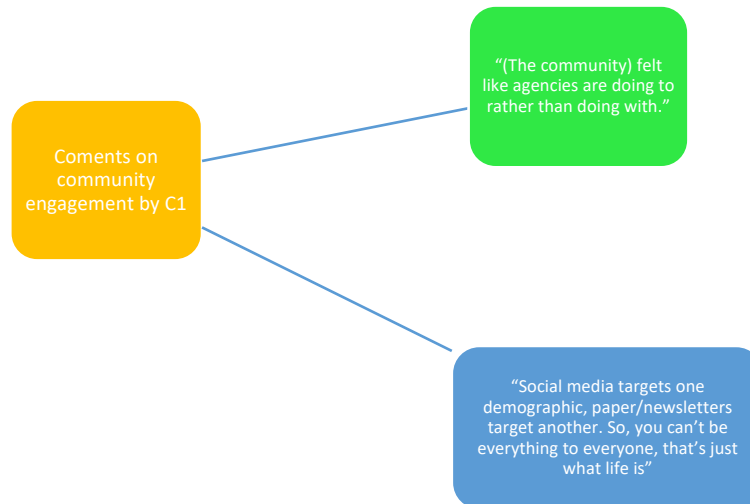


*Figure 5-25 The diagram above shows the comments made by C1 on post-disaster community engagement in Kaikōura.*

C4 gathered the community's response towards the reconstruction project from the media and commented on the recreational and amenity areas regarding Iwi interests and public oppositions. C3 said it was a challenge communicating with the construction team regarding erosion and sediment control measures when there's a giant slip that is dumping sediments into the ocean created by natural processes. Similarly, C5 mentioned that meeting the community's expectation was a bit of a challenge, and the negative media coverage made matters worse. C2 shared similar views to C5. Table 5-7 below illustrates the challenges with community engagement in Kaikōura.

*Table 5-9 The table below shows the comments on community engagement in Kaikōura by C2 and C4.*

| C2 | *"It's about listening and showing empathy to the community, put yourself in their shoes, but also trying to take them on the journey about why you're doing certain things."* |
|---|---|
| | *"I think the challenges are meeting the expectations of the community.  and providing enough information to the community which gives and confidence that you are doing everything you can to  keep them safe and restore the situation. And I think in New Zealand as well the challenges define the resources quickly.  And when I say resources I mean capable and competent resources."* |
| C4 | *"There might be people who like it, and don't, but that's always the case."* |

A3 expressed similar views with C4 on the community response on protective barriers constructed in Japan. The informant mentioned that there had been a decrease in population in the affected areas, which meant that the towns and cities struggle to rebuild because of contacting issues. The government proposed memorial objects for the cities and towns, but "the people didn't want to be reminded of anything", the informant said.

> *"Some people like the big tsunami walls to protect the town, but some people don't like that, because they lose the nice view." A3*

### Comments on recovery structure

In the Kaikōura context, C2 stated that they underestimated the amount of resources needed for community engagement, which has tripled ever since. The informant questioned if Civil Defence was the most suitable agency to set up the cauldrons during the time of a disaster. The control and operation of the cauldrons should be more of a defence force type of role who has got the specialist equipment and resources for the overall control and coordination of it, C2 said. In addition, C4 felt like it would be more beneficial for the council to "be more involved and make more use of their local knowledge and their knowledge of local and community issues". The felt like there were limited authority from the council in terms of the consenting process due to the nature of the project. Moreover, C3 brought up that they had to assess the consents three times because the designs were done too early on. C3 further mentioned that the community pressure overtook their assessment. The hierarchical nature of NCTIR meant that reporting would go up to the senior management staff where it would be responsible to report it back to NCTIR, rather than straight to NCTIR itself, the informant stated. The figure below outlines some of the key quotes by the informants to illustrate the perspectives on the recovery structure.
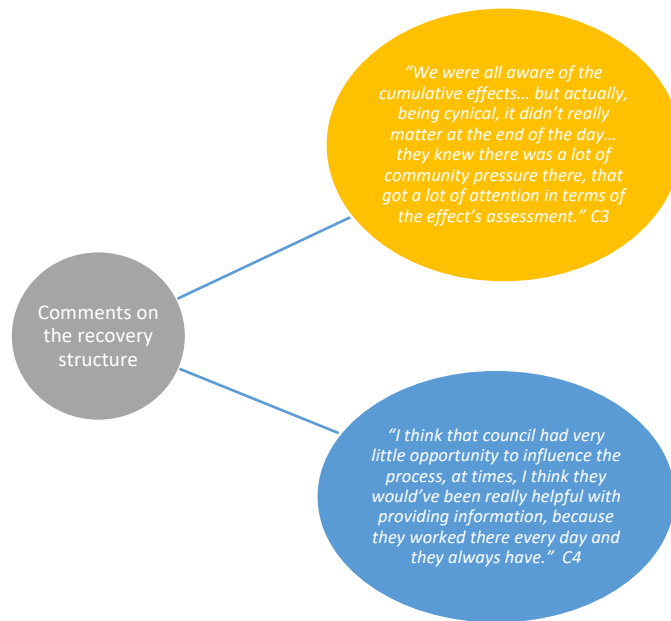
*Figure 5-26 The diagram shows the comments on the recovery structure by C3 and C4.*

As expressed by a few of the key informants, the recovery process in Kaikōura was heavily focussed on the reinstating the isolated corridor. There was a trade-off between quick physical restoration and environmental impact.

> *"It just had to be done, because the priority was to get the road opened." C4*

In an international context, K3 expressed that politics can come into play sometimes. The informant described that the input from United Nations can be dependent on the social context of a country, and within that, funders' priorities come in to play. In addition, K3 talked about waste management in the community level in Japan. There are decontamination issues with solar panels at the moment, but possibly due to profitability, many old rice paddies near the train tracks have now been converted to house solar panels, the informant said.

> *"Interactions with developing countries are partly political, but in most instances, demand driven… and we do our best to respond to them, but at the same time, we raise funds… which is a bit of a balancing game of looking at the priority of the funders." K3*

Rather than standing on the legislation, K4 said that Civil Defence in Marlborough took a more prescriptive approach through community-led recovery. That was possible because of the Kaikōura Earthquake was relatively small scale, the informant said. In addition, A1 raised the point of how the name of an earthquake can affect the recovery process. The informant described that due to the name of the earthquake, Kaikōura received more significant amount of aid compared to the other areas which were affected. Also, CS4 felt like New Zealand, a country that is as disaster prone, is "playing catch-up" when it comes to reduction works.

> *"(Hurunui and Waiau) got a bit annoyed that Kaikōura was getting all the spotlight on them because it was the Kaikōura earthquake." A1*

A1 and A3 talked about how culture comes into play for post-disaster management (Table 5-8). A3 raised the point about how the general public is highly dependent on the government for information. On the other hand, A1 talked about how it is difficult to compare New Zealand and Japan because of the cultural difference. The informant described how culturally, New Zealand and Japan differ when it comes to government decisions. Significant community participation is possible in New Zealand because we have a smaller population in comparison. In Japan, because of the size of the country and the power of the government, they can step in and start developing, which makes re-development quicker than New Zealand, the informant stated.

*Table 5-10 The table below shows the comments by A1 and A3 on how culture comes into play for post-disaster management.*

| Comments on influence of culture | |
|---|---|
| A1 | *"Japan is used to having government impose decisions on them, and they are quite willingly to have that happen… That would never happen here. I mean culturally, we are not that and we would not want stuff imposed on us."* |
| A3 | *"This is the kind of Japanese mentality. People are dependent on the government. We call it Okami. It means imperial or upper state of the country could protect us."* |
| | *"Some cities have local or NGOs to make some kind of evacuation plan… but most of the case, they follow the rules given by the government."* |

## Comments on waste management

In the Tōhoku context, A2 commented on the streamlined structure for disaster waste management in Japan but expressed concerns about the landfill capacity. A2 also described how the market can play a role in disaster waste management as in the case of Sendai city, where metal wastes can sell for a significant amount of money because of the clear separation from the other waste materials. A2 explained how because the wastes were submerged in sea water, they contain sodium chloride and thus, making it difficult to incinerate as it causes corrosion to the incinerator. The informant also reflected on the turnover of government staff every 3 or 4 years, and how that knowledge is lost with the shift, however, A2 pointed out how the D-waste network aims to provide support for that. In addition, K3 mentioned how Japan's solution to incineration is to make islands out of the ash produced, but that does not work for disaster waste as it requires a steady stream of high caloric waste.

> *"Government staff change around every 3 or 4 years. Experienced people in particular sector got shifted around, then it is back to zero and we have to reconstruct the system again. But, D-Waste network supports the system." A2*

In the Tōhoku context, A3 pointed out that the monitoring was mainly managed by the local government and due to the large area, central government is not able to cover everything at the local level. The informant added though, that the local government have an obligation to report the recovery process back up to the central government as they provide funding. A3 also noted that the media plays a role as they expose the current recovery affairs and progress.

In an international context, K3 talked about using technology like robots and drones for monitoring outcomes but raised the point that there is no long-term solution for disaster wastes. The informant further explained how nuclear plant waste has no long-term solutions in place due to legal reasons. K3 mentioned that monitoring is weak since project timeline is typically three to five years. The "impacts and outcome are much longer term" and due to finance and community engagement issues, there is a disconnect between the operational timescale; and the operational monitoring timescale presents a problem for monitoring, the informant stated. K3 questioned the value of monitoring and review though, and said it only add values if it has an impact on decision making.

> *"We monitor spending, money, expenditure, procurement… and ask questions beyond the outputs and publish those. So, who cares? Who read it? We call it consideration for informed decision making. It only has an outcome or impact if a decision maker reads it, gets informed and takes the decision based of the knowledge in part of it… which can be monitored (through citations etc.)" K3*

In the Marlborough context, K4 raised the point that Kaikōura and Marlborough had a different monitoring system in place as Marlborough is a unitary authority whilst Kaikōura involves the regional and local councils to monitor the consented projects. This meant that monitoring is more streamlined and added to the database. It is important to have an "escape plan" for the recovery process though, and that things had to return to business as usual, which could be difficult to draw a threshold to the recovery process, the informant said. K4 explained that it is not to say that the psycho-social aspect won't continue, but it is about going back to business as usual and doing a "soft-release" where people can seek support on their own (Figure 5-27).
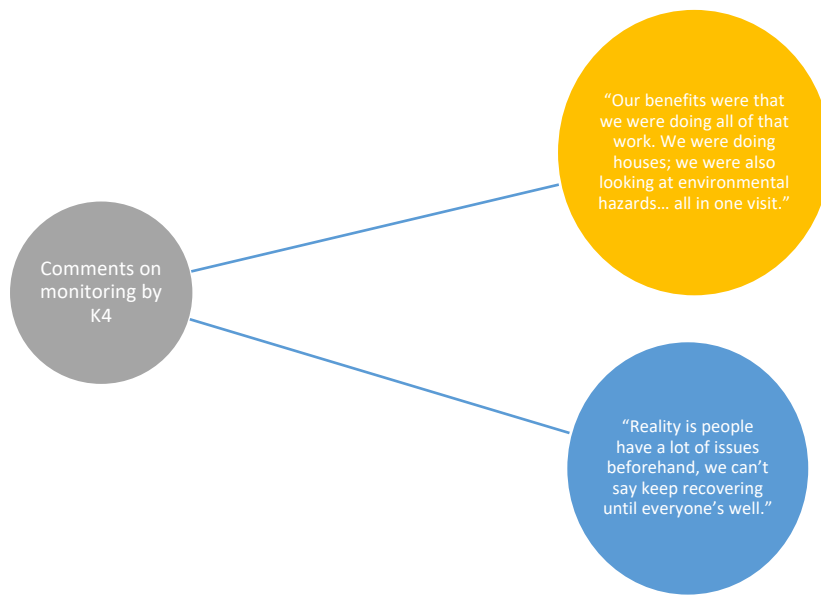
*Figure 5-27 The diagram above shows the comments by K4 on monitoring process in Marlborough.*

CS2 talked about the review that has been done on the recovery process and Kaikōura and said that they are still struggling for all the repairs and needed government help. The informant raised the point of marking an end to the recovery process. It could have continued, but when people are up and running, and there are signs of economic improvements with tourists coming in, and businesses buying new cars, it meant that the "time was up" and the town did not need a control recovery, the informant said. Furthermore, the informant reflected upon the recovery process in Kaikōura and talked about how it would be different in bigger cities. Marlborough would come in to help in the case of another event, the informant said (Figure 5-28).
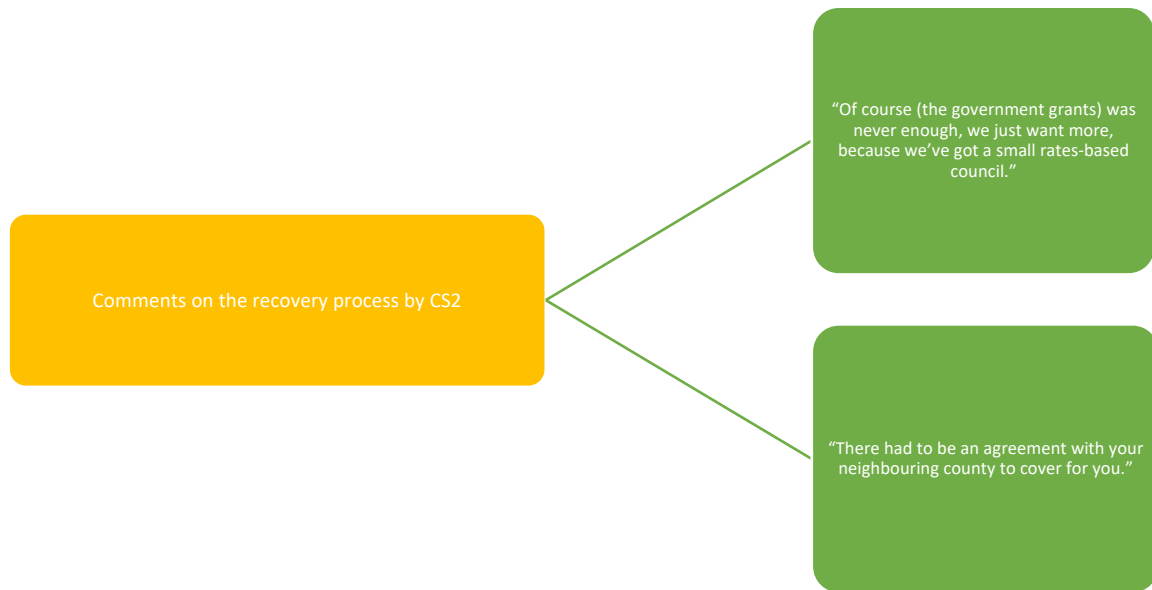
*Figure 5-28 The diagram above shows the key quotes made by CS2 on the recovery process in Kaikōura.*

C2 described the monitoring process around the state of the assets in Kaikōura in terms of degree of damage before rebuilding. The informant said that this is to assess what the options were, and what were the problems needed to be fixed by developing a strategic business case. C2 added that the problem was that communities were disconnected as they were physically isolated and could not get access to the critical services and increased freight time.

CS3 described that due to the small size of the Kaikōura District Council, Environment Canterbury (the regional council) does the monitoring for the consents and was able to duplicate the regional council consents as they were similar. The informant mentioned how with the Order in Council, the council was able to impose conditions on the consent applications where the applicants (NZTA or KiwiRail) could accept or reject those changes.

*"So, the conditions imposed on a consent were generic, and we were fortunate that the regional council, Environment Canterbury, has been pretty helpful in terms of monitoring consents and undertake multiple consents. Because effectively, unless we employ additional staff, we didn't have the resources because of everything else that was occurring." CS3*

K1 talked about the partnership between the environmental team at NCTIR and Environment Canterbury for consent monitoring. Monitoring is time-consuming but that is "just part of the business" and it produces a more desirable outcome, the informant said.

> *"At the end of the day, we all want the same thing…*
> *We don't want to damage the environment… the*
> *animals or anything in the area." K1*

### Suggestions to managing future disasters

At the end of the key informant interviews, the informants were asked for their perspectives to managing future disaster events. This section of the chapter thematically presents the measures recommended by the informants.

A1 emphasised that disaster management is "really context specific" and described how resilience networks prior to the events determines the recovery and response process after a disaster. The informant also talked about "building a sense of community" and raising awareness on disaster management plays a key role in building resilient communities. Leadership is really important with issues like this, the informant said.

> *"So, if you were in a well network community, and you*
> *know who the key people are, you know who the leaders*
> *are, you understand the disaster management*
> *arrangements, then, you're much better off in the*
> *aftermath of an event like (Kaikōura)." A1*

Similarly, K3 explained that there is no definite answer for moving forward in terms of post-disaster management. There are elements that could be identified, such as resilience for a city and patterns of vulnerability, but it is complicated, the informant said. There can be easy solutions like allocating space for large volume of disaster waste to ensure responder get access into the affected areas, and "a lot of places don't do that". Furthermore, K3 also mentioned that "people care about the outcome", rather than who is in charge of the recovery process, whether it be the United Nations, NGOs, or government. K3 said it's highly dependent on the country though, that some prefer the United Nations as it is perceived to be neutral. K3 brought up that their engagement is usually triggered top-down with bottom-up stakeholder engagement.

K4 said that even though the Civil Defence Group in Hurunui is small, the team do their best. We can be a bit stretched on the ground, but we are focussed on the important issues, the informant said. K4 described how the Hurunui District's financial capability contributed to the recovery process in the region. There were disgruntled reactions amongst the community about the lack of support, but it was a trade of between being in charge of the recovery process and getting financial aid from the central government, the informant said. The informant described how Marlborough gave the message nationally that they were coping with the disaster, when in reality, they had higher repair bill than Kaikōura and Hurunui combined, but because they did not declare a state of emergency, they did not get as much support from the government due to the desire to be independent. K4 also mentioned that they had a relatively small focus on psycho-social recovery in Marlbourough.

> *"Because our view, if you provide them with clean water, warm house, roof over their head, transport, food etc. That's going to improve their mental wellness a lot more than hey, how would you like to have some free doctor's visits… You can't separate these things out." K4*

K4 also mentioned how the actions in the response phase would affect the recovery phase. Appointing a recovery manager that "understands the whole picture" is also important. K4 also emphasised on the importance of investing in reduction programme, which is lacking at the moment. The informant also expressed concerns for the affordability side of things for future disasters (Table 5-9).

*Table 5-11 The table below illustrates the key quotes made by K4 on the current post-disaster recovery structure framework.*

| |
|---|
| *"There's nobody thinking 6 months, 12 months out, people are just responding to what's in front of them right now. Recovery starts on day 1. It's just making sure decisions made aren't affecting what's going to happen in the next few years."* |
| *"We have enough experience in recovery, what works what doesn't… But it's the more in the reduction, the faster recovery will be."* |
| *"I think we have to look at how we do recover from these things if insurance companies start to bail."* |

Conversely, C3 applauded the accelerated process the Order in Council brought in for the Kaikōura rebuild. The informants added that they felt it was important that ecological principles get captured into the Order in Council for other events. Similarly, C2 commented on the governance structure of the alliance and the different levels of interfaces to ensure clear responsibilities and roles and how things flow. CS2 also talked about having clear roles and responsibilities between the council staff and the recovery team.

> *"I don't think you could ever achieve a recovery in that time without breaking from the normal systems. You would still be consulting over things, wouldn't you, even now." C3*

K2 described how due to Kaikōura District Council being a small council, the rebuild management should have been outsourced and managed by an individual party to allow council to "focus on moving forward". The informant also talked about how the delays in the rebuild could be attributed to the lack of skills and expertise within the council to manage a large-scale project involving concurrent infrastructural projects and restoring critical services like roads and water. K2 also felt like recovery team should have been kept separate from the council, rather than it being merged back into the council after the transition period.

> *"Now they are trying to do (recovery, rebuild work management and business as usual), without the expertise to do it or the manpower to do it effectively, and that is actually dissolving their ability to resolve as a council." K2*

C5 brought up that the financial system needed a bit more attention at NCTIR. C5 also raised the point that the data collected on site should have been converted into database to provide more functionality and analytical values. There should also be standard process for the engineering assessments on the damage for future events, the informant said.

> *"The construction industry is putting best financial people into NCTIR... but isn't that detrimental for the*

C2 also said to "be ready" for another major event, by having the system and process in place that "we can just pull out of the drawer and implement it as quickly as we can but have the resources that we can tap into quickly." CS3 raised the point that a proactive approach through generic plans prior to the events with more generic support from the national government or having a group trained the specifically offer assistance to smaller councils would be beneficial.

*"I'm assuming you'd still have to go through that*
*special legislation to fix roads again, to redo things,*
*critical infrastructures, and you think, now we have to*
*reinvent the wheel a little bit." CS3*

In an international context, K3 highlighted that post-disaster management or preparation is thinking about the stochastic events and developing the capacity of the systems to handle those extreme events. It is also about involving the community and investing in reduction and preparedness measures, the informant stated. K3 also talked about improving resilience in different contexts regarding the type of disasters, the predictability and response of it, and the social contexts of the regions (Figure 5-29). Japan is able to cope with the disaster waste because they got the resources to distribute the waste nation-wide, which eased the pressure. However, for countries with limited resources, "technology don't work in that context", the informant said. This is because of maintenance and affordability issues. In those cases, K3 suggested that financial aid and insurance-based mechanisms would help.

*Figure 5-29 The diagram above shows the comments made by K3 on how the social context comes into play for post-disaster management.*

In the Kaikōura context, K2 suggested that for post-disaster recovery, it is important that businesses are working collectively together. C2 also talked about supporting council around statutory tasks and activities as councils "normally run a pretty tight ship, fiscally, their budgets are pretty tight", but there needs to be more support and investment for the community at the council's part. C2 noted that people wanted follow-ups from navigators for door-knocking to check on them, to ensure that the they feel supported from a wellbeing perspective in terms of access to food, critical services like clean water and power. If they have not got those, they knew what options were available to them, the informant said. Furthermore, C2 raised the point that community engagement is important when it comes to post-disaster recovery (Table 5-10).

*Table 5-12 The table below lays out the key comments made by C2 on the lessons learned from post-disaster community engagement in Kaikōura.*

| |
|---|
| *"So, my view is, you need to provide lots of information, and even if there's no new information, you need to continue providing the same key messages to people."* |
| *"As we start mobilising, we're able to give people confidence that we were flooding the area with resources, that we're going to help them, that we were bringing in specialised plant in to assist the recovery."* |
| *"And the lesson there is that because we undercooked in the beginning, it took us a long time to recovery the confidence of the community."* |

CS1 emphasised on the importance of community connections and how that would benefit the recovery process (Figure 5-30). The informant also stressed the importance of localism for community and economic development. The informant described that in this structure, the local council would report up to the regional level by which they would their own research and organise the resources needed. CS1 said currently, they are trying to establish a community house where the key agencies are based out of to provide for community services in Kaikōura.



Comments on post-disaster management by CS1

"If we strengthen these grass-roots things, we are so much better off in a disaster because we could just tap into those organisations and say what do you need, and then we can hustle with the people who know how to get stuff from the Central Government."

"It was locally-led, intermediately managed and nationally supported."

"Community connections on a grassroots level is key to resilience in peace time or disaster times."
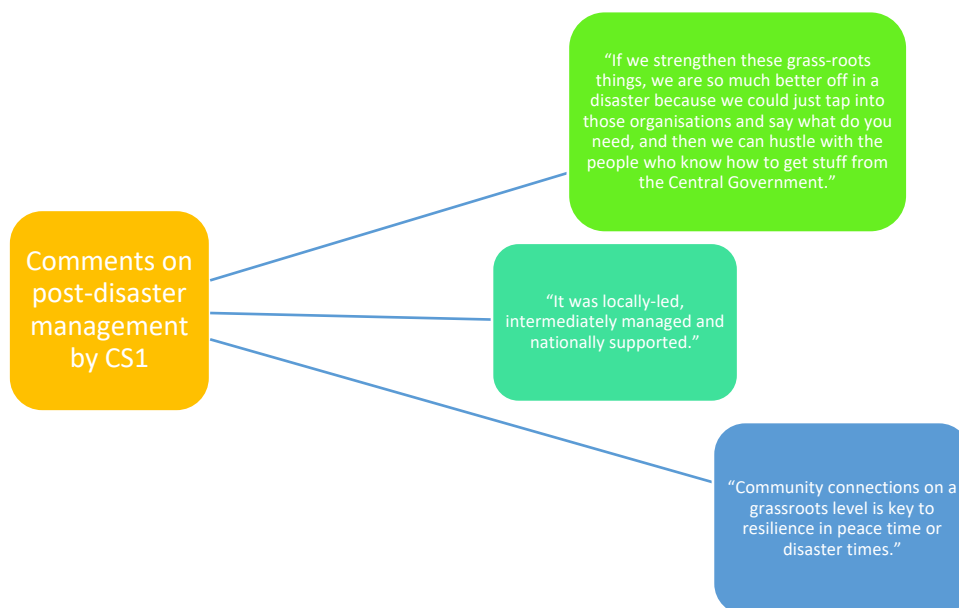
*Figure 5-30 The diagram above shows the comments made by CS1 on how to potentially manage future post-disaster situations.*

CS3 emphasised on the importance of having people in the community can trust, who can then act as a conduit between what's happening at the local level and the national level. The informant praised that the local government works well as a conduit. It does not always work, but the local government does benefit by having a bit more ground as opposed to external agencies like NZTA or KiwiRail in a small community like Kaikōura's, the informant said.

C1 said "it's easy to insult, but it's hard to fix" but emphasised on the importance of community engagement and strategic approach for post-disaster management. The informant explained it through the fishery ban based on the Maui Dolphin Management Plan proposed, which they felt could heavily impact the fishing community in Kaikōura. The small population in Kaikōura meant that we didn't have as much say in it, the informant said. In addition, the informant felt that the external council staff are lacking the local community knowledge as they are not part of the community. C1 further added that the recovery period should not have been in the legislation, as "you can't draw a line on issues like that". There needs to be a social, cultural and local environment introduced into the recovery legislation, the informant stated. This is reinforced by CS2, who emphasised that it was important to having local knowledge sitting alongside the external controllers and recovery managers. The informant also talked about having a database of businesses that the management staff could just tap into and to further the recovery process.

> *"We need (external support), but you need that*
> *local knowledge, especially in a small town." CS2*

Furthermore, K3 described how sometimes money and technology are not the issue for post-disaster recovery, and social engagement comes into play. There could also be unintended consequences at the base level of society, where alternative livelihoods come into play, the informant said. K3 also talked about the importance of awareness and knowledge, planning and funding when it comes to post-disaster management. Figure 5-31 below shows some of the comments made by K3.

*Figure 5-31 The diagram above shows the comments made by K3 on post-disaster management at a local level.*

CS1 brought up how that the recovery team was not fully supported by the council staff and had "no idea how council systems work". The informant said that it was important to have a good information management system for the database. In addition, K1 emphasised on the importance of getting the community on board on what NCTIR was doing from the beginning. C4 said that it would be beneficial to have a council staff sitting alongside the consultants where they could "feed into the process more effectively" given that the council had limited time to influence the process.

> *"Give the council more opportunity through the consenting process to comment on things because they are the ones who will have to live with the long-term solutions over the next decade." C4*

Regarding the rebuild project in Kaikōura, C5 said it is important that the community focus on the good things that were happening, rather than dwelling on the bad press about the project. The table below outlines some of the key quotes by the informant.

*Table 5-11 The table below illustrates the key quotes by C5 on the community's perception of the rebuild process in Kaikōura.*

| |
|---|
| *"I hope people realise that it was a small component, yes, it could have been dealt differently, but (the community) needs to see the other stuff that we're doing that was much better."* |
| *"It would have been nice if people knew about the things that were going on, but you can't have everything."* |
| *"They knew that it was going as fast as it could, quite cool that it flipped. You got a bit of a Kaikōura bubble, you forgot that the rest of New Zealand don't see it that way, but that's how these things go."* |

In the Japanese context, A2 said that disaster waste storage space should be a bit more of a priority. A3 also mentioned that decisions are made by politicians and dependent on budget. There has to be geographical input and preparing infrequent might not be the best way.

## Chapter Summary

This chapter has illustrated a broad array of characteristics about the post-disaster recovery framework in Tōhoku and Kaikōura. The chapter began with a brief overview of the Tōhoku and Kaikōura region to provide context to the results. Both regions had overarching national management systems for the recovery process, namely the Reconstruction Agency in Tōhoku, and the North Canterbury Transport Infrastructure Recovery Alliance in Kaikoura. Amongst the results discussed, and of particular importance to the present study, was the effects of local context on the post-disaster recovery environment. The pros and cons of the post-disaster recovery framework were outlined with reference to the key informant interviews. Furthermore, the chapter outlined several solutions that each region has utilised to managing post-disaster situations. These included drawing on the available general resources and developing communication channels that were recognised to be effective in each region. On the contrary, the informants also provided details on the constraints that were preventing the implementation of those solutions, which included limitations to human and financial resources as well as the issues surrounding the communication measures. Overall, the informants have provided useful insights into the post-disaster legislative environments in each region and the

chapter concluded with suggestions by the informants to managing future post-disaster situations. In order to address the research questions proposed, the following chapter interprets these main findings and aims to evaluate the post-disaster recovery environment in Tōhoku and Kaikōura.

# Chapter 6: Discussion

This chapter has two primary objectives. Firstly, the main findings from the key informant interviews are interpreted and discussed with reference to the theoretical framework developed in Chapter 2. Secondly, this chapter assesses the meaning of the results against the research questions proposed. The research questions addressed in this chapter are:

| | |
|---|---|
| Research Question 1 | Is post-disaster management in Japan the state of the art? |
| Research Question 2 | What are the gaps and challenges of post-disaster recovery management? Are there ways through which they could be filled? |
| Research Question 3 | What is the best step forward to managing post-disaster recovery efforts? |

Figure 6-1 demonstrates the key themes emerged from the findings of this research. It illustrates the intertwining relationship of the contextual factors, legislative environment, and the recovery structure. Due to the complex nature of the findings, this chapter is split into two sections. The first section investigates the effects of context on the post-disaster recovery environment. The second section explores the interlinking relationships between the contextual factors, recovery structure and the legislative environment.
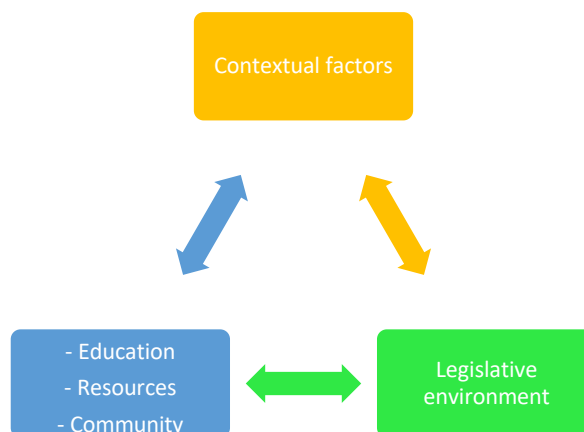


*Figure 6-5 The diagram above illustrates the key themes that have emerged from the findings of the study. It shows the interlinking relationship between the contextual factors, legislative environment and the recovery structure. The recovery structure itself shapes the a list of factors which are also influenced by the contextual factors.*

## Comparison issues

This study sets out to evaluate post-disaster recovery frameworks in Japan and New Zealand. The first research question examines whether Japan is the leading country in terms of their approach to post-disaster recovery management. In order to address this question, a comparative study was carried out focusing on the recovery structures put in place after the Tōhoku earthquake in Japan and the Kaikōura earthquake in New Zealand. As previously mentioned, the two cases were selected based on their geographical and legislative similarities. Both Tōhoku and Kaikōura had national governance structures in place to assist with the recovery process. This had significant implications on the recovery structure in the respective Regions. The 2011 natural disaster in the Tōhoku Region of Japan was characterised by three catastrophes. The earthquake triggered a tsunami which devasted the Region and also led to a nuclear plant meltdown. The complexity and extent of the damage meant that high-level assistance was required to restore and revitalise the affected regions. Similarly, in the case of Kaikōura, a state of emergency was declared as the Council did not have the finances and general resources to cope with the disaster. As a result, a national governance structure was put in place to assist the Kaikōura district. The following subsections explores the effects of the contextual factors (e.g. geographic, cultural settings) on a post-disaster recovery environment.

### Contextual factors

As the research developed, it became increasingly apparent that the comparative study presented some challenges because of the different contextual factors between Tōhoku and Kaikōura. Many informants have raised the importance of local context in a post-disaster recovery environment. This is because the local context appears to be a determining factor that shapes the recovery structure. The local context encompasses the social, economic, built and natural environments; and the contextual factors transpired from this study included social and economic settings, as well as the type and scale of events. These factors seem to be significant in influencing the level of assistance (national, regional, local, or international) required for the affected regions. This evidently suggests that local context is the common denominator for shaping the recovery framework in each region. This is supported by several informants, who commented on how the sheer scale of events triggered a need for a national government support, meaning a national governance structure was put in place to assist with the recovery efforts in each region.

The cultural differences of Japan and New Zealand appears to be one of the contextual issues for the comparative study. It seems that the underlying difference of the cultural context lie within community participation. To illustrate, with a governance structure, the government can impose decisions on the community. The legislative environment can be highly prescriptive and can define the extent of community participation. The extent to which communities can influence the decision-making process seems like a differentiating factor between the governance structure in Japan and New Zealand. As mentioned above, the legislative environment in Tōhoku and Kaikōura both followed a top-down approach. However, the translation of the centralised structures to affected communities are starkly different.

The Japanese communities appear be more compliant to the regulations than New Zealand communities. This may be due to the fact that, culturally, New Zealanders are not used to having decisions being imposed on them. To put that into context, the Japanese community had mixed review in relation to the delayed progress of the Tōhoku reconstruction efforts. As mentioned by informant A3, the Tōhoku community felt like the amount of support from the national government coincides with their economic contribution at the national level. It was suspected that the Tōhoku recovery process would have received a significantly higher level of financial assistance towards the recovery process if the region had more economic significance at the national level, as exemplified below:

> *"Because if (the Tōhoku Earthquake) happened in Osaka*
> *or Tokyo, they would make the recovery process quick,*
> *it's related to the economic heart of Japan" A3*

Conversely, the Kaikōura community expressed certain degree of dissatisfaction with the governance structure that was in place. There was some frustration with the slow progress, but it looks as if the main issue the informants had was with the governance structure in place. For instance, informant CS1 compared the recovery structure between Kaikōura and Hurunui. The informant expressed dissatisfaction with the rigorous recovery structure in Kaikōura. There were obligations that the local council had to meet as part of the national governance support, and the informant argued that it substantially hindered the recovery process. According to informant CS1, Hurunui was allowed more flexibility in their disaster recovery and recovered a lot faster than Kaikōura did.

A mixed response with the recovery progress in the Tōhoku region was observed, but unlike Kaikōura, there was no apparent indication of frustration towards the top-down management system. This is highlighted by informant A3, who described the idea of "okami", meaning relying and trusting the government. This evidently suggests that local-level processes in Japan were heavily influenced by high-level governmental decisions. Informant A1 reinforced the notion and stated that the Japanese community is accustomed to having government impose decisions on them. As informant A1 explained, this would not happen in New Zealand, as culturally, New Zealanders do not appreciate having decisions imposed on them by the government. It is normally assumed that New Zealand could afford extensive community participation because of its small population, however, the findings illustrate how culture plays a big part in post-disaster recovery, as suggested by this comment by informant A1:

> *"Japan is used to having government impose decisions on them, and they are quite willingly to have that happen… That would never happen here. I mean culturally, we are not that and we would not want stuff imposed on us."*

### Monitoring difficulties

Another issue with the comparative study is difficulties with the monitoring process. Monitoring the outcomes of a recovery process allows an understanding of the recovery structure, and thus, providing indications to the effectiveness of a post-disaster recovery structure (Brown *et al*., 2015). However, as raised by several informants, there were many complications involved with the monitoring process for the Tōhoku and Kaikōura regions. This poses a question to the value of comparing the post-disaster recovery structures of the two regions. The informants listed many geographical and logistical difficulties when it comes to the monitoring process, which many of these problems appear to be related to financial and community engagement issues (K3). As indicated by informant A3, the large scale of the event may mean that it would not be feasible to cover the extent of the damage from the disaster. Furthermore, there appears to be a disconnect between the operational and monitoring timescale. According to informant K3, a project timeline typically ranges around three to five years, however, the effects and outcomes of a project are usually presented on a much longer timescale. The interpretation of these findings suggests that monitoring is difficult to achieve, and as reinforced by informant K3, there are no long-term solutions for monitoring situation.

Moreover, monitoring outputs would be worthwhile only if it had impacts on the decision-making level (K3).

## Implications of contextual factors and monitoring difficulties on the comparative study between Tōhoku and Kaikōura

The findings evidently suggest that a comparative study would not be the most effective platform to illustrate the merits of a post-disaster recovery framework. This may be due to the interlinking relationship between disaster recovery and resilience networks. According to informants A1 and K3, the level of resilience in a community determines the quality of the recovery process. There are patterns of vulnerability and resilience characteristics that can be captured as to the effectiveness of a post-disaster recovery process. This resonates with the findings of Strunsińska-Correria (2017), who recognised the functions of social elements in a post-disaster recovery environment. These observations suggest the heavy correlation between the contextual factors and the success of the recovery process.

In regard to the discussion above (which was articulated with reference to the national governance structure for post-disaster recovery efforts), a national governance structure provides vast amount of financial and human resources and accelerate the reconstruction process. It also allows cross-sectoral integration and partnerships, thus, providing another source of resources to the affected communities (Kwok et al., 2016). The importance of partnerships resonated in the findings from the informant interviews and the literature. It is vital as this collaboration plays a significant role in providing a platform for data exchange in a post-disaster recovery situation (Godschalk et al., 1999). Many informants have highlighted the significance of establishing effective communication channels at the local, regional and national level (A1; C2; CS1; K4). This parallels with strengthening and forming relationships amongst the key stakeholders (Karunansean and Amaratunga, 2016; Hatton et al., 2017). However, as mentioned by Becken and Hughney (2013) and Kwok et al. (2016), establishing relationships requires sound leadership and coordination. This is reinforced by informant K4, who emphasised on the role of stakeholder relationships in post-disaster management, as exemplified below:

*"If you haven't got good relationships before it turns to mud, trying to develop relationships in a middle of a crisis, it's a nightmare crisis, don't ever, and really test good relationships sometimes." K4*
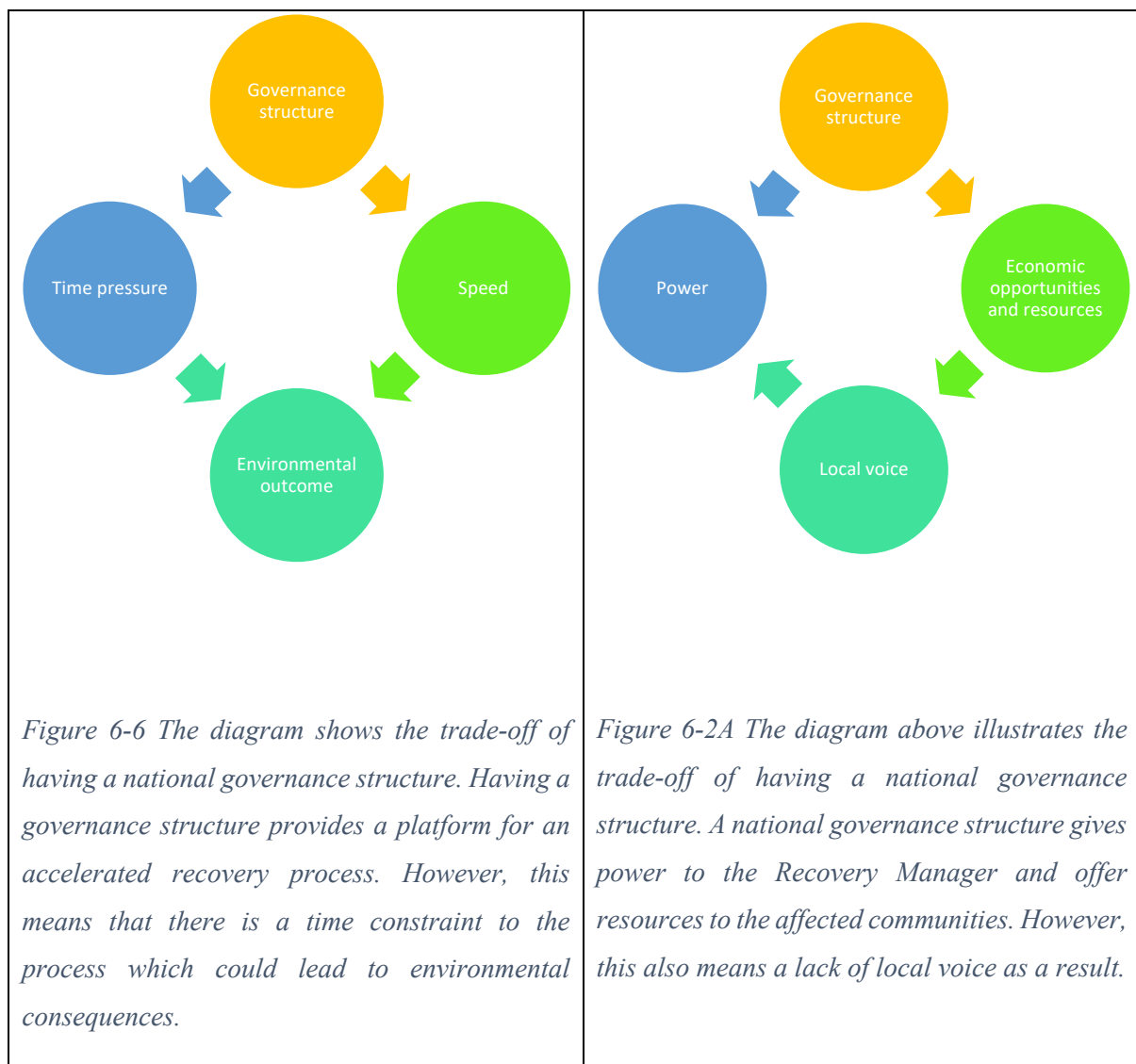
However, as identified by K4, there was a trade-off between flexibility for the recovery process and the resource influx when it comes to having a governance structure. The informant raised the point that the national governance structure provided general resources into the affected regions, but it also meant that there would be a more rigorous structure in place for the recovery process at the local level. Moreover, the informants had competing views on the governance structure for the recovery process in Kaikōura. The informants had described that the recovery process in Kaikōura was different to the recovery process in Marlborough. Marlborough did not declare a state of emergency and had a locally-led recovery structure as a consequence. This poses the question of whether having a governance structure is the most effective approach to managing post-disaster situations and raises the intriguing possibility that the very structures designed for recovery may at times impeded recovery. The following subsection will discuss the pros and cons of having a national governance structure for post-disaster recovery management with reference to the contextual factors, legislative framework and the recovery structure in Tōhoku and Kaikōura.

## Pros and Cons of having a governance structure

Many informants commented on the trade-offs within the governance structure regarding the post-disaster recovery process. Some of these compromises were between the speed and time pressure and how it affects the environmental outcome (Figure 6-2). Some informants argued that the reconstruction processes were accelerated by having a national governance structure (C3; C4; C5; K1). In the case of Kaikōura, the structure contributed to a more streamlined and truncated consenting process. However, it also meant that there was a time pressure on the consenting process, which led to minimal environmental assessments as a consequence (C3; C4). This led to concerns in regard to the long-term environmental outcome under the national governance structure. Informants C3 and C4 felt that the environmental assessment was "more of a box-ticking process". Likewise, informants C2 and C5 reinforced the element of time pressure and that it altered the normal proceedings of managing a construction project. These

observations suggested that there was a need to balance short-term benefits with long-term environmental impacts (CS3; CS4; C4), as exemplified below:

*"I wouldn't call it environmental recovery of such, it's just construction really, and management of ecological effects during construction." C4*



*Figure 6-6 The diagram shows the trade-off of having a national governance structure. Having a governance structure provides a platform for an accelerated recovery process. However, this means that there is a time constraint to the process which could lead to environmental consequences.*

*Figure 6-2A The diagram above illustrates the trade-off of having a national governance structure. A national governance structure gives power to the Recovery Manager and offer resources to the affected communities. However, this also means a lack of local voice as a result.*

Similarly, Figure 6-2A presents the trade-offs between statutory power and community concerns. According to informants CS1 and C1, the national governance structure inundated the affected regions with economic opportunities and general resources. In Kaikōura, the access to the pool of experts positively impacted the recovery process (C2; C5). This corresponds with

the findings of Singh and Wilkson (2008) and Chang et al. (2011) who recognised resource availability as a critical driving force for the success of post-disaster recovery. In addition, the governance structure provided a platform for coordination of resources as well as the flow of vital information in a post-disaster recovery environment. This was reflective of the provisions outlined in the policy and planning document review in Chapter 3. As supported by Jensen (1998), these provisions appear to have been central to creating an effective post-disaster recovery environment. Furthermore, the governance structure created statutory powers needed to assist the recovery process (CS2). However, several informants have argued that this top-down management approach led to a lack of community voice in the post-disaster recovery environment. In reality, communication measures were unsatisfactory in Kaikōura and do not seem to be not reflective of the provisions evaluated in Chapter 3 (CS1; C1; C2). This is reinforced by informant CS4, where the informant indicated the fragility of the legislative barriers, as exemplified below:

> *"There's things I'd say a lot of the senior management staff got really good of not communicating well with the public, and the elective members are hearing a very diluted truth and I don't feel like they know what's exactly going on. There's been a COMS team put together at the council, but I feel like less information is coming out than ever before, and it's all very sanitised." C1*

The findings of Lawson *et al.* (2018) advised incorporating insights gained from previous experiences into post-disaster management. This was reflective in the findings from the informant interviews, where informants C5 and C2 both recalled the benefits of prior disaster experiences and described how that was a vital element in the recovery process in Kaikōura. This was also reinforced by informants A3 and K3, who revealed that there was a need to transfer this knowledge into the community level, as evident in the maladaptation of protection barriers in the Tōhoku region. These observations suggest a link between planning issues and the impact of the natural hazards. As described by the informants, there appears to be an intertwining relationship between awareness level and recovery process. It seems that the level of awareness influences the planning processes. The planning processes in turn correlates with the level of preparedness of a community, thus, affecting the quality of recovery after a disaster

(Figure 6-3). This resonated with the findings of Jensen (1998), who recognised the association of level of preparedness with post-disaster recovery.



*Figure 6-7 The diagram above illustrates the relationship between awareness level; planning processes; preparedness; and recovery. It has become apparent that awareness level influences the planning processes, which in turn, influences the level of preparedness, all these combined, influences the recovery process.*

Additionally, perception is another factor emerged from the informant interviews. There were varying perceptions regarding the quality of the recovery process. Informants K3 and C5 both quantified its role in influencing the recovery process with regard to nuclear contaminated products and community response towards media respectively. Several informants had competing views regarding the length of the recovery period in Kaikōura. Informants C1 and CS1 both argued that the recovery support from the national government was too short-lived to have made a lasting positive impact to the community; while informants CS2 and K4 emphasised on the importance of an escape plan, and stated that a threshold was needed to be drawn to allow effective recovery of the affected communities. To summarise the importance of perception, the comment by informant C5 is outlined below:

> *"I hope people realise that it was a small component, yes, it could have been dealt differently, but (the community) needs to see the other stuff that we're doing that was much better."*

## Chapter Summary

The findings presented in the informant interviews accentuates the significance of community engagement and education. This is due to the fact that the level of awareness affects the post-disaster recovery environment (Jensen, 1998). According to informant K3, this is a major gap in post-disaster management. This resonated with the findings of Jensen, 1998 and Kwok et al. (2016), who identified the correlating relationship between the level of awareness and level of preparedness. This is reinforced by informants CS4 and K4. The informants recommended investments in pre-disaster risk reduction measures that develops the resilience of the local communities. This increase in resilience would minimise the adverse impacts of a disaster (Hatton et al., 2017), as suggested by the comment below:

> *"Putting that knowledge in place in the right*
> *communities is a big challenge or gap." K3*

In addition, the results of the study have revealed that flexibility in the governance structure is not the sole factor in providing a successful recovery outcome. There are clearly advantages and some disadvantages to a national governance structure (Figure 6-4). As described above, a national governance structure presents several trade-offs regarding statutory power, communication channels, environmental outcomes, rate of reconstruction and general resources. In contrast, the flexibility of recovery structure allows a focus at the local level. This evidently suggests that contextual factors have equal influence on the recovery process. There was an initial assumption that financial capability was a prominent factor when it comes to post-disaster recovery. However, the findings from the informant interviews have demonstrated other limiting factors in the social and logistical context such as cultural differences and monitoring difficulties, of which of those have been discussed above.

In light of the findings of the study, it is recognised that the post-disaster recovery framework is highly interconnected to the contextual factors, the legislative environment and the recovery structure. There is no such thing as a 'perfect recovery', but an effective recovery framework exhibits a quality of adaptability. This can be achieved by introducing an adaptable emergency legislation that incorporates the contextual factors and encompasses elements of localism. On the contrary, this necessitates significant amount of support and general resources, and there are several issues in relation to monitoring processes and community engagement. Thus, it

illustrates the complexity of managing a post-disaster situation and clearly suggests a research gap in the study.
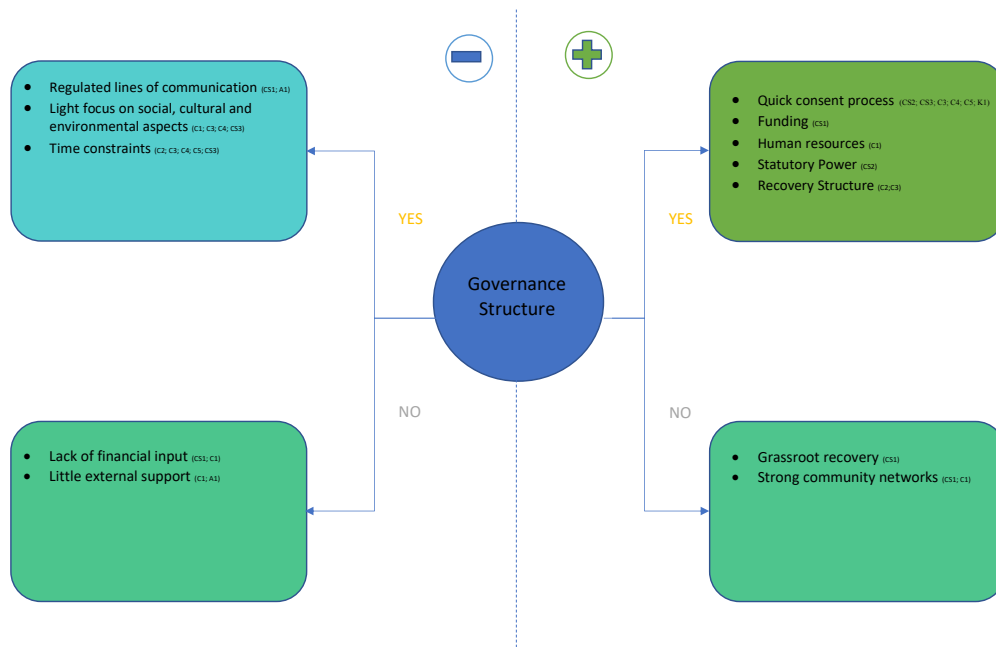


*Figure 6-4 The diagram above illustrate the pros and cons of a national governance structure. The presence or absence of a national governance structure has significant implications, as illustrated by the difference in the recovery process between Marlborough and Kaikōura.*

This chapter has presented interpretations of the main findings from the informant interviews and the paper-based review. The first section of the chapter addressed the Research Question 1 by exploring the importance of the contextual factors in a post-disaster recovery setting. The latter section tackled Research Question 2 and 3 through a detailed analysis of the recovery frameworks in Tōhoku and Kaikōura. The chapter concludes with remarks of the complex task of achieving a 'perfect' post-disaster recovery.

# Chapter 7: Conclusions

Post-disaster recovery planning coordinates the efforts to recover from the physical, social and economic repercussions in a medium to long-term time scale. It involves the built, natural, social and economic environment. This research has explored the topic of post-disaster recovery efforts through two case studies; Kaikōura Earthquake in New Zealand and Tōhoku Earthquake in Japan. These case studies were selected as both locations are experiencing significant risks from natural hazards, and a comparative study would contribute to improving post-disaster management in New Zealand. The findings of this research concluded with recommendations of factors to be considered to managing post-disaster recovery efforts.

## Key findings

This thesis set out to evaluate the post-disaster recovery framework in Tōhoku and Kaikōura. The motivation of this research was to identify whether disaster management could be improved in New Zealand.

This study revealed that a comparative study of the post-disaster recovery framework between Tōhoku and Kaikōura is a complex undertaking because of the interlinking relationship between the contextual factors, legislative environment and the recovery structure. Post-disaster management is highly context-specific. In this case, it encompasses the social, geographical and logistical contexts. This consists of a variety of aspects, including the cultural setting, geographical setting, and the economic setting. The informants have provided key insights into the contextual factors and discussed the effects of these factors on the post-disaster recovery environments in each region. The observations from the findings have suggested that the reason for the issue with the comparative study may be due to the interlinking relationship between post-disaster recovery and community resilience. It evidently suggested that the these social elements shaped the post-disaster recovery environment.

As the research developed, it was also observed that the national governance structure in place for the recovery process in Tōhoku and Kaikōura each had some advantages and some disadvantages. The national governance structure seemed to have provided a steady influx of general resources and support to the affected communities and accelerate the recovery process. It also provided statutory powers necessary to assist in the recovery process. However, as

mentioned by the informants, the time pressure with the rebuild project meant that there was a light focus at the local-level in terms of the social, cultural and environmental aspects. Communication channels were seemingly regulated as mentioned by the informants. This is of importance as post-disaster recovery is heavily reliant on local level participation, and it seems like the national governance structure followed a top-down management approach, as opposed to being bottom-up.

The informant findings and paper-based review have suggested that community engagement is the key to managing post-disaster situations and the higher level of preparedness, the quicker the recovery process. On the contrary, as several informants suggested, some of the elements in the disaster triggered the need for a top-down management approach. This included the scale of the events, the type of the events, general resource capacity and capability of the affected area, and the cultural beliefs of the communities. Again, this is where the contextual factors comes in, in particular, cultural differences and funnelling through all these factors, it became apparent that a generic emergency legislative environment may be one of the solutions to managing future post-disaster events. This emergency environment may presents elements of top-down management to provide structure and support to the affected communities, but it also consists of bottom-up mechanisms and incorporates the local level values regarding the social, physical, natural and built environment.

## Reflections and avenues for future research

This research had contributed to a detailed understanding of a post-disaster recovery framework regarding the contextual factors, legislative environment and the recovery structure. As mentioned above, the findings from the informant interviews and document review evidently suggests the intertwining relationship between a broad array of factors. This posed as a challenge to the study, but it was also reflective of the complex nature of a post-disaster recovery environment. Considering the findings of the research in Tōhoku and Kaikōura, this research has also recommended factors to be taken into account in a post-disaster environment. The case studies have demonstrated that while quite different in terms of reconstruction scale, spatial size, economic and cultural backgrounds, challenges to post-disaster management remain universal and are highly dependent on the local contexts (e.g. geographical and social setting).

The research was is constrained by being based on only two case studies, both with national governance recovery structures. The strength of this research however, is that the underlying principles of post-disaster recovery management can be applied to any other setting. In addition, broadening the scope of the research to include those principles, such as social contexts and community participation would provide useful insights into post-disaster recovery management. Further research within the timeframe was not feasible, and future research could be conducted on a wider scale. There is the potential to explore in more in-depth detail in relation to encouraging community participation and raising level of awareness on post-disaster management.

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# Appendices

## Appendix 1: Information Sheet for research in Japan

Application Form for ethical consideration of research and teaching proposals involving human participants

[Reference Number: *as allocated upon approval by the Human Ethics Committee*] [*Date*]

**UNIVERSITY of OTAGO**
*Te Whare Wānanga o Otāgo*
NEW ZEALAND

**POST-DISASTER MANAGEMENT IN JAPAN**
**INFORMATION SHEET FOR PARTICIPANTS**
Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate, we thank you. If you decide not to take part, there will be no disadvantage to you, and we thank you for considering our request.

**What is the Aim of the Project?** *The aim of the research is to identify where improvements can be made to disaster management. This project is being undertaken as part of the requirements for the Master of Planning Programme at the University of Otago.*

**What Type of Participants are being sought?** *The research seeks to gather the perspectives of government officials and key stakeholders involved in the recovery projects around the Tōhoku Region. Participants for this project will be people who can offer key insights into the post-disaster recovery efforts around Tōhoku.*

**What will Participants be Asked to Do?** *Should you agree to take part in this project, you will be asked to participate in semi-structured interview, either as an individual or as part of a group. You will be asked questions on the topics of planning and regulations in terms of disaster management, post-disaster recovery efforts and community responses. Interviews are expected to take around 30 minutes and should not exceed the duration of 1 hour. The interviews will be audio recorded. If at any stage you feel uncomfortable, you may decline to answer any question, or request that the interview be terminated. Please be aware that you may decide not to take part in the project without any disadvantage to yourself of any kind.*

**What Data or Information will be Collected and What Use will be Made of it?** *Information about post-disaster management in Japan will be collected. If you agree, the interviews will be audio recorded to assist the researcher in interpreting the provided information. The results of the project may be published but every attempt will be made to preserve your anonymity should you choose to remain anonymous. Raw data will be kept in secure storage for at least 5 years before destroyed. If you are interested, you can also receive a copy of the completed thesis.*

**Can Participants Change their Mind and Withdraw from the Project?** *You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind. You may also request to view a transcript of your interview up until September 30, 2019 and may request that something that you said during the interview be not used in the thesis or subsequent publications.*

**What if Participants have any Questions?** *If you have any questions about our project, either now or in the future, please feel free to contact either:-*

**Zheng Lee**                              and          **Professor Sean Fitzsimons**

School of Geography                                    School of Geography

E: leezh160@student.otago.ac.nz                        P: +64 21 279 8786

                                                       E: sean.fitzsimons@otago.ac.nz

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

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# Appendix 2: Participant consent forms for informants in Japan

Application Form for ethical consideration of research and teaching proposals involving human participants

**POST-DISASTER MANAGEMENT IN JAPAN**
**CONSENT FORM FOR PARTICIPANTS**

I have read the Information Sheet concerning this project and understand what it is about. All my questions have been answered to my satisfaction. I understand that I am free to request further information at any stage.

I know that:-

1.  My participation in the project is entirely voluntary;

2.  I am free to withdraw from the project before its completion *(specify a date if necessary)*;

3.  Personal identifying information [*audio recordings*] may be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

4.  This project involves an open-questioning technique. The general line of questioning includes post-disaster management in Japan. The precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops and that in the event that the line of questioning develops in such a way that I feel hesitant or uncomfortable I may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind.

5.  The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity, *should I choose to remain anonymous.*

6.  I, as the participant:  a) agree to being named in the research, ☐

    b) would rather remain anonymous ☐

I agree to take part in this project.

..............................................................   ...............................
(Signature of participant)                              (Date)

..............................................................
(Printed Name)

…………………………………………………..
Name of person taking consent

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

# Appendix 3: Information sheet for research in New Zealand

Application Form for ethical consideration of research and teaching proposals involving human participants

[Reference Number: *as allocated upon approval by the Human Ethics Committee*] [*Date*]

**POST-DISASTER MANAGEMENT IN JAPAN**
**INFORMATION SHEET FOR PARTICIPANTS**
Thank you for showing an interest in this project. Please read this information sheet carefully before deciding whether or not to participate. If you decide to participate, we thank you. If you decide not to take part, there will be no disadvantage to you, and we thank you for considering our request.

**What is the Aim of the Project?** *The aim of the research is to identify where improvements can be made to disaster management. This project is being undertaken as part of the requirements for the Master of Planning Programme at the University of Otago.*

**What Type of Participants are being sought?** *The research seeks to gather the perspectives of government officials and key stakeholders involved in the recovery projects around the Tōhoku Region. Participants for this project will be people who can offer key insights into the post-disaster recovery efforts around Tōhoku.*

**What will Participants be Asked to Do?** *Should you agree to take part in this project, you will be asked to participate in semi-structured interview, either as an individual or as part of a group. You will be asked questions on the topics of planning and regulations in terms of disaster management, post-disaster recovery efforts and community responses. Interviews are expected to take around 30 minutes and should not exceed the duration of 1 hour. The interviews will be audio recorded. If at any stage you feel uncomfortable, you may decline to answer any question, or request that the interview be terminated. Please be aware that you may decide not to take part in the project without any disadvantage to yourself of any kind.*

**What Data or Information will be Collected and What Use will be Made of it?** *Information about post-disaster management in Japan will be collected. If you agree, the interviews will be audio recorded to assist the researcher in interpreting the provided information. The results of the project may be published but every attempt will be made to preserve your anonymity should you choose to remain anonymous. Raw data will be kept in secure storage for at least 5 years before destroyed. If you are interested, you can also receive a copy of the completed thesis.*

**Can Participants Change their Mind and Withdraw from the Project?** *You may withdraw from participation in the project at any time and without any disadvantage to yourself of any kind. You may also request to view a transcript of your interview up until September 30, 2019 and may request that something that you said during the interview be not used in the thesis or subsequent publications.*

**What if Participants have any Questions?** *If you have any questions about our project, either now or in the future, please feel free to contact either:-*

**Zheng Lee**                    and          **Professor Sean Fitzsimons**

School of Geography                           School of Geography

E: leezh160@student.otago.ac.nz              P: +64 21 279 8786

                                             E: sean.fitzsimons@otago.ac.nz

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

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# Appendix 4: Participant consent form for research in New Zealand

Application Form for ethical consideration of research and teaching proposals involving human participants

**POST-DISASTER MANAGEMENT IN JAPAN**
**CONSENT FORM FOR PARTICIPANTS**

I have read the Information Sheet concerning this project and understand what it is about.  All my questions have been answered to my satisfaction.  I understand that I am free to request further information at any stage.

I know that:-

1. My participation in the project is entirely voluntary;

2. I am free to withdraw from the project before its completion *(specify a date if necessary)*;

3. Personal identifying information [*audio recordings*] may be destroyed at the conclusion of the project but any raw data on which the results of the project depend will be retained in secure storage for at least five years;

4. This project involves an open-questioning technique. The general line of questioning includes post-disaster management in Japan. The precise nature of the questions which will be asked have not been determined in advance, but will depend on the way in which the interview develops and that in the event that the line of questioning develops in such a way that I feel hesitant or uncomfortable I may decline to answer any particular question(s) and/or may withdraw from the project without any disadvantage of any kind.

5. The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand) but every attempt will be made to preserve my anonymity, *should I choose to remain anonymous.*

6. I, as the participant:    a) agree to being named in the research,    ☐

                             b) would rather remain anonymous    ☐

I agree to take part in this project.


............................................................    ...............................
     (Signature of participant)                    (Date)


............................................................
     (Printed Name)


……………………………………………………..
Name of person taking consent

This study has been approved by the University of Otago Human Ethics Committee. If you have any concerns about the ethical conduct of the research you may contact the Committee through the Human Ethics Committee Administrator (ph +643 479 8256 or email gary.witte@otago.ac.nz). Any issues you raise will be treated in confidence and investigated and you will be informed of the outcome.

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## Appendix 5: Interview questions

Drafted potential questions for interviews:

[Legislative environment]

1. What is your role?

2. What do you think about the current regulatory framework around post-disaster management?

3. How do you feel about the current reconstruction model?

[Community response and communication measures]

4. What do you think about communication between the council and stakeholders involved in post-disaster management?

5. What do you think about the community engagement and involvement regarding post-disaster reconstruction efforts?

6. How do you feel about the community response towards the reconstruction efforts?

7. How do you feel about the monitoring and reviewing system in place?

[Suggestions on way forward]

8. What do you think are the challenges or barriers?

9. What do you see council's role as being in managing the post-disaster reconstruction efforts into the future?

10. What do you think would be the best step forward to managing post-disaster recovery efforts?