



## Lincoln University Digital Dissertation

### Copyright Statement

The digital copy of this dissertation is protected by the Copyright Act 1994 (New Zealand).

This dissertation may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- you will use the copy only for the purposes of research or private study
- you will recognise the author's right to be identified as the author of the dissertation and due acknowledgement will be made to the author where appropriate
- you will obtain the author's permission before publishing any material from the dissertation.

# DISASTER BY DESIGN

## THE ROLE OF LANDSCAPE ARCHITECTS IN THE CANTERBURY EARTHQUAKE RECOVERY

---

A dissertation  
submitted in partial fulfillment  
of the requirements for the Degree of  
Master of Landscape Architecture

at  
School of Landscape Architecture  
Lincoln University  
by  
H. M. Ayres

---

Lincoln University  
2011

## ABSTRACT

Earthquakes and other major disasters present communities and their authorities with an extraordinary challenge. While a lot can be done to prepare a city's response in the event of a disaster, few cities are truly prepared for the initial impact, devastation, grief, and the seemingly formidable challenge of recovery. Many people find themselves overwhelmed with facing critical problems; ones which they have often never had experience with before. While the simple part is agreeing on a desired outcome for recovery, it appears the argument that exists between stakeholders is the conflicting ideas of *How To* effectively achieve the main objective. What I have identified as an important step toward collaborating on the *How To* of recovery is to identify the ways in which each discipline can most effectively contribute to the recovery. Landscape architecture is just one of the many disciplines (that should be) involved in the *How To* of earthquake recovery.

Canterbury has an incredible opportunity to set the benchmark for good practice in earthquake recovery. To make the most of this opportunity, it is critical that landscape architects are more effectively engaged in roles of recovery across a much broader spectrum of recovery activities. The overarching purpose of this research is to explore and provide insight to the current and potential of landscape architects in the earthquake recovery period in Canterbury, using international good practice as a benchmark. The research is aimed at stimulating and guiding landscape architects dealing with the earthquake recovery in Canterbury, while informing stakeholders: emergency managers, authorities, other disciplines and the wider community of the most effective role(s) for landscape architects in the recovery period.

### Keywords:

earthquake recovery; disaster recovery; emergency management; Canterbury; Christchurch; resilience; hazard mitigation; landscape architecture; planning; sustainable development; urban regeneration

## ACKNOWLEDGEMENTS

I am extremely grateful to my supervisor Neil Challenger for his incredible patience with me. I would have been lost without his guidance and positive support throughout the process of completing this dissertation.

I would like to thank all of the staff at Lincoln University's School of Landscape Architecture who have taught me throughout my education, and are therefore to thank for opening my eyes to the wonderful world of landscape architecture.

Most importantly I would like to thank my family and friends whose unwavering faith and support have spurred on my determination to achieve my goals. I'll be forever grateful to my Mum and Dad (Debbie and Stuart) who have always been there to support me through thick and thin, and contribute their words of wisdom throughout my education.

And a final thank you to Mother Nature who so kindly inspired my incredibly interesting research topic.

## THE CANTERBURY EARTHQUAKES

***“It will be a long and complex task, which we will need to work through step by step. But one thing is certain. Christchurch, we will rebuild you.”***

*New Zealand Prime Minister John Key, March 8, 2011.*

Like every other person in Canterbury on the 22nd of February, I have my own story to tell about what happened at 12.51pm that day. I was at my home in Cashmere when the 6.3 magnitude earthquake violently jolted Christchurch. It was terrifying. At the time I had no idea of the devastation across the city, all I knew was that my house was a mess and my neighbourhood had suffered a lot of damage. I helped my elderly neighbour out of her crumbling house shortly before the second 5.8 magnitude quake threw us into the garden and I watched a great boulder break off the top of the valley and smash into the back of a house on the hill. After that, it wasn't long before I joined almost every other person in Christchurch in the frantic attempt to contact my loved ones to make sure they were alright.

Little did I know at that time that the devastation and destruction of Christchurch left in the wake of that earthquake and the many more to come, would change the face of Christchurch for ever. Though Christchurch is continually reminded with every aftershock that another major earthquake could happen at any time, the process of recovery has begun and empty voids are slowly being revealed in the place of those structures and memories that previously gave shape to Christchurch. While it is still hard to get over the traumatic events, the Canterbury community is determined to get through them. It has become clear the possibilities for the future development Christchurch has reached new limits. Various cities that have suffered the same scale of destruction in the past, are evidence of the fact that the post-disaster environment can lead to unprecedented and exciting opportunities for enhancing a city far beyond its pre-disaster capabilities. It is now a common opinion that the extensive reconstruction of Canterbury should embrace the rare opportunity to replan the city as a whole, including its badly damaged central business district. It is possible for Christchurch to make the most of the situation and attempt to rebuild itself as a globally recognised icon for sustainability and resilience that reflects 21st century values, knowledge and technology. What Canterbury is now faced with for at least the next 15 years is a complex and challenging recovery period in which holistic, innovative decisions must be

made confidently and quickly. And to top it off, we all have to learn as we go.

It was in the week following the quake that I began to realise the true extent of damage across Canterbury and particularly the central city. The research proposal I was writing for my dissertation at the time of the earthquake along the lines of 'the resiliency of public spaces in central Christchurch' would no longer be a suitable topic. It was from this circumstance that I took interest in the rare opportunity to analyse the process of post-earthquake recovery in Christchurch as it unfolded, and weave into this, research on the past, present and potential role of landscape architects in post-disaster recovery. Admittedly, post disaster recovery had never before been a specific interest of mine although sustainable development and urban resilience in the face of climate change, globalisation and environmental degradation had.

I consider myself incredibly lucky that aside from the memorable experience of a major earthquake, my masters dissertation topic was about the only permanent change that happened to me personally as a result of the 22nd of February earthquakes. My heart goes out to the community of Christchurch who were not as fortunate as myself. I hope this research can in some way contribute to the overwhelming task of regenerating our beautiful city and to helping other cities recover from disaster in the future.

## TABLE OF CONTENTS

ABSTRACT.....	II
ACKNOWLEDGEMENTS.....	III
PREFACE.....	IV
TABLE OF CONTENTS.....	VI
<b>CHAPTER ONE:</b>	
<b>STUDY FRAMEWORK.....</b>	<b>1</b>
1.1 RESEARCH INTRODUCTION.....	2
1.2 RESEARCH AIMS.....	3
1.3 RESEARCH METHODOLOGY.....	4
1.4 RESEARCH CONTEXT: DISASTER RECOVERY AND LANDSCAPE .....	9
1.5 DISSERTATION FRAMEWORK.....	22
<b>CHAPTER TWO:</b>	
<b>KEY CASE STUDY: THE EARTHQUAKES IN CANTERBURY.....</b>	<b>25</b>

2.1 CANTERBURY’S PATCHWORK QUILT.....	26
2.2 A BRIEF HISTORY OF CHRISTCHURCH CITY AND THE CANTERBURY REGION.....	27
2.3 THE 2010/2011 EARTHQUAKES.....	33
2.4 EARTHQUAKE IMPACTS AND IMPLICATIONS FOR LANDSCAPE.....	37
2.5 MANAGING THE EARTHQUAKE RECOVERY PERIOD.....	43
2.6 CHAPTER SUMMARY.....	49
<b>CHAPTER THREE:</b>	
<b>THE ROLE OF LANDSCAPE ARCHITECTS IN EARTHQUAKE RECOVERY AT THE BIG PICTURE SCALE.....</b>	<b>51</b>
3.1 QUILT PLANNING.....	52
3.2 ADDRESSING THE BIG PICTURE ISSUES FOR LANDSCAPE: THE ISSUES OF CURRENT (PRE-EARTHQUAKE) PRACTICE.....	55
3.3 THE ROLE OF LANDSCAPE ARCHITECTS IN ADDRESSING THE BIG PICTURE ISSUES IN DISASTER RECO VERY.....	59
3.4 CHAPTER SUMMARY.....	80

CHAPTER FOUR:  
THE ROLE OF LANDSCAPE ARCHITECTS IN  
EARTHQUAKE RECOVERY AT THE  
COMMUNITY SCALE.....83

4.1 PATCHWORK DESIGNING.....84

4.2 THE CRITICAL ROLE OF LANDSCAPE ARCHITECTS  
IN REGENERATING OUR COMMUNITIES: GENERAL  
PRACTICE.....86

4.3 THE ROLE OF LANDSCAPE ARCHITECTS IN REGENERATING OUR  
COMMUNITIES IN DISASTER RECOVERY.....91

4.4 CHAPTER SUMMARY.....103

CHAPTER FIVE:  
THE ROLE OF LANDSCAPE ARCHITECTS IN  
EARTHQUAKE RECOVERY AT THE  
LOCAL SCALE.....105

5.1 FABRIC DESIGNING.....106

5.2 THE CRITICAL ROLE OF LANDSCAPE ARCHITECTS IN REGENERATING  
OUR LOCAL ENVIRONMENTS.....109

5.3 THE ROLE OF LANDSCAPE ARCHITECTS IN REGENERATING OUR  
LOCAL ENVIRONMENTS IN DISASTER RECOVERY.....110

5.4 CHAPTER SUMMARY.....138

CHAPTER SIX:  
CONCLUSIONS.....141

REFERENCES.....151



chapter  
one

INTRODUCTION

# RESEARCH INTRODUCTION

Earthquakes and other major disasters present communities and their authorities with an extraordinary challenge. While a lot can be done to prepare a city's response in the event of a disaster, few cities are truly prepared for the initial impact, devastation, grief, and the seemingly formidable challenge of recovery. Many people find themselves overwhelmed with facing critical problems; ones which they have often never had experience with before.

The main objective of disaster recovery is most commonly agreed upon by every stakeholder as being: **to restore acceptable function to damaged communities as quickly as possible while making the most of the opportunity to rebuild infrastructure and regenerate communities and the environment in a way that is more resilient and superior to that which existed before the disaster event.** While the simple part is agreeing on a desired outcome, it appears the argument that exists between stakeholders is the conflicting ideas of how to effectively achieve the main objective: whether it's how the recovery framework should be managed; who should make the decisions; how aspects of the recovery should be prioritised; what level and type of involvement public should have; what expertise is necessary to achieve the desired outcomes; and so forth. What I see as an important step toward collaborating on the *How* of recovery is to identify the ways in which each discipline can most effectively contribute to the recovery. Landscape architecture is just one of the many disciplines (that should be) involved in the *How* of recovery.

Once described as “the profession of the future” by ex-IFLA president Martha Fajardo, landscape architecture now finds itself in a unique and important position to deal with the landscape as an agent for positive

change (Yu & Padua, 2006). In the present world where human populations are increasing, natural resources are depleting, environments are degrading and identities are being lost through globalization, landscape architects are increasingly faced with a responsibility for being key actors in promoting and implementing sustainable development, urban regeneration and sense of place. Landscape architects are holistic thinkers who recognise the importance of understanding the science of natural and human processes throughout space and time, and use the function and design of the landscape to balance those processes. It therefore seems logical that they are well suited to roles of planning and designing sustainable and resilient regions, cities, communities and neighbourhoods in the presence of rapid change, such as post disaster.

In the days following the major earthquake on February 22nd 2011, as it became undeniably evident that my own city of Christchurch was in for long and complex recovery, that I began to wonder how myself and my fellow landscape architects might go about most effectively helping the city to recover – how we might play a part in ensuring Christchurch and it's community is built back better. It is for this reason I decided to write my masters dissertation on the current and potential role of landscape architects in post disaster recovery. I took the opportunity to understand the issues arising in the recovery of Christchurch as it unfolded, to expand my knowledge of relevant landscape architecture and disaster recovery theory and literature, and to find case studies where landscape architects have made an important contribution in the recovery process in the past. In this way I hope to be able to most effectively engage in the recovery of Christchurch and play a part in regenerating my exposed city.

# RESEARCH AIMS

## RESEARCH AIMS

The overarching purpose of this research is to explore and provide insight to the current and potential of landscape architects in the earthquake recovery period in Canterbury. The research is aimed at stimulating and guiding landscape architects dealing with the earthquake recovery in Canterbury, while informing stakeholders: emergency managers, authorities, other disciplines and the wider community of the most effective role(s) for landscape architects in the recovery period.

To pursue its purpose, this research will answer a series of key questions that will allow it to meet a range of objectives:

### ***What has been the role of the landscape architects in disaster recovery in the past?***

*Objective: Understand the way in which landscape architects have been involved in addressing the issues of the recovery through identifying international post disaster case studies and literature that highlights good practice and lessons learned.*

### ***What are the issues that are of interest to landscape architects in the Canterbury earthquake recovery period?***

*Objective: Establish the problem situation by identifying the earthquake implications for landscape that are present in Canterbury following the devastating earthquake sequence of 2010 and 2011.*

### ***What is the current role of landscape architects in Canterbury's earthquake recovery?***

*Objective: Understand the current role of landscape architects in the Canterbury earthquake recovery; what recovery activities they are most involved in and what aspects of the recovery they deserve a more critical role.*

### ***What should be the role of landscape architects in Canterbury's earthquake recovery?***

*Objective: Critique current recovery practices in Canterbury based on international good practice case studies and literature, and suggest why and how landscape architects should be more effectively engaged critical roles of recovery to help meet the objectives of recovery for Canterbury.*

# RESEARCH METHODOLOGY

## RESEARCH APPROACH & METHODS

The methods used in this research were simple yet necessary tools for collecting factual information (case studies), theory, and perspectives on the current and potential role of landscape architects in post disaster recovery. The approach I used to carry out the research was a Participatory Action Research (PAR) approach, whereby I as the researcher was actively engaged in the process under investigation. This approach involved researching the Canterbury recovery as it unfolded and identifying the role of landscape architects in the recovery process. PAR is a form of empirical research, which involves knowledge that comes from experience and observation rather than basing itself on theory or logic, and produces data that can be analysed quantitatively or qualitatively. Empirical research is a basic research strategy commonly used in landscape architecture research (Deming & Swaffield, 2011).

Due to the complex, explorative nature of this research, I used predominantly qualitative, observational action research methods for collecting and analysing data. A literature review provided not only the basis for the research, but expanded on important themes, and provided case studies and reports on key lessons learned from other disasters. PAR methods included online survey of the field, participation in a number of meetings, presentations and events involved in the recovery of Canterbury, alongside personal observation and a review of grey literature (media). These methods established the basis upon which I was able to analyse current practice alongside international case studies and literature.

## LITERATURE REVIEW

As an anchor to the research, a literature review provided relevant background literature and theories, and was a means for seeking an appropriate research topic that contributed to gaps in existing literature. The literature review began with a broad overview of current literature on the topic of post-disaster recovery and became more specific as the research progressed, honing in on key lessons learned from disaster recovery in the past, current and former post-disaster landscape and planning projects, and the involvement of landscape architects

and other designers in the post disaster recovery process. Literature on both post disaster recovery and landscape architecture has been reviewed and refined to formulate a discussion on the past, present and potential roles of landscape architects in post disaster recovery.

## PARTICIPATORY ACTION RESEARCH

Assembling data about the earthquake recovery process in Canterbury was an integral component of the research. Details of the earthquake implications and an understanding of the decisions being made, made it possible to analyse the potential role of landscape architects in its recovery. The research was conducted in Canterbury from February 2011 to July 2011. The data contributes to an overall account of the extent of damage to Canterbury since earthquake event on the 4th of September 2010 and reports on the current visions and recovery efforts to date.

As a method of participatory action research, I recorded details, actions and events involved in the recovery process. The statistical and spatial information disseminated from this analysis for part of a larger implications analysis, including things such as estimate numbers of displaced people and businesses, land area which is to become vacant after damaged buildings are demolished, and an overview of the state of damage to preexisting landscape and infrastructure. Multiple websites provided much of the factual information about the earthquake, and news paper articles frequently informed me of the major decision being made by authorities. I personally attended a number of meetings and events held by the City Council and other organisations that were involved in the recovery, and have been actively engaging with the Sumner community in their recovery.

## ONLINE SURVEY

The questionnaire was a research method used to survey the level and types of involvement of landscape architects in post-disaster recovery in Canterbury at present, and how this compares to different countries. It was used not only to collate data on the level of involvement of landscape architects, it also gathered information about the type of involvement, and different opinions about what landscape architects should be contributing to in the post disaster recovery process. Comparisons were able to be made between the perceived level of desired involvement and actual involvement. In some instances, case study projects were also sourced for use in the discussions.

The online Qualtrics survey distributed to both landscape architects who have experience with post disaster recovery projects, and those who have not. The questionnaire was distributed to more than 100 members of the Canterbury/Westland Branch of the New Zealand Institute of Landscape Architects, as well as landscape architects in Chile, California, Japan, China and Australia. While the intention of the survey was not to make any statistical analysis with the data, it was rather to gather an idea of the common perception from landscape architects in each country, on their role in disaster recovery. Distribution of the questionnaire was also targeted at cities that had suffered from a major disaster in the last 25 years.

## CASE STUDIES

Case studies are critical to this research. The key case study in this research is obviously that of the Canterbury earthquake recovery. As described in the research approaches above, various methods have been used to formulate the descriptive case study. In addition to this, international case studies are selected from the literature and used in the discussion about applying the lessons learned. Christchurch has joined the long list of cities in the world that have now experienced a major disaster. It is from analysing these other disasters and their recovery that we are able to learn key lessons and good practise which can be used to advise our own process of recovery. The purpose of analysing case studies is not to replicate one recovery procedure and overlay it on another. In this case it is purely method for learning lessons from good practice examples of previous disaster recovery cases.

No two disasters are ever the same. Individual disaster events occur at variable scales and cause a wide range of damage to infrastructure and communities. Economies, cultures and governance affect the capacity of a city to recover efficiently. Some places are more resilient than others and have taken precautions prior to the disaster to mitigate the effects of predicted catastrophic events. Even still, there is always something to be learned by experience and the analysis of good practice that help to ensure the recovery process happens as efficiently and effectively as possible in the future.

A variety of case studies contribute valid and useful lessons to the discussion about the current and potential role of landscape architects in the recovery of Canterbury. International case studies have been specifically selected according to their relevance to the different issues experienced by the Canterbury earthquake. The case studies are not limited to earthquake recoveries and instead span a wide range of natural and human disasters.

## THE CHALLENGES OF THIS RESEARCH

Before launching in to the following chapters, it is worth mentioning the challenges I have faced when conducting this research. The first challenge I will mention is the challenge of being an action researcher attempting to comprehend the extensive impacts and consequences of such a major natural disaster as the Christchurch earthquakes. Reporting on the recovery of Christchurch has been a major challenge as aftershocks continue, new updated information is released, new recovery efforts are reported, new perceptions, new ideas, and new discoveries are made that are sometimes conflicting with previous data. It has been incredibly challenging as the action researcher to continually keep up with new information and to finally decide when to stop collecting data.

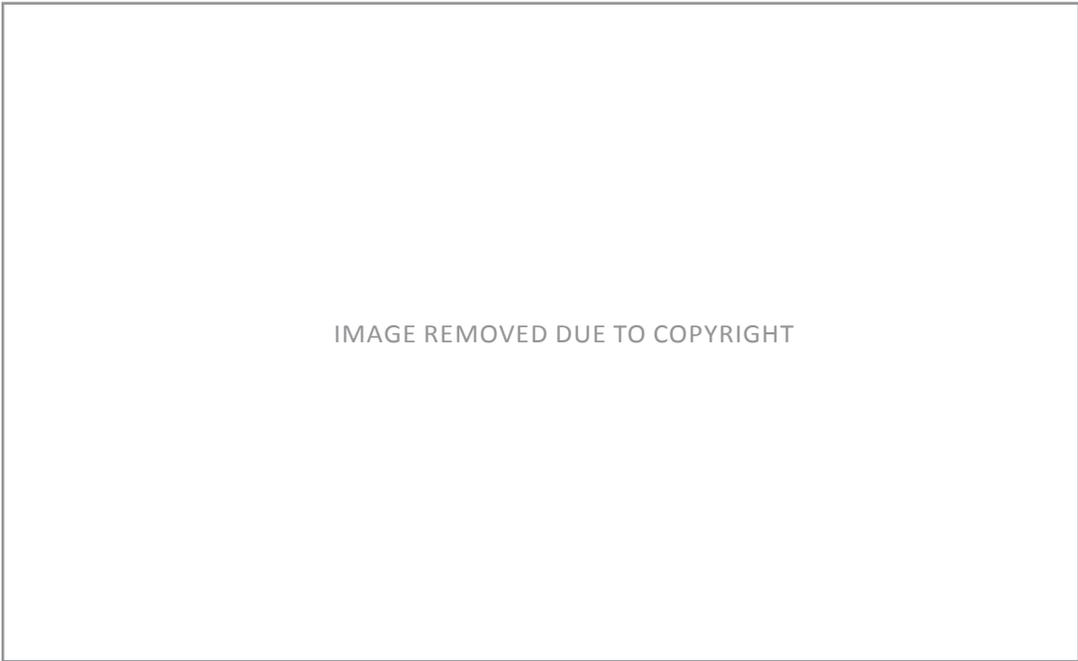
The second major challenge has been to gain a holistic perspective on the huge body of disaster recovery literature. I am by no means a disaster recovery expert - never before have I had to study disaster recovery best practice. To source, understand, process and translate

disaster recovery literature has been a major challenge, yet one that I have learned a lot from, and I believe more landscape architects should become familiar with in their education and in practice.

The third major challenge has been to distil the practices of landscape architects in a way that is understandable to everyone that isn't from the discipline or related field. As such a broad professional field with many specialisations and educational backgrounds, it's actually a very difficult discipline to describe simply. The realities of landscape architecture practice are quite different to the ideals of landscape architecture theory. Furthermore, it has been a major challenge to explain the views and practices of landscape architects because as unique individual designers the views and practices of one landscape architect don't necessarily match the views practices of another. Distilling this information has been a huge learning curve and one which I will continue to benefit from in the future.

The fourth major challenge has been to compile the research in an over viewing approach that brings together the Canterbury recovery, disaster recovery literature, landscape architecture literature, case studies, landscape architect perspectives and my own analysis in a cohesive and useful story that is able to be understood by a wide range of readers.

Overcoming the challenges of this research has been both arduous and rewarding. It has been a process from which I have learned a vast amount the Canterbury recovery, community led recovery, international disaster recoveries, landscape architecture practice, emergency management practice, and research in general.



**FIGURE 1.1** FLOWERS ARE LEFT IN FRONT OF A CORDONED SITE IN RICcarton WHERE A MAN WAS CRUSHED BENEATH THE FACADE OF A DESTROYED BUILDING. CANTERBURY'S EARTHQUAKE RECOVERY IS GOING TO BE A TIME OF GRIEF, REMEMBRANCE, STRENGTH AND OPTIMISM

# RESEARCH CONTEXT: DISASTER RECOVERY AND LANDSCAPE ARCHITECTURE

## SETTING THE SCENE: DISASTER RECOVERY

When a city experiences a major disaster it undergoes a harsh test of its true resilience, as every strength and weakness of that city's buildings, infrastructure, procedures, governance and community is exaggerated. Disaster recovery presents a bittersweet opportunity to learn from this test. Disaster should be seen as a chance to build back better, stronger, safer, more resilient, and more sustainable than it was before so that when the next disaster occurs, be it another earthquake, tsunami, terrorist attack or gradual hazard such as sea level rise, the city will endure.

Hundreds of cities worldwide have experienced disaster of some scale at some point in their history. While some cities located in volatile landscapes that are more prone to natural disaster, others have suffered the devastation of war and other human related disaster. It is therefore not surprising that the literature on urban disasters and their aftermath is extensive (Campanella & Vale, 2005). Within this large body of literature there is documentation, analysis and interpretation of the many individual urban disasters and their recovery. Due to the widespread and complex consequences that disasters have on human settlements, urban disaster literature stems from a wide range of disciplines, and covers the diverse range of scientific, economic, and social aspects associated with any disaster.

This section sets the context of this research with an overview of the literature on the practice and management process of disaster recovery. It begins with a description of emergency management practice in New Zealand. It then goes on to provide an understanding of the recovery process, the issues of recovery and a description of what the literature refers to as 'good' recovery. Obstacles and enablers to successful recovery are outlined before finishing with a note on disaster governance, and why it is such a critical aspect of disaster recovery.

## EMERGENCY MANAGEMENT

Emergency management (referred to as disaster management in the USA) refers to the management of the entire disaster process in which recovery is one of the stages. Although the practice of disaster recovery involves a wide range of disciplines, the management of disaster response and recovery has been typically dealt with by the professional discipline of emergency management. Emergency management practitioners and policy makers are concerned with all types of disaster and every phase of disaster management both before and after a disaster event occurs. While the practice of emergency management has been around since the beginning of recorded history, the discipline

is still relatively new worldwide (Bumgarner, 2008). Now, emergency management is a profession of its own that requires specific training and carries out operations based on its own set of principles. In New Zealand, emergency management on a national scale is dealt with by the Ministry of Civil Defence and Emergency Management, which operates in accordance to the Civil Defence and Emergency Management Act 2002 (CDEMA).

Emergency management is often divided into four core phase, commonly referred to as 1) mitigation; 2) preparedness; 3) response; and 4) recovery (Batho et al 2000). In New Zealand, the four phases of emergency management are referred to as the 4 Rs: (refer to diagram of emergency management)

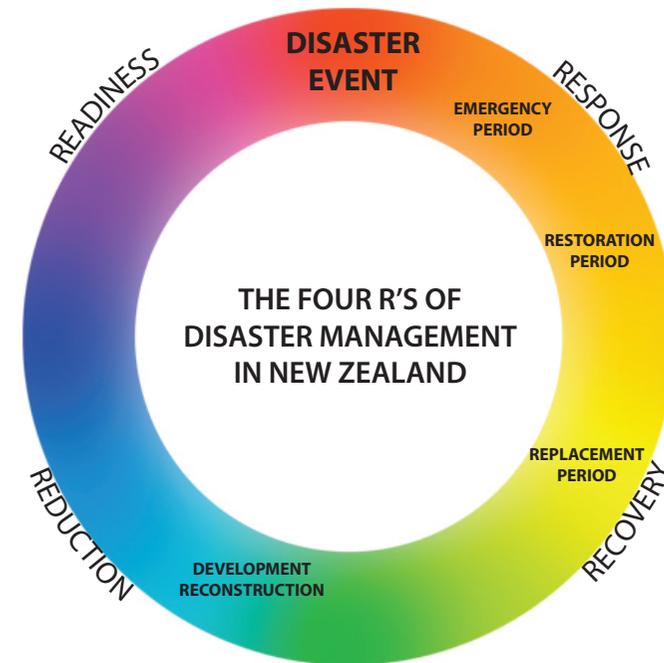
- Reduction (mitigation): involves identifying and analysing long-term risks to human life and property from natural or non-natural hazards; taking steps to eliminate these risks if practicable, and, if not, reducing the magnitude of their impact and the likelihood of their occurring; and
- Readiness (preparedness): refers to the development of operational systems and capabilities before a civil defence emergency happens, including self-help and response programmes for the general public, and specific programmes for emergency services, lifeline utilities, and other agencies; and
- Response: the actions taken immediately before, during, or directly after a civil defence emergency to save lives and property, and to help communities recover; and
- Recovery: the co-ordinated efforts and processes used to bring about the immediate, medium-term, and long-term holistic regeneration of a community following a civil defence emergency.

(CDEMA, 2006)

While it is easier to broadly understand emergency management based on these four phases, it is important to remember that emergency management activities are in no way ordered and are often overlapped or incapable of being compartmentalized into one phase or another (Bumgarner, 2008).

### THE POST-DISASTER RECOVERY PERIOD

It is in the emergency management stages of post-disaster recovery and pre-disaster mitigation of disaster management that the knowledge and skills of landscape architects can have the greatest influence on the recovery outcomes of urban disasters, and is therefore the focus of this research. The post-disaster recovery stage of



**FIGURE 1.2 THE DISASTER CONTINUUM:** EMERGENCY MANAGEMENT PROCEDURES CAN BE DEFINED IN FOUR STAGES THAT ARE REFERRED TO IN NEW ZEALAND AS THE FOUR RS. THE RECOVERY PERIOD OF EMERGENCY MANAGEMENT CAN BE BROKEN DOWN INTO A FURTHER FOUR PHASES THAT OVERLAP AND INTEGRATE WITH BOTH THE RESPONSE AND REDUCTION STAGES OF DISASTER MANAGEMENT.

emergency management involves setting up a programme to rehabilitate communities while restoring and enhancing urban environments (Williams et al., 2000). It is the stage of the continuum that is critical to helping break the disaster cycle, by providing significant opportunities for future mitigation (Olshansky & Chang, 2009). Merged into the post-disaster recovery stage is pre-disaster mitigation, which involves reducing the vulnerability of future disasters. It can and should be undertaken before a disaster even occurs, but in most cases is only built into planning after an event has happened (FEMA, 2001; Beygo et al, 2009).

Unlike the emergency response period which has been generally well refined in terms of best practice, up until recently there has been less research done on the recovery period than any other phase of emergency management (Olshansky & Chang, 2009; Olshansky et al., 2005). During the last few decades the planning field has made progress towards filling this void that has been previously neglected by emergency management and has succeeded in expanding the body of literature on post-disaster recovery planning.

Reconstruction Following Disaster by Haas et al. (1977), was the first comprehensive study of the recovery process, and outlined the common lessons on the factors that influence a city's recovery after a disaster (Olshansky et al., 2005). Haas et al. (1977) first emphasised the importance of understanding the recovery process. One lesson advised by Haas et al. (1977) in their pioneering study that is now largely disagreed with (Olshansky et al., 2005; Philipsborn, 2001; Barbee et al., 1985) is their perhaps overconfident statement that "the reconstruction process is ordered, knowable and predictable" (p261). In fact key lessons highlighted in subsequent literature suggest the exact opposite – and that "issues frequently crop up in simultaneous or illogical sequences" (Rubin et al., 1985) and "response activities are often uncoordinated, occur concurrently and, on occasion, overlap or conflict with one another" (Philipsborn, 2001).

Haas et al were the first to identify that the post-disaster recovery period can be broken down into a further four overlapping phases: (1) emergency period (a few weeks); (2) restoration period (a few months); (3) replacement period (up to two years); and (4) commemorative, betterment, and development (up to 10 years). The time frames given for each of the phases have since been proven slightly optimistic. However the sequence Haas et al identified remains largely unchanged and provides a frequently referred to basis to the recovery process. More recent literature has gone on to confirm that the process of a disaster recovery is in fact ongoing, cyclical and spans many years. While the post-disaster response (should) begin prior to the disaster event, the complex recovery and mitigation period ends many years later.

## CLASSIC ISSUES OF POST-DISASTER RECOVERY

In addition to simplifying the recovery process, Haas et al made number of observations in a study that examined two recent disasters at the time and two older, are still largely confirmed by disasters today. They observe that:

- Cities will typically rebuild in the same location in a character that remains familiar to its residents, and is usually built back safer but not as improved as it could have been

- Those with wealth will recover faster than those who were not financially stable before the disaster
- There is a wide range of factors that influence the speed of recovery including availability of resources, leadership, community consensus and the existence of prior plans
- Ongoing urban trends such as decentralisation (sprawl) tend to accelerate after disaster
- The opportunity to comprehensively re-plan the city is not often fulfilled due to the costs involved in a time of uncertainty.

It is from these observations that planners most often critique current emergency management practice from the perspective that long term mitigation and resilience efforts should be integrated most effectively in disaster recovery efforts. Consequently, the trade off between speed versus deliberation in the post-disaster recovery planning environment is regularly emphasised. Robert B. Olshansky from the Department of Urban and Regional Planning at the University of Illinois is a key author on this topic, and has published extensive research on post-disaster planning. Olshansky analyses the extent to which holistic, sustainable and collaborative activities can be played out in the high pressure recovery period. Although speed is important in recovery, taking a step back to look at the big picture in order to plan for community betterment in the early stages of recovery is incredibly important to ensuring a holistic recovery and future resilience (Olshansky et al., 2005). Post-disaster recovery is without a doubt, an incredibly high-pressure process in which both timely and accurate decisions are critical. A need for speed is understandable: the importance of speed implies that decisions are made quickly and the road to recovery begins without delay allowing people's lives to get back to normal as soon as possible. Although speed can also imply that in acting quickly, vital steps in the process toward a sustainable recovery can be overlooked, or become less of a priority to decision makers and money spenders who just want to see some sort of progress. There is a huge amount of pressure felt by governing bodies to appear as if progress is quickly being made, and in many cases, it is what is expected of the community. But the importance of considering a deliberated, big picture approach is essential to a holistic, integrated recovery. Deliberation implies that more time is taken to consider all aspects of a decision in the big picture before following through. Typically, deliberation is associated with the desire to build back better with a longer term vision in mind. While there are pros and cons to each scenario and a successful recovery really comes down to a perfect balance of the two – both speed and deliberation are important, however, in practice it is hard to do both at the same time (Olshansky et al., 2005).

## DISASTER RECOVERY ACTIVITIES

A later study by William Spangle and Associates (1990) explored the experiences of planners following earthquakes that occurred from 1963 through to 1989. A key observation of their study suggested that certain types of activities cluster in time:

- Month 1: Activities initiated, including evacuation, damage surveying, emergency shelter, and basic restoration of community functions

Text Box 1-1  
**Activities of the Disaster Recovery  
 Process**  
**(Philipsborn, 2001: 2-1)**

*warning and ongoing public information  
 evacuation and sheltering  
 search and rescue  
 damage assessments  
 debris clearance, removal and disposal  
 utilities and communications restoration  
 re-establishment of major transport linkages  
 temporary housing  
 financial management  
 economic impact analyses  
 detailed building inspections  
 redevelopment planning  
 environmental assessments  
 demolition  
 reconstruction  
 hazard mitigation and  
 preparation for the next disaster*

Text Box 1-2  
**10 Step Process for Recovery  
 Planning**  
**(Philipsborn, 2001: 2-1)**

1. *Get organised*
2. *Involved the public*
3. *Coordinate with other agencies, departments and groups*
4. *Identify the problem situation*
5. *Evaluate the problem and identify the opportunities*
6. *Set goals*
7. *Explore all alternative strategies*
8. *Plan for action*
9. *Get agreement on the action plan*
10. *Implement, evaluate and revise*

- Year 1: Preparing for the rebuilding, including demolition and debris removal, temporary housing and business locations, minor repairs, and planning for rebuilding heavily damaged areas
- Year 2: Significant rebuilding completed (with or without plans), leaving not only the most problematic areas (city centres, areas with geologic problems, controversial areas). These problem areas can require a decade or more to complete.

(Adapted from Olshansky et al., 2005)

A best practice handbook produced by the Natural Hazards Centre at the University of Colorado, Boulder called: *Holistic Disaster Recovery: Ideas for building local sustainability after a natural disaster* (FEMA, 2001), further expands on recovery activities and is a very good source for advising decision makers about achieving holistic disaster recovery. *Chapter 2: The Disaster Recovery Process*, written by Clancy Philipsborn, discusses the details of the disaster recovery process based on case study analysis. In this chapter, the disaster recovery process is described as being not so much an ordered process as it is a set of loosely related activities that occur before, during and after a disastrous event. Included in the process are activities outlined in Text Box 1-1. Thinking about each of these response and recovery activities as part of a holistic process is a challenge in itself. They overlap, occur concurrently, interconnect and often conflict, making it very difficult to grasp the dynamic process as a whole.

For the sake of simplicity, (Philipsborn, 2001) also identifies in his chapter a 10 step process for recovery planning during recovery (see Text Box 1-2). Again, while listing the steps there appears to be a fairly straight forward set of steps, it is important to understand that the disaster recovery process is far more iterative and tends to be relatively unstructured, cyclical and far from linear. Additionally, the management of each step varies hugely depending on the scale at which the recovery is occurring.

#### PRINCIPLES OF A 'GOOD' RECOVERY

How do we know when the recovery period is successfully completed? When do we know when to stop 'recovering'? While it is almost impossible to identify the 'end point' of a recovery, it should be expected that it take many years before a city takes on the shape of a thriving metropolitan environment as opposed to landscape that resembles a disaster zone. It is equally difficult to determine what equates to a good or 'successful' recovery (Olshansky et al., 2005). A good recovery could be determined in multiple ways: it could be considered based on the speed at which it gets 'back to normal', or it could go beyond 'back to normal' and be considered complete when the economic, social, cultural and environmental well beings of a town or city are sustainably balanced in equilibrium. It might be complete when the budget for recovery runs out, or when the debt of the recovery is paid off. This is a topic that is regularly discussed in the disaster recovery literature.

While socially, physically and economically devastating, disasters are frequently talked about as a rare opportunity to regenerate a better built-environment that should act as a catalyst for implementing sustainable development (FEMA, 2001). Often damages are so extensive that in some cases starting again is often more logical and affordable. This exposes unprecedented opportunities for a community to address pre-existing issues and re-plan a well-designed place that could never have been achieved pre-disaster. However, the consequences of business as usual can be negative. Unfortunately, there are many cases of communities that did not rebuild wisely, or that neglected the opportunity to include sustainability following a disaster (FEMA, 2001) leaving the community exposed to pre-existing issues on top of many others. Without a truly holistic approach that focuses on disaster mitigation and preparedness just as much as sustainable development, communities are just as likely to return to their pre-disaster state and remain unsustainable and therefore vulnerable to future changes and hazards. Put simply, emergency managers strive for a holistic recovery. (Philipsborn, 2001) identifies the ideal disaster recovery process as being one that is consensus-based and compatible with long term community goals, and should take into account all the principles of sustainable development.

***“A good recovery is a holistic recovery – one that considers the community’s best interests overall, by including the principles of sustainability in every decision.”***

*Philipsborn, 2001: 2-2*

## OBSTACLES AND ENABLERS FOR HOLISTIC DISASTER RECOVERY PROCESS

Philipsborn’s chapter also highlighted a set of nine obstacle and seven enablers for holistic disaster recovery as outlined in Table 1-1 on the following page. The obstacles and enablers provide a useful basis from which to critique the recovery process as it has been played out in the Canterbury recovery. It should be noted that obstacles should not be seen as barriers that prevent holistic recovery, but they can be expected to slow the process down. I will make reference to this table throughout this chapter and later chapters when analysing the Canterbury case study and when discussing how landscape architects could help to overcome some of the obstacles and create some of the enablers.

## THE CONCEPT OF ‘GOOD DISASTER GOVERNANCE’

At the basis of almost every obstacle and enabler to holistic recovery is the concept of governance. Governance has a huge influence on the extent of collaboration and management of the recovery period, which is why it is a brief although relevant aspect of this study. With regard to the post disaster recovery context, it is necessary to understand that governance is not government, and that governance, as a concept, recognizes that decision making power exists inside and outside the government’s formal authorities. A simple definition used by UNESCAP (United Nations Economic and Social Commission for Asia and the Pacific) on their web page *What is good governance*, describes governance as: *“The process of decision making and the process by which decisions are implemented (or not implemented)” (UNESCAP, 2011).*

The governance of disasters is a concept that attracts the interest of a diversity of people that have been affected by disaster and a variety

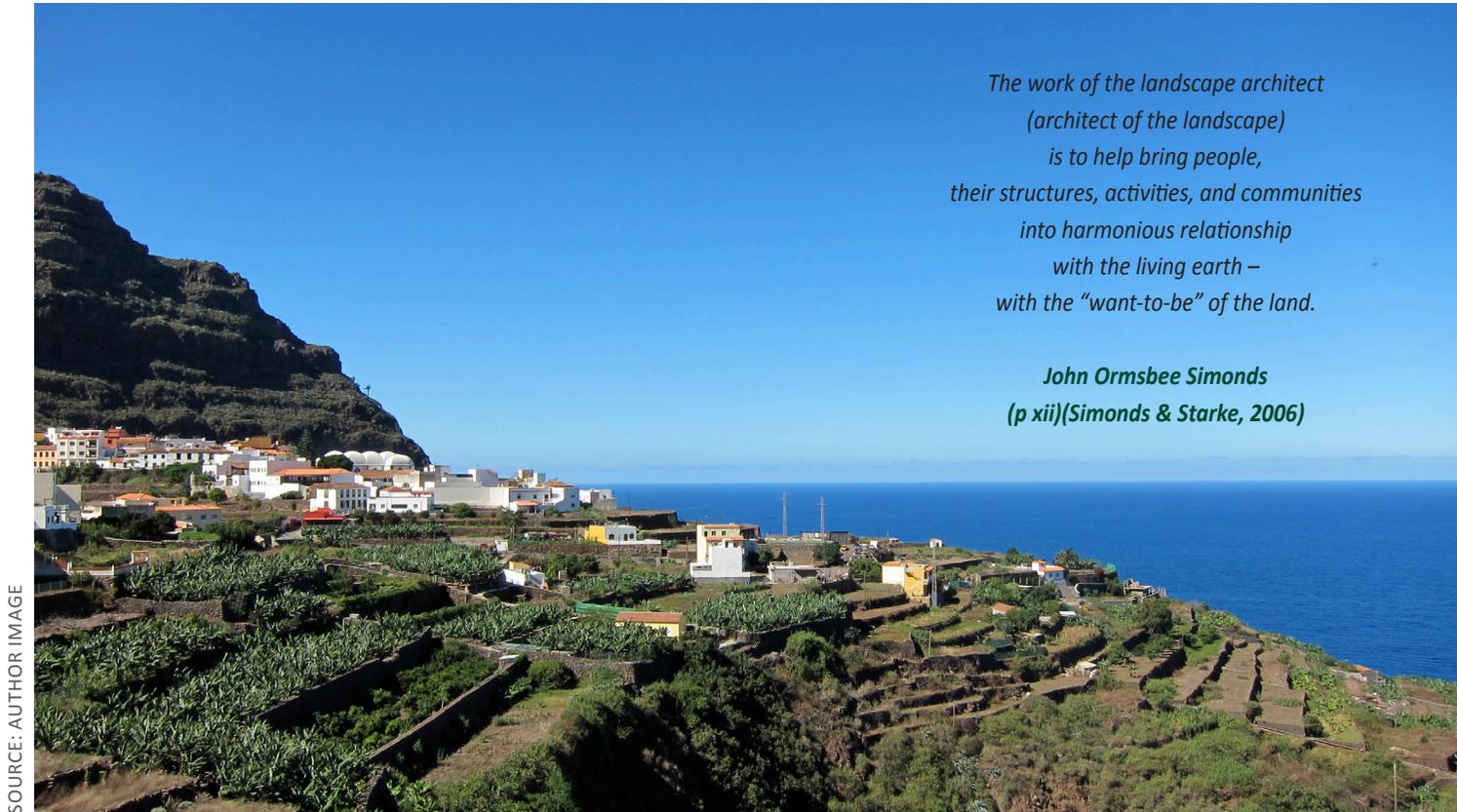
TABLE 1-1: OBSTACLES AND ENABLERS TO HOLISTIC DISASTER RECOVERY (ADAPTED FROM: PHILIPSBORN, 2001)

<b><i>Nine obstacles to holistic recovery</i></b>	<b><i>Seven enablers to holistic recovery</i></b>
<i>The lack of political will to “do the right thing”</i>	<i>Political will to analyse the issues, evaluate the alternatives and protect the long term public interest over short term goals</i>
<i>Other ‘money’ issues such as property rights, development, insurance, land use and substandard housing</i>	<i>Funding that provides greater flexibility in community choices</i>
<i>The propensity to strive for “a return to normal.”</i>	<i>Stakeholder perception about the decisions made in the recovery, generally enhanced by including all stakeholders in decision making</i>
<i>A lack of awareness of what the true redevelopment possibilities are</i>	<i>Vision of where the community wants to “be” in the future</i>
<i>The immediate change in the roles and procedures of local government officials</i>	<i>The ability of authorities to use appropriate tools to support the needs of the community</i>
<i>Rules, regulations and policies that can sometimes alter priorities, limit opportunities and curtail creative solutions</i>	<i>Establishing priorities that allows community to order it’s actions to maximise their outcomes and “double up” on achieving goals</i>
<i>The lack of systematic communication between decision makers, various departments and agencies, and stakeholders</i>	<i>Community endorsement or “buy in” that builds expectations and confidence</i>
<i>The degree of damage inflicted on the community</i>	
<i>Searching for the extraordinary solution to what appears to be an extraordinary problem</i>	

***“Large-scale bottom-up participatory approaches cannot be effective without significant top-down support”.***

*(International Recovery Platform, 2010)*

of disciplines involved in the recovery. This includes landscape architects whose practice is influenced by ‘the powers that be’, and the way in which landscape principles are acknowledged in decision making. A document produced by the International Recovery Platform (IRP) in collaboration with United Nations Development Program (UNDP) called Guidance Note on Recovery: GOVERNANCE (2010), informs a significant portion of the discussion about what it considered ‘good governance’. In this document it is emphasised that while governments play a key role in governance, they are **not the sole actor in the decision making and implementation process**. In addition to this, it is important to appreciate that governance is a concept that emphasises that decisions should be made based on the collaboration of many different key actors (IRP. & UNDP, 2010). Good disaster governance is therefore governance that allows significant collaboration between stakeholders, including landscape architects, at every level of decision making.



SOURCE: AUTHOR IMAGE

*The work of the landscape architect  
(architect of the landscape)  
is to help bring people,  
their structures, activities, and communities  
into harmonious relationship  
with the living earth –  
with the “want-to-be” of the land.*

**John Ormsbee Simonds  
(p xii)(Simonds & Starke, 2006)**

FIGURE 1-3: ANCIENT FARMING TECHNIQUES ON THE ISLAND OF LA GOMERA (ONE OF THE CANARY ISLANDS OFF THE COAST OF MOROCCO) DEMONSTRATES THE HARMONIOUS RELATIONSHIP THAT THE PEOPLE HAVE WITH THEIR DYNAMIC LANDSCAPE

## SETTING THE SCENE: LANDSCAPE ARCHITECTURE

In order to explore the role of landscape architect in post disaster recovery, it is useful to first briefly clarify the scope of the field of landscape architecture and how it has developed up until the 21st century. In this way, those who are not familiar with the discipline can gain a clear understanding of what it is that landscape architects offer as discipline, while establishing a base for further discussion on the role of landscape architects in post disaster recovery.

### LANDSCAPE ARCHITECTURE AS A DISCIPLINE

Landscape architecture remains a continually evolving profession that can be explained from many, sometimes conflicting perspectives. Once perceived as descending from the art of gardening, many now argue that landscape architecture in fact has its roots in land stewardship and planning human settlements than in the art of designing gardens for the wealthier classes of society (Spirn, 1997; Yu & Padua, 2006). Today, it is an incredibly diverse profession that covers a wide spectrum of practice, from small-scale garden projects in residential neighbourhoods, through public urban space design and broad scale regional planning. It goes without saying that sustainability and sustainable development is the foundation upon which landscape architecture functions as a profession. In fact it could be argued that the principles of the discipline addressed issues of sustainability long before it became a worldwide concern. Landscape architects are educated in natural sciences, social sciences, creative art and design, sustainability sciences, project management, and could even be considered high tech CAD and GIS experts among other things. The difference between each individual landscape architect perhaps comes down to the scale at which they prefer to practise, if not the requests of their clients.

While often a hugely attractive and beneficial aspect of the discipline, the broad and diverse scope of landscape architecture has lead not only to a misunderstanding of the profession outside of the design and planning fields, but also conflicts of understanding within the field itself. With the exception of a few well known landscape architects such as Ian McHarg, in the past very few landscape architects have either the knowledge or the interest to embrace the entire scope of the discipline within their practices and theories (Spirn, 2000). It is this long standing issue that has had an influence on the engagement of landscape architects in urban development practice in the past. Nonetheless, difficulty in distilling the professions history and practices into a simplified description has not prevented landscape architects from making their mark on the world. As almost every nation continues to face unprecedented challenges of environmental degradation, urbanisation and globalization, the field of landscape architecture also continues to evolve and develop as a leading profession in high quality sustainable development and regenerating cultural identity and ecological health.



SOURCE: ALL AUTHOR IMAGES

FIGURE 1-4: DEMONSTRATING THE DIVERSE NATURE OF LANDSCAPE ARCHITECTURE PRACTICE. CLOCKWISE FROM TOP LEFT: IMMACULATE FLOWER BEDS AND SCULPTURE IN KOWLOON PARK, HONG KONG; URBAN RECREATION SPACE IN HAFEN CITY, HAMBURG, GERMANY; NATURAL GARDENS AND WATER FEATURES, HONG KONG BOTANIC GARDENS; INDUSTRIAL WASTELAND CONVERTED TO A FUNCTIONAL URBAN PARK, SPOOR NORD, ANTWERP, BELGIUM; DETAILS OF THE URBAN LANDSCAPE = URBAN PLAYGROUND IN HAFEN CITY, HAMBURG, GERMANY; LANDSCAPES FOR REMEMBERING, THE WOODLAND CEMETERY, STOCKHOLM, SWEDEN

SOURCE: YU &amp; PADUA, 2006; 104,

IMAGE REMOVED DUE TO COPYRIGHT

FIGURE 1-5: REGENERATING THE VERNACULAR LANDSCAPE: THE RICE CAMPUS, SHENYANG ARCHITECTURAL UNIVERSITY. NATIVE CROPS (RICE AND BUCKWHEAT) ARE USED FOR THE NEW CAMPUS LANDSCAPE (LANDSCAPE ARCHITECT: KONGJIAN YU, TURENSCAPE, CHINA)

## LANDSCAPE ARCHITECTURE AND THE ART OF SURVIVAL

In my eyes, Kongjian Yu, one of China's most well known landscape architects of today, is a very good example of a contemporary landscape architect who bases his principles and practice on 21st century issues. Kongjian Yu is Dean and Professor of the Graduate School of Landscape Architecture, Peking University and President (+ founder) of Turenscape, the largest private landscape architecture firm in China. Professor Yu is also one of China's most controversial landscape architects, who once described modern China as having a major identity and ecological crisis. In his book, *The Art of Survival: Recovering Landscape Architecture*, Yu speaks about the roles and responsibilities of landscape architects as urban development professionals in the 21st Century – as masters of the art of survival. While Yu does not specifically focus on post disaster recovery situations, his landscape architecture theories and practices reminiscent of the scientifically based ecological infrastructure theories of Ian McHarg, are especially relevant to urban development in hazard prone areas of developing countries.

*“Landscape architecture must define itself in terms of the art of survival, not just as a descendent of gardening. The profession must re-evaluate the vernacular of the land and the people, and lead the way in urban development by planning and designing an infrastructure of both landscape and ecology, through which landscape can be created and preserved as a medium, and as the connecting link between the land, the people, and the spirits.”*

**Kongjian Yu**

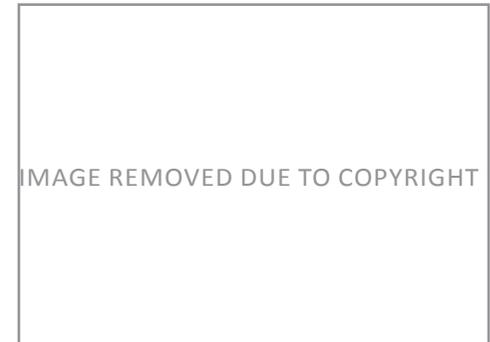
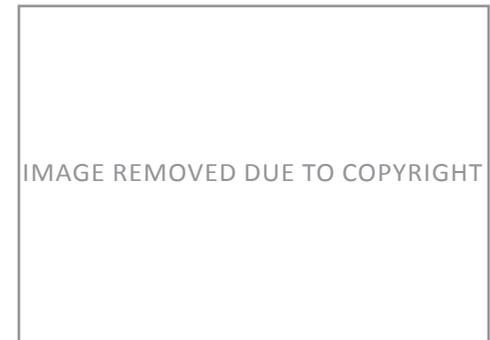
(Yu & Padua, 2006:11)

While it is important not to ignore the varied descriptions and understandings of the landscape architecture discipline, it is from Professor Yu's recent reflection that I make assumptions about the role of landscape architects in the 21st century. His words provide a basis from which I can argue that landscape architects should be, if they aren't already, key actors in the process of post-disaster recovery.

If the field of landscape architecture is to pursue an era of using landscape as an agent for positive change, there is no better time to prove its capabilities than in the wake of disaster. It therefore came as a surprise to me that in practice, landscape architects are not typically considered as one of the key actors in post disaster recovery. This was supported by the fact that it was difficult to find landscape architecture literature reporting on best practice which specifically related to the post disaster recovery period. As for the literature that does exist, not only is there less research on recovery than any other phase of disasters management; (Olshansky & Chang, 2009; Olshansky et al., 2005), there is more critique about the exclusion of designers and planners in the process of disaster recovery than their involvement. Recent literature suggests that there are only a few cases where design professionals, such as landscape architects have been consulted regarding devastation after natural disasters (Allan & Bryant, 2010; Chang et al., 2006).

Chang et al 2006, highlight through several case examples that natural disaster related recovery has typically been focussed on infrastructure engineering and food provisions, resulting in a redevelopment process that fails to address the integration of ecological and cultural concerns. They enforce that designers are desperately needed in disaster response teams to ensure essential human needs (cultural, ecological, and social) are addressed or even acknowledged in the reconstruction process. It was also concluded in this paper that there is a huge call for future research into the considerations and responsibilities of designers in post-disaster environments (Chang et al., 2006). Furthermore, Dr. Paula Villagra, a member of the Chilean Institute of Landscape Architects (ICHAP) who contributed to a recent TOPOS article about the role of landscape architects after the earthquakes in Chile (Oñate et al, 2010), recently reported to me personally that landscape architects are still failing to be recognised by the government as key players in the recovery master plan development teams. She says she is very sad about this, but that ICHAP is working on building the landscape architecture profession in Chile, which is currently not very well known.

There are a number of potential reasons why landscape architects have not typically been involved in disaster recovery or in addressing major environmental issues. Aside from the differences between recognition of the discipline in various countries, Professor Kongjian Yu put's it down to the fact that landscape architecture, as a profession, is still associated with the ancient tradition of gardening. But times are changing, and the discipline of Landscape Architecture is continuing to evolve and be recognised. As seen in later chapters, the role of landscape architects in disaster recovery is increasingly being recognised as a critical component of achieving holistic, sustainable disaster recovery in both first and third world countries.



**FIGURE 1-6: HAZARD MITIGATION IN THE PAST HAS INVOLVED ENGINEERING TECHNIQUES THAT STRIP THE LANDSCAPE OF IT'S NATURAL PROCESSES.** THE LOS ANGELES RIVER (TOP) DEMONSTRATES A RIVER THAT HAS BEEN COMPLETELY STRIPPED OF ITS NATURAL FUNCTION AS A HAZARD MITIGATION TECHNIQUE TO PROTECT THE CITY FROM FLOOD. THE HAN RIVER IN SEOUL, KOREA (BOTTOM), WAS ONCE MANAGED IN A SIMILAR WAY. AFTER A SEVERE URBAN FLOOD IN 1984 THE DECISION WAS MADE SOME YEARS LATER TO REGENERATE THE RIVER AS AN URBAN PARK WHILE RESTORING SOME OF ITS NATURAL FUNCTION.

SOURCE: WWW.WORLDCHANGING.COM

SOURCE: HTTP://INHABITAT.COM

*“The rich heritage and overwhelming literature about gardening and garden art did not help landscape architecture emerge as a modern discipline. It is time to declare that landscape architecture is not a direct descendent of garden art, but a descendent of the survival skills of our ancestors who had to endure a changeable environment, ensuring a safe place away from floods and enemies, while surviving by levelling the land, planting and irrigating crops, and saving water and other resources for sustaining the family and the people.”*

**Kongjian Yu**  
**(in Yu & Padua, 2006:11)**



SOURCE: AUTHOR IMAGES

**FIGURE 1-7: GARDEN ART VS THE ART OF SURVIVAL.** THE BAROQUE GARDENS AT FREDERIKSBORG CASTLE IN HILLERØD, DENMARK (LEFT) DEMONSTRATE THE HISTORIC PRACTICE OF GARDEN ART THAT HAS DOMINATED THE PERCEPTION OF LANDSCAPE ARCHITECTURE PRACTICE. MEANWHILE THE ANCIENT CANARY ISLAND VILLAGE OF VALLEHERMOSA (RIGHT) IS AN ANCIENT CULTURAL LANDSCAPE THAT DEMONSTRATES THE ‘ART OF SURVIVAL’ THAT IS ARGUABLY THE TRUE ROOTS OF THE LANDSCAPE ARCHITECTURE DISCIPLINE.

# DISSERTATION FRAMEWORK

## DISSERTATION FRAMEWORK

The issues unique to the Canterbury earthquake recovery provide the back bone to the topics of recovery discussed in this dissertation. Chapter two sets the scene for the Canterbury Recovery by discussing the greater Christchurch region, its geological and cultural history, the earthquakes, the earthquake impacts and the implications of the impacts for landscape architects. This chapter is intended to provide the background information that may be referred to throughout the dissertation. Included in this case study is an overview of the current governance structure of the Canterbury recovery, which has a major influence on the way the recovery is carried out.

Chapter three, four and five are the recovery chapters. Both disaster recovery and landscape architecture practice share a similar variety of traits including a focus on the well being of the environment, society, culture and economy across a broad spectrum of interrelated scales from regional to local. Therefore, to simplify the description of earthquake implications and the role of landscape architects in recovery practice, the framework for these chapters is based upon scale:

- Regional/Big Picture scale
- District/Community scale
- Site/Local scale

Each chapter reflects on the landscape oriented earthquake implications and issues for landscape at each scale and how the issues are currently being dealt with in the Canterbury earthquake recovery. It then goes on to discuss what it is that landscape architects do at each scale, and uses international case studies so demonstrate their potential role in relevant recovery activities.

To help myself and the reader understand the hugely complex topic of both earthquake recovery and landscape architecture practice, I have threaded an analogy throughout the dissertation which describes a simplified, identifiable way in which landscape architects might understand the disaster recovery and its implications for landscape. This analogy refers to the Canterbury region as giant, patchwork quilt that has been ripped and torn in the earthquakes, and refers to the role of landscape architects as the master quilters...

## A STORY ABOUT MASTER QUILTING

To a landscape architect, the regional landscape might be seen as one big, precious, patchwork quilt. It is a quilt that requires constant maintenance and upkeep as new patches of modern colours and textures steadily replace the old patches over time. The patchwork pattern includes not only the agricultural lands, but the built form of existing towns, suburbs, and neighbourhoods, each with their own patch of distinctive fabric. The patterns, textures, colours and stitches of the patchwork all contribute to the regions distinctive character; one giant piece of craftsmanship that has been altered by many different 'quilters' over time. It is important to not forget the underside layer to this quilt too. Unlike the colourful patchwork top layer, the underside to the quilt is a single sheet of durable fabric that is repaired but never replaced. The underside fabric is what supports the top layer and holds the quilt together. Therefore, holes in the underside fabric and faults in the stitching can have a major effect on the top layer which is why it is constantly modified, unstitched, rethreaded and sewn again. While this underside layer of the quilt might only one sheet of mottled grey fabric, there is still a pattern embedded in the sheet by the blue and grey threads that attach the top layer to the underside.

In this picture, landscape architects would tend to see themselves as a specialist in the craft of Master Quilting. They are the people who specialise in understanding the art of planning and designing the patchwork that is the regional landscape. They don't always hold the needle and thread, but they guide the people that do. Landscape architects are those people who have dedicated themselves to ensuring the quality and beauty of the quilt is never compromised now and in the future. While new patches, colours and patterns are introduced, landscape architects try to ensure that the patches all connect somehow in one colour palette, one distinctive patchwork pattern; one unique work of art that remains a beautiful manifestation of nature and culture over time and space. Landscape architects understand the importance of preserving the quilt's historical character; ensuring the high quality of its fabric and stitching; and nurturing the nuances that exist between the patches and patterns that together form one beautiful, meaningful picture. To make justified decisions, landscape architects are influenced by those layers of (natural and cultural) fabric that existed there throughout history and the future visions of those whose quilt is being continually crafted.

Landscape architects now tend specialise in different roles of quilting. Some landscape architects take on a combination of roles, while others specialise only in one. But together they strive to work simultaneously to preserve, enhance and sustain the quality of the evolving patchwork quilt for current and future generations. It is also important to understand that while landscape architects envision and plan the quilt holistically, they also realise that accidents, imperfections and evolutions are what make the quilt unique and beautiful. In fact many master quilters embrace this aspect of quilting and will plan for the natural evolution of a patch and its qualities.





The different specialisations of Master Quilting can be broken down and described as:

- **Quilt Planning** (Landscape Planning): Quilt Planning is the practice of overseeing the evolution, management and future design of the entire quilt. The specialised role of the landscape architect in this practice is essentially to coordinate the appropriate textures, colours, shapes and sizes of patches and strategically group them together in a unique and harmonious big picture arrangement. Landscape architects implement strong principles and visions in distinctive combinations that form large sections of the patchwork. Their work sets the standards for patch-working and fabric designing, and ensures the overall style, character and quality of the collectively envisioned quilt is preserved and maintained.
- **Patchwork Designing** (Urban Design): Patchwork Designing focuses only a handful of patches that have been strategically placed in position by the big picture quilters. The role of the landscape architect in patchwork designing is to arrange the patches in a pattern, deciding on the individual qualities of each patch: their colour, size, and shape; their exact arrangement; and the qualities of the stitching. Patchwork designers take into consideration the vision of the quilt planners, to ensure their section of the patchwork contributes to the envisioned character and style of the entire quilt.
- **Fabric designing** (Landscape Design): Fabric designing is concerned with each individual patch and the stitching that holds the patches together. In this practice, landscape architects are masters of designing the patterns, colouring the threads and weaving the textures that make up the fabric of individual patches. They too are influenced by the overall style and character of the entire quilt and particularly the relationship between the individual patch and its surrounding patches. However, it is the objective of landscape architects specialised in fabric designing, to make each and every patch unique and distinctive from the next depending on the present and historical natural and cultural character of the old existing patch.

The next chapters are threaded with this metaphor of the Canterbury region as being a like a damaged patchwork quilt. It explores the different roles of landscape architects as the ‘master quilters’ and their current and potential actions towards repairing the damages and regenerating the quality of Canterbury’s the post-earthquake ‘patchwork’ landscape. By looking at the scale and type of the damage, reporting on the repair work to date, and looking at the work of other master quilters who have had experience in a similar situation, it is hoped that Canterbury’s master quilters can contribute to ensuring Canterbury’s patchwork quilt is repaired as a masterpiece that all Cantabrians can be proud of.

chapter  
two

KEY CASE STUDY  
THE EARTHQUAKES IN CANTERBURY

# CANTERBURY'S PATCHWORK QUILT

Canterbury's quilt is forever evolving as it exists throughout time and history. Imagine the quilt 500 years ago: This was nature's quilt. The big patches would have existed in organic shapes and varied sizes, in shades of green, grey and brown, stitched together with turquoise blue thread. Next think of the quilt only 100 years ago when nature's quilt was beginning to be tailored by people. Maori had already changed the colour and texture of some of the quilt patches; however it was the Europeans that had begun work on changing the patchwork patterns. In many sections of the quilt, the patches had been covered over with new patches or divided into smaller, more angular shapes. Europeans changed the colour and texture of the patches and stitched them together with grey and green threads as well as blue. Other smaller patches in new colours replaced some of the green, and were clustered together around a newly formed centre piece. Now think of the quilt as it was only recently in 2010: For many years, the quilt had been fondly recognised as the 'patchwork plains', reminiscent of a history of English agriculture. The patchwork was almost completely comprised of small angular patches of varying sizes, shapes textures and shades of green, yellow and brown, stitched together with new threads of dark green, light grey and blue. Very few of the 500 year old patches and turquoise blue threads still existed, and none remained in their historical shape and size. A significant area of the quilt was made up of a cluster of the introduced coloured patches, occurring in various shades and textures arranged around the large centre piece.

On the 4th of September 2010, the Canterbury patchwork quilt was severely damaged in an unexpected disaster that ripped and tore holes in the patchwork's fabric, stitching and underside layers. Some patches were worse affected than others. The fabric and the stitching were broken in many places and were in desperate need of repair. As people began repair work

on the patches, they soon realised that the worst was not over...there were more disruptions, more of these devastating events that ripped the quilt. The worst occurred on the 22nd of February 2011 when a major disturbance almost completely destroyed the centre piece and numerous other patches of the quilt. Huge holes were opened up and stitching came undone in the underside layer of the quilt, severely affecting the patchwork layer which was left in a huge mess. As a result of these devastating events, a huge part of Canterbury's quilt was, and still is, left in rips and shreds.

For the master quilters, one of the most important things to do first is to make an assessment of the problem situation – analyse the true scale of the impacts and understand the implications of those impacts on the future of the quilt. In this way the master quilters are better able to gain a holistic picture of what actions need to be taken to ensure the big patchwork quilt is regenerated as best and as quickly as is possible. This chapter is based on the first assessment which is necessary to understand the big picture. It begins with a reminder of Canterbury's identity that is a manifestation of its natural and cultural history. This is an important aspect that needs to be considered when regenerating the quilt, as many of the oldest patches have been so severely damaged and now Canterbury is at risk of losing them forever. It then describes the earthquakes and the reason we need to consider the future strength and resilience of the quilt. Next the immediate earthquake impacts and consequences are described based on how they have affected different parts of the quilt, as well as the immediate response efforts which highlight the effectiveness of current practice. The last section of the chapter talks about how the recovery efforts in Canterbury are currently structured. This includes a brief section on the concept of governance and how it affects the recovery and the role of landscape architects.

## A BRIEF HISTORY OF CHRISTCHURCH CITY AND THE CANTERBURY REGION

SOURCE: ABISKO LODGE, METHVEN | FLICKR.COM

IMAGE REMOVED DUE TO COPYRIGHT

**FIGURE 2-1: THE CANTERBURY LANDSCAPE.**  
AERIAL VIEW OVER THE RAKAIA RIVER AND THE  
CANTERBURY PLAINS

A brief background analysis of Canterbury as it existed before the earthquakes is an important step towards understanding the big picture. Based on this analysis we are able to make more meaningful, grounded decisions about future development that will not only make Canterbury more resilient, but give it a stronger sense of place and identity.

### NATURAL PROCESSES AND GEOLOGY

In order to predict, plan and prepare for natural disasters and their effects, landscape architects recognise the importance in understanding the underlying natural processes that cause such an event to happen. The geology of Canterbury makes it a hazard prone region that is subject to earthquakes, floods (both river and sea level rise), and potentially tsunamis. This means that decisions made about existing and future development areas need to seriously consider natural processes and the effects of potential natural hazards. Furthermore, the region needs to be resilient and well prepared for the next major disaster, which means the community needs to respect the natural processes, appreciate them as opposed to fight them, and become self reliant and self sustaining so that they can easily adapt to future changes.

Understanding the natural geological processes of New Zealand reveals a lot about how we can become more resilient to the natural disasters that occur here. Geological hazards occur as a result of tectonic movement and therefore some parts of the world are more prone to this type of natural disaster than others. For some countries earthquakes are inevitable, but unlike volcanoes, their location and magnitude is often unpredictable. While there is nothing we can do to stop them, we can try to understand them and attempt to become more resilient to their effects.

From a geological perspective, it comes as little surprise that Canterbury was struck by a large earthquake. New Zealand is located on the Pacific Ring of Fire, straddling the convergent boundary between the Pacific and Australian Plates. As a result, New Zealand is a highly tectonic country, prone to many geological hazards such as earthquakes, tsunamis, and volcanic activity. The likelihood of an earthquake occurring in many parts of the country is high, and while some parts of the country have been expecting a major earthquake for some time (such as Wellington), the earthquake events in Canterbury have proven that the location of a major earthquake event cannot be predicted. Understanding the geology of New Zealand is both exciting (for geologists) and scary (for everyone else). Although we may not like to

IMAGE REMOVED DUE TO COPYRIGHT

**FIGURE 2-2: THE COUNTRY ASTRIDE A PLATE BOUNDARY:** NEW ZEALAND SITS ASTRIDE THE PACIFIC-AUSTRALIAN PLATE BOUNDARY, RESULTING IN A HIGHLY TECTONIC AND VOLCANICALLY ACTIVE LANDSCAPE

SOURCE: GRAHAM, 2008: 94

SOURCE: GRAHAM, 2008: 141

IMAGE REMOVED DUE TO COPYRIGHT

**FIGURE 2-3: A COMPLEX COLLISION:** THE COLLISION OF THE PACIFIC PLATE INTO THE AUSTRALIAN PLATE CAUSES THE MOUNTAINS TO RISE, THE OCEAN TRENCHES TO DEEPEN AND THE EARTH SURFACE TO STRETCH. IT'S NO WONDER NEW ZEALAND IS PRONE TO EARTHQUAKES

think about the fact that we live in such a tectonically active part of the world, we have to remember it is geological processes forming the topography that makes the New Zealand natural landscape so variable and stunning.

The boundary of the Australian and Pacific Plates on which New Zealand lie, forms a major active fault line that runs the length of the South Island on the western side of the Southern Alps and continues under the ocean along the eastern coast of the North Island. The Pacific Plate is colliding with the Australian Plate at a rate of about 40 mm/yr causing compression and uplift that forms the mountain ranges in the North and South Islands. While the plates are colliding, the speed and direction of movement differs along the length of New Zealand. To the north of New Zealand, the Pacific Plate is subducted beneath the Australian Plate forming the Kermadec Trench, which extends down the eastern coast of the North Island past the Cook Strait to end off the coast of Kaikoura. In the South Island from Kaikoura though to Fjordland, the two plates slide past each other with slight abduction of the Pacific Plate over the Australian Plate. This movement creates the Alpine Fault and the Southern Alps which are uplifting at a rate of 10mm every year (although they are eroded at a similar rate) (Graham, 2008). In the ocean south of Fjordland, the Australian Plate subducts under the Pacific Plate forming the Puysegur Trench.

Canterbury is located on the eastern coast of the South Island, bordered in the east by the Southern Alps and beyond them, the Alpine Fault. Being so close to the Alpine Fault, there are many smaller fault lines beneath Canterbury and it is evident from various tell tale signs in the landscape that earthquakes have been known to shift the land considerably in the past. Mid way along the western coastline of Canterbury is Banks Peninsular. The peninsular was originally a cluster of extinct volcanoes that have become connected to the mainland as rivers bought alluvial gravels from the mountains and built up the plains over thousands of years. A huge aquifer remains beneath the plains above which layers of alluvial gravels form a substrate that thins as it reaches the coast. The plains once supported thriving swampy wetlands and forests that were well adapted to flood. Unbeknown to early European settlers who found the landscape to be highly productive and fertile, it also happened to be a soft substrate that was prone to liquefaction and lateral spread in event of an earthquake.

## SETTLEMENT

Up until the early 1800s, the Canterbury region was occupied by a succession of Māori tribes who had fought over the territory since about the 10th century when it is thought that Polynesians first discovered New Zealand. For hundreds of years, Maori had cultivated, hunted and gathered their food in the abundant landscape. It is thought that the first Maori settlers hunted the now extinct moa bird burned half of the forests on the plains in the process.

At the time of the arrival of English settlers, it was the Ngāi Tahu tribe that occupied the region after taking over the territory from Ngāti Māmoē, a tribe from the north who had settled in the area in the late 1500s. While there may have once been populations of 5000 or more Ngāi Tahu people in the region, there was only a very small population of Ngāi Tahu when Europeans arrived as a result of being severely depleted in 1827 in a brutal invasion by the Ngāti Toa, a northern tribe led by Te Rauparaha (Byrnes, 2009).

While sealers and whalers were the first Europeans to set foot on the shores of Canterbury around the early 1800s, Christchurch did not begin to be planned until the late 1840s. At first, Lyttelton was established as an active port that serviced whaling ships and Canterbury's original European settlement. A few years later the fertile Canterbury plains began to be cultivated by English sheep farmers who found the regenerating tussock lands highly productive to graze. It wasn't until 1847, that British politician Edward Gibbon Wakefield and Irish statesman John Robert Godley started to plan Christchurch. In 1850 English surveyor Edward Jollie completed a survey and plan of Christchurch and in 1851 the ship "Canterbury" brought a large portion of settlers from England to begin building the city. In 1856 Christchurch was made a city by Royal Charter, thereby making it officially the first established (and therefore oldest) city in New Zealand (ibid).

### **CULTURAL IDENTITY**

Right from the earliest Maori settlers through to the latest rugby team, Canterbury's cultural identity is an incredibly important aspect to consider in the recovery, as the decisions we make now will define the identity of the region in the future. Born and bred Cantabrians are affectionately labelled by fellow kiwi's as staunch, 'one eyed' people with typically conservative characteristics that stem from English traditions. In modern times, Canterbury is known for its flat patchwork landscape, Gothic architecture and English style parks, the Christchurch Anglican Cathedral and the infamous Crusaders rugby team whose home ground until the earthquake, was the recently renovated AMI stadium.

The cultural landscape extends from the mountains to the sea and includes the Southern Alps, the Canterbury Foothills, the Canterbury Plains, the Waimakariri and Rakaia Rivers, Bank Peninsula and the Canterbury Coast. Whilst naturally covered in scrubland, wetlands and beech forests, very little of the natural landscape cover remains as colonisers have transformed it into farmland that now supports a large agricultural industry. Nowadays, Canterbury is characterised by its striking patchwork plains and perfectly trimmed hedgerows, a traditional characteristic of the pioneering English farmers.

Christchurch is one of the oldest European settlements in New Zealand, and is characteristically distinctive as part of New Zealand's history. Prior to the earthquakes, Christchurch was a beautiful city that took pride in its collection of stone heritage buildings. Set out on a north-south

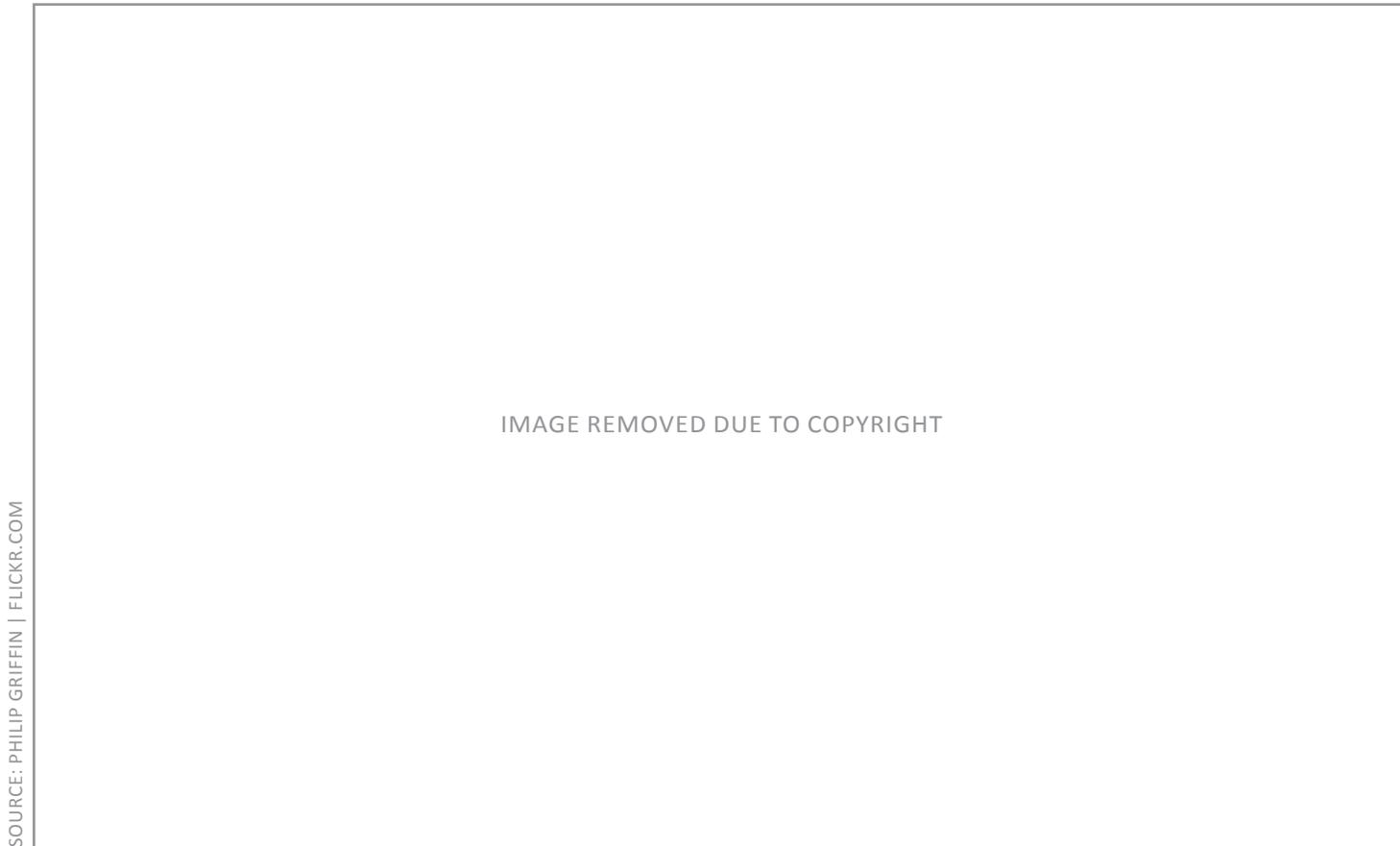


FIGURE 2-4: VIEW TO THE ALPS FROM THE PORT HILLS ACROSS CHRISTCHURCH AND THE CANTERBURY PLAINS: CANTERBURY'S CULTURAL LANDSCAPE EXTENDS FROM THE OCEAN TO THE MOUNTAINS.

axial grid pattern, the central city is bounded by four avenues and is bordered by Hagley Park to the west and views of the Port Hills to the south. At the centre of the grid, the Christchurch Cathedral stands within Cathedral Square and was a popular tourist destination. The Christchurch tram was a popular tourist attraction that passed by the square on its small circuit that connected Cathedral Square with the historic arts centre and the boutique shopping lane of New Regent Street. The central city area includes a tree lined section of the meandering Avon River, a feature of the city that has been previously recognised as being an understated asset of the city. Within the central city grid, a network of small lane ways existed behind the older low-rise brick buildings. These lanes had in recent years been rediscovered and transformed into a successful district of boutique bars, clubs, restaurants and retail spaces that became the unique experience of Christchurch’s local market space and night life.

Through identifying the natural and cultural layers of the Christchurch and Canterbury landscape, we are able to extract those characteristics that define it as a place, and use those characteristics to strengthen the identity and resilience of Christchurch as it is rebuilt. The natural layers remind us of the *want-to-be* of the landscape, and give us clues about how to become more resilient. Meanwhile the cultural layers are important to keep in mind as the city rebuilds and covers the earthquake layer with a permanent post-earthquake layer - one that will affect the history and the future of the city for ever.

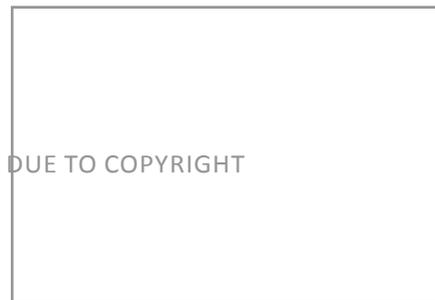
**FIGURE(S) 2-5: CHRISTCHURCH CHARACTER:** LEFT TO RIGHT: CANTERBURY PROVINCIAL COUNCIL BUILDINGS; CHRISTCHURCH TRAM WITH CHRISTCHURCH ART GALLERY IN THE BACKGROUND; POPLAR LANE; THE TREE-LINED AVON RIVER.



SOURCE: ONTARIONS.TRAVELLERSPOT.COM



SOURCE: CANTERBURY-NEW-ZEALAND.COM



SOURCE: CHRISTCHURCHMUSIC.ORG.NZ



SOURCE: PHILIP GRIFFIN | FLICKR.COM

IMAGES REMOVED DUE TO COPYRIGHT

## THE 2010/2011 EARTHQUAKES



SOURCE: ADAM HUTCHINSON

FIGURE 2-6: THE IMMEDIATE AFTERMATH OF THE FEBRUARY 22 EARTHQUAKE THAT DESTROYED CHRISTCHURCH'S CENTRAL CITY.

In the space of less than ten months, the mid Canterbury region was hit by three major earthquake events each with their own series of aftershocks. The community, the economy, the infrastructure and the landscape of greater Christchurch has suffered extensive damage resulting in New Zealand's costliest natural disaster and the third costliest disaster (nominally) worldwide (Murdoch & Fraser, 2011). While the initial earthquake was the largest, it has triggered a sequence of more than 7800 aftershocks of magnitude 2 or above, including around 28 that have been of magnitude 5 and above. These aftershocks are still continuing to shake Canterbury more than a year later.

## SEPTEMBER 4TH, 2010 | THE CANTERBURY (DARFIELD) EARTHQUAKE | 7.1ML

The first major earthquake occurred on September 4th, 2010 at 4.35am local time, and was located on the Canterbury Plains close to the eastern foothills of the Southern Alps, 10km deep and 40km west of Christchurch, near the small rural town of Darfield. The 7.1(mL) earthquake was the result of strike-slip faulting within the crust of the Pacific Plate, about 80-90km from the plate boundary and major Alpine Fault. While there are known to be about 100 faults recognised around the region, the Greendale fault line where the epicentre was located has been previously unknown. The 7.1 earthquake which lasted around 40 seconds, was preceded by a 5.8 fore shock that hit five seconds before the main quake. The peak ground acceleration recorded near Darfield measured 1.26g (1.26 times the acceleration of gravity), which was considered by GNS scientists at the time to be an extremely rare seismic recording. The earthquake was felt widely across the South Island and as far north as New Plymouth.

The movement experienced by the earthquake has been described as a powerful rolling motion. Close to four metres of sideways movement has been recorded either side of the previously unknown Greendale Fault. The earthquake caused significant amounts of liquefaction, which was a major feature of the earthquake. It was the liquefaction and lateral spread that caused major damages to roads and underground infrastructure, and lead to the collapse of many buildings. Liquefaction was particularly problematic in developed areas close to rivers and the coast where soils were already wet. While the effects of the earthquake were strongly felt in Christchurch, it was the rural towns in the Waimakariri District that suffered significant destruction and lateral spread caused major land subsidence. Even though the earthquake caused major damages to infrastructure, miraculously only two people were seriously injured, and one fatality occurred that was indirectly linked to the quake. It is thought that due to the location of the epicentre, the time of the earthquake, and the relatively strict building regulations in New Zealand, people were able to avoid falling victim to the earthquake.

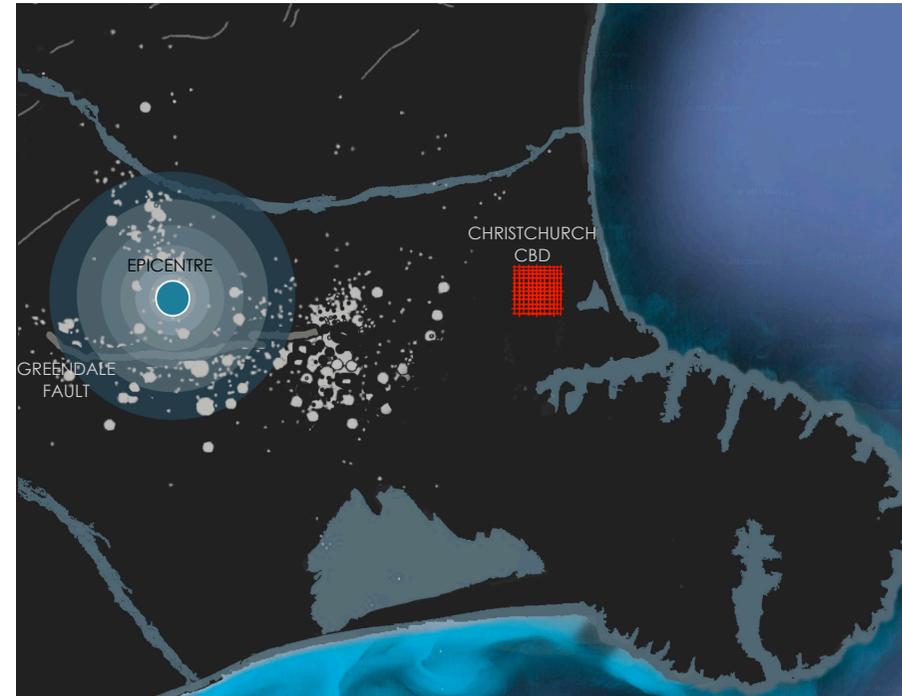


FIGURE 2-7: THE CANTERBURY (DARFIELD) EARTHQUAKE | 7.1 | 4TH SEPTEMBER, 2010

## FEBRUARY 22ND, 2011 | THE CHRISTCHURCH EARTHQUAKE | 6.3ML

It was the fatal February 22nd aftershock that had the most significant impact on Christchurch's community and infrastructure. The magnitude 6.3 earthquake that erupted beneath Christchurch at 12.51pm on Tuesday the 22nd of February became New Zealand's second deadliest natural disaster recorded since the magnitude 7.8 Hawkes Bay earthquake in 1931 which killed 256 people. Prime Minister John Key named it "New Zealand's darkest day". While located on a different fault line, the earthquake was considered as aftershock triggered by the September event. With a shallow depth of only 5km below the Heathcote valley, 2km west of Lyttelton and 10km southeast of Christchurch, the earthquake was incredibly violent. Described as a 'strike-slip event with oblique motion', the land movement varied both horizontally and vertically, the subsurface rupture displaced the land south of the Port Hills Fault by 50cm westwards and upwards and raised the Port Hills by 40cm.

The intensity of vertical and horizontal movement during the quake has been recorded as one of the greatest in the world, with peak ground acceleration (PGA) reaching up to 2.2g, far exceeding that of the September quake. As a comparison, the Haiti earthquake in 2010 had a PGA of 0.5g. Lives were lost, injuries and damages were devastating, and Cantabrians once again found themselves in a terrifying state of emergency while search and rescue teams from all over the world searched the rubble for survivors, and teams worked night and day to restore critical infrastructure. Such severe shaking caused parts of the hills to subside and deadly rock falls around the hill and coastal suburbs. Buildings within the central city, including the Christchurch Cathedral simply crumbled, many of which had been constructed or reinforced to meet existing earthquake standards. Perhaps most damagingly though was the sudden quicksand effect of the liquefaction which caused buildings (and cars) to subside into the ground, underground pipes to explode, and whole suburbs flood with liquid silt.

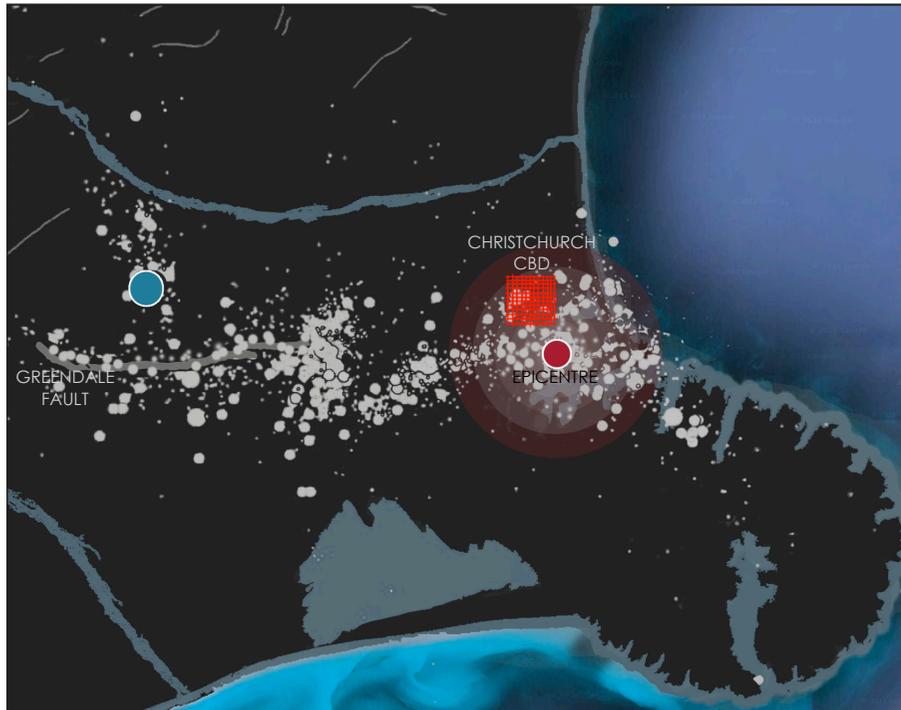


FIGURE 2-8: THE CHRISTCHURCH EARTHQUAKE | 6.3 | 22ND FEBRUARY 2011

## JUNE 13TH, 2011 | THE JUNE 2010 CHRISTCHURCH EARTHQUAKE | 6.3ML

The third major earthquake event occurred on Monday the 13th of June at 2.20pm. It was yet another 6.3 (mL) tremor that generated its own cluster of aftershocks and was centred only 6km deep and 13km south east of Christchurch central city on the eastern end of the Port Hills Fault. While less damaging than the February earthquake, the effects were of a similar nature, causing strong ground motions that brought up more liquefaction exacerbated the damage of already vulnerable buildings. Sand boils welled up beneath roads, and natural springs emerged in the Heathcote Valley as result of the sudden rise in water table. The shock caused widespread power outages and further damages to many structures, particularly in the central city where many buildings were already vulnerable. It is thought that due to tight restrictions in place on previously damaged buildings and well practised evacuation procedures, the quake caused no further fatalities and injured only 46 people. Additional damages were estimated to increase costs significantly but in many cases the quake helped to confirm decisions to demolish many already damaged buildings and abandon severely quake damaged land. While the effects of the aftershock were less severe than in February, it was a huge blow to the fragile community who were once again reminded of an uncertain future in Canterbury.

The geoscientists who have provided information on the earthquake effects are currently carrying out rigorous assessments to identify those areas that are most vulnerable to future earthquakes effects. Perhaps fortunately for us, as indicated by the third major earthquake event in June, it appears those areas already suffering from the earthquake effects are most prone to further damages, and decisions can be more easily made about their suitability for redevelopment.



FIGURE 2-9: THE JUNE CHRISTCHURCH EARTHQUAKE | 6.3 | 13TH JUNE 2011

## EARTHQUAKE IMPACTS AND IMPLICATIONS FOR LANDSCAPE



SOURCE: ADAM HUTCHINSON

FIGURE 2-9: PUBLIC MAKING DESPERATE RESCUE EFFORTS IMMEDIATELY FOLLOWING THE FEBRUARY EARTHQUAKE.

Canterbury's community, infrastructure, buildings and ecosystems have suffered extensive physical impacts in the earthquakes. The widespread impacts have led to a range of short term and long term consequences for almost every aspect of the human environment. This section describes the earthquake impacts and consequences that have come as a result of the many major and minor tremors experienced by Canterbury in the last 11 months. For each aspect of the social, built and natural environment, the physical impacts and implications for landscape are outlined.

### BUILT ENVIRONMENT

#### IMPACTS

- Intense vertical and horizontal movement and land subsidence resulted in collapse or irreparable damage to more than 1000 buildings in the central city and causing damage more than 100,000 homes in Greater Christchurch.
- More than 200,000 tonnes of liquefaction silt bubbled out from the ground and smothered roads and properties while at the same time turning the ground to soup, causing buildings to sink into the ground (3NEWS, 2011).
- Un-reinforced masonry buildings were the most severely affected buildings in the earthquakes. Steel and timber frames were the most resilient although some still suffered damage and a few required demolitions (Akguzel et al., 2011).
- Schools: Following the February quake, all 163 primary and secondary schools all were closed for at least 2-4 weeks while inspections were carried out (Kam et al., 2011). 24 required repair work and 11 were seriously damaged (Gilbert, 2011).
- Tertiary Institutes: Canterbury University was damaged in the September earthquake, and sustained further damage in February (Stevenson et al., 2011). Lincoln University had some damage to older masonry buildings in the September earthquake and sustained only minor damages in February. CPIT buildings were not damaged in either earthquake; however Natcoll and a number of other central city tertiary providers had their premises destroyed.
- Christchurch Hospital suffered damage (although remained operational)

## IMPLICATIONS FOR LANDSCAPE

The extensive impacts to built form have major implications for landscape. The the large portion of urban landscape within the city that is now deemed unsuitable for redevelopment will cause a major shift in patterns of urban form and open space. Liquefaction has been the most significant problem especially in the eastern suburbs where a lot of the development was built on reclaimed wetlands adjacent to the Avon and Heathcote Rivers. It is in these areas that most of the land will be abandoned and require a change of land-use. This presents multiple issues of where the relocated people and businesses go, and what to do with the abandoned land. Previous urban development plans had not expected such rapid new development, particularly in the absence of the central city. Hence there is huge pressure to allow for greenfield development in undamaged outskirts of the city, and previously quiet suburban centres are booming with new unplanned development. There are major landscape implications that present themselves with a shifting population which are discussed further in chapter three.

Another major implication for landscape is the overwhelming amount of debris and waste created by the destroyed buildings. Waste has major implications for the environment which is increasingly polluted with non-biodegradable waste. Furthermore, the embodied energy within the building material is completely wasted as new materials are manufactured and used to construct new buildings. Waste management is a huge sustainability issue that therefore crosses over as an implication for landscape and the state of the environment. Furthermore, the waste created in constructing cheap, temporary or quickly constructed buildings is of major concern to long term sustainability objectives.

Perhaps most positive implication is the fact that rebuilding presents a huge opportunity to re-design major portions of the city and change pre-existing patterns of urban form that previously made it difficult to achieve goals of sustainable and character rich urban form. Within the CBD, approximately 1000 of the 4000 building are to be demolished as a result of earthquake damage. This presents a major opportunity to re-design the central city as a far more resilient, sustainable and vibrant residential, entertainment and business district than prior to the earthquakes. The same goes for many of Christchurch suburban centres such as Sydenham, Lyttelton and Sumner that suffered damage.

Sense of place and identity are important components of place richness and community well being, and are therefore an important aspect of landscape. Christchurch is a city that relies largely on its architectural style for its distinctive character and like many other cities worldwide, has fought to maintain its cultural identity as it grows and changes in an era of globalization. Unfortunately, as a result of the earthquakes, the battle for the city has just got even harder. Christchurch's heritage buildings were hard hit in the earthquakes, many of which were un-reinforced masonry buildings. So far CERA has approved demolition of 152 heritage buildings in Christchurch and the partial demolition of another 34. Unfortunately only 45 damaged heritage buildings have been approved for 'make safe' work (Heather, 2011). Christchurch is now presented with the tough challenge of reconstructing a totally new face in the absence of its place defining heritage

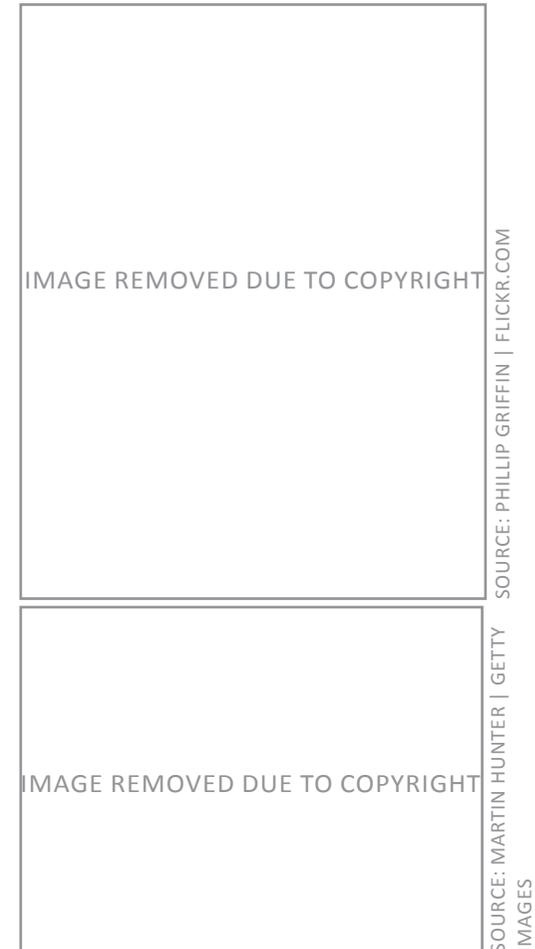


FIGURE 2-10: CHRIST CHURCH CATHEDRAL BEFORE AND AFTER THE FEBRUARY EARTHQUAKE

architecture. Regenerating sense of place in the absence of heritage buildings is a major concern for landscape architects.

Lastly, with so many buildings requiring demolition and rebuilding, the city is in for a long reconstruction period. Thousands of vacant sites around the city will remain abandoned wastelands until they are rebuilt, while thousands more are under construction. This presents another landscape issue that is concerned with the intermediate landscape, and how communities are expected to live in a city that is to be the country's largest construction site for many years to come.

SOURCE: MARK MITCHELL | NZ  
HERALD

IMAGE REMOVED DUE TO COPYRIGHT

FIGURE 2-11: HELICOPTER VIEW OVER THE SEVERELY DAMAGED NEIGHBOURHOOD OF WAINONI

## UNDERGROUND INFRASTRUCTURE

### IMPACTS

- 80% of the underground water services including drinking water, waste water and stormwater pipes have been damaged since September. Hundreds of kilometres of underground water services require replacement and repairs. . Approximately 50% of the city was without running water during the first few days following the February event. A month later over 95% of the city outside of the CBD cordon had running water, however citizens had to continue boiling their water due to potential contamination from the broken waste water system (Stevenson et al., 2011).
- Water reservoirs have also suffered damaged (Stronger Christchurch, 2011b)
- The entire sewer system was severely affected (see CCC diagram). The following parts of the system suffered significant damage: the treatment plant; 15km of the city's large sewer mains; ten of the city's 97 pumping stations; 300km of the city's 1858km of street sewer pipes; many kms of street lateral pipes (connecting houses to the mains system) – this assessment is ongoing (CCC, 2011c).
- Liquefaction silt clogged stormwater drains, uplifted river beds and waterways and cracked water pipes causing major surface flooding.
- There were 600+ faults in the electricity network, (each taking more than 12 hours to find and fix).
- All four 66,000 volt underground cables supplying north-east Christchurch with electricity (including the central city) were damaged beyond repair (ORION, 2011a). Most of the damage was to underground cables that had been broken by the forces of earth movement and liquefaction, some cables stretching cables up to one metre.

SOURCE: PHILNZ1965 | FLICKR.COM

IMAGE REMOVED DUE TO COPYRIGHT

FIGURE 2-12: BURST UNDERGROUND WATER PIPES CAUSED MAJOR SURFACE FLOODING ACROSS THE CITY

## IMPLICATIONS FOR LANDSCAPE

The implications for approaching repair work to the underground infrastructure network have implications for the physical landscape patterns and features above ground. One of the biggest issues is that future repairs to the underground system are at risk of becoming damaged in future earthquakes. To increase future resilience, there is argument for isolating networks and even encouraging households and individual buildings to become self sustaining, at least in back up emergency situations. It is a landscape concern because it refers to sustainability and the resulting above ground patterns of urban form. If more buildings collected their own rainwater, generated their own solar energy and dealt with their grey water and sewerage in localised systems, not only would they be more sustainable, they would be far more independent and therefore resilient in the event of future disasters. Reinforcing the reality of true resilience and sustainability of our communities is an issue frequently reinforced by landscape architects.

Secondly, had much of the storm water system been above ground in open air streams, many of the issues with flooding due to clogged storm water drains could have been avoided. This is an argument frequently reinforced by landscape architects (and more recently adopted by the Christchurch City Council) for a more sustainable and resilient approach to storm water management that does not involve underground pipes.

## ECONOMY

### IMPACTS

- Public and private assets suffered severe damage and a lot of land has become unsuitable to rebuild upon.
- So far the total rebuild cost of the earthquakes from September to date is estimated to be more than NZ\$20billion (One News, 2011), quadrupling the estimated \$5billion bill for the September quake, and making it New Zealand’s costliest natural disaster and the third-costliest earthquake (nominally) worldwide.

## IMPLICATIONS FOR LANDSCAPE

Economy is a landscape concern in the sense that future development has a lot to do with the costs involved, the value of land and the desires of the people who hold the cheque book. Furthermore, due to the fact that so much of our urban property is privately owned, the speed of recovery and the quality of redevelopment has a lot to do with the economic prosperity of private land owners. While on a positive note, the Canterbury earthquakes have been identified as the ‘most insured disaster in the world’ (Hughes, 2011), insurance experts are

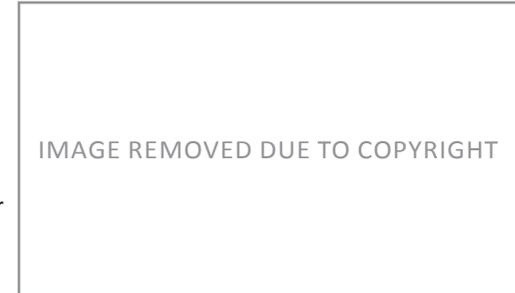


FIGURE 2-13: LINESMEN WORK TO FIX THE DAMAGED UNDERGROUND ELECTRICAL CABLES AFTER THEY WERE STRETCHED AND TORN IN THE FEBRUARY EARTHQUAKE

SOURCE: CARYS MONTEATH | STUFF.CO.NZ

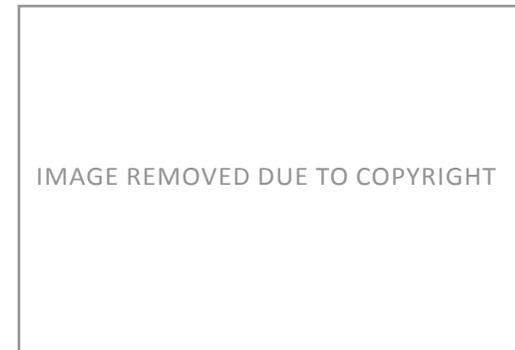


FIGURE 2-14: RED=PARTS OF THE CITY STILL WITHOUT POWER ON THE 23RD OF FEBRUARY

SOURCE: ORION.CO.NZ

warning that some parts of Christchurch will become uninsurable as a result of the earthquake risk and insurance premiums have already sky rocketed for those policy holders who have not even suffered earthquake damage (Booker, 2011). This will mean some land is going to be far more attractive to investors than others - most frequently in green field areas that had previously restriction on development. The landscape problem here is the fact that green field development contributes to urban sprawl and the reduction of otherwise productive landscapes. Decisions made to regenerate short term economic wellbeing often conflict with long term environmental, social and cultural wellbeing, which is why the economy has implications for landscape.

Furthermore, the budget for recovery is always much smaller than desired. Budget management decisions have implications for the short term and long term recovery of communities and their environments. Prioritising the budget to cope with a balance between environmental, social and cultural wellbeing is of major importance to a holistic recovery. Coping with the management of new development is discussed throughout the following chapters.

## TRANSPORT

### IMPACTS

- Approximately half of all of Christchurch's streets and roads suffered some level of damage in the Feb earthquake amounting to hundreds of kilometres of repair work. More than 50,000 individual road surface defects have been recorded across the city – which includes anything from a hump in the road to more major damage (CCC, 2011b).
- More than 40 road and bridge closures across the city caused major disruptions to traffic flows and damaged or flooded road surfaces made getting around the city very difficult for Cantabrians who rely heavily on their personal cars for transport.
- The central bus depot is unable to be accessed in the central city, resulting in a makeshift central bus station on the edge of South Hagley Park (Stevenson et al., 2011).

### IMPLICATIONS FOR LANDSCAPE

The widespread road damage is expected to be one of the most costly and long term parts of the city to recover. It is necessary to first address the underground infrastructure beneath the roads before any permanent repair work can be made to the roads. This has major implications for the transport circulation patterns around greater Christchurch - a city that has typically been dominated by cars. The impacts on transport have had implications for landscape in the sense that the transport network has a lot to do with spatial circulation and connec-

SOURCE: WASHINGTONPOST.COM

IMAGE REMOVED DUE TO COPYRIGHT

**FIGURE 2-15:** LATERAL SPREAD CAUSED MAJOR DAMAGES TO ROADS ACROSS THE CITY, PARTICULARLY THOSE NEAR THE AVON RIVER

SOURCE: ADAM HUTCHINSON



**FIGURE 2-16:** LIQUEFACTION SILT FLOODED ROADS IN THE SUBURBS OF CHRISTCHURCH

tivity. Being involved in the big picture decisions about prioritising repair work to the transport network and planning new public transport modes (such as light rail) and circulation patterns are all aspects of transport that landscape architects should be involved in. The location and characteristics of transport nodes where multiple transport types intersect are particularly important when thinking about the structure and function of the city. Road hierarchies and transport types to suit different parts of the city are also landscape issues.

In many ways the impacts on transport have come with a silver lining from a landscape perspective. At a time when driving a car in the city is less desirable than riding a bike due to traffic congestion, now is a perfect time to make Christchurch citizens aware of how much they rely on their cars for everyday transport. This emphasises the need for better cycle networks, public transport and walk-able communities and changes in lifestyle that are all critical to more sustainable lifestyles.

## NATURAL ENVIRONMENT

### IMPACTS

- The breakages in what would otherwise be tightly sealed systems have allowed raw sewage and other substances to discharge into Canterbury's river, estuarine and ocean environments.
- As the liquefaction silt gets washed down the rivers, many of Canterbury's natural ecosystems are covered with a layer of thick silt.
- Land subsidence as well as the mass amounts of liquefaction that has clogged drains, waterways and rivers, has made some land more vulnerable to flooding and high tides.

### IMPLICATIONS FOR LANDSCAPE

Impacts on the natural environment have obvious implications for landscape as the natural environment refers to the wellbeing of local ecology and biodiversity. For those ecosystems that have become polluted or damaged, it is a landscape concern to regenerate their health, not only to sustain biodiversity, but to create natural buffers that can aid in future hazard mitigation. Regenerating the city wide open space, and green and blue network is a task for landscape architects who are frequently involved in ecological restoration projects.

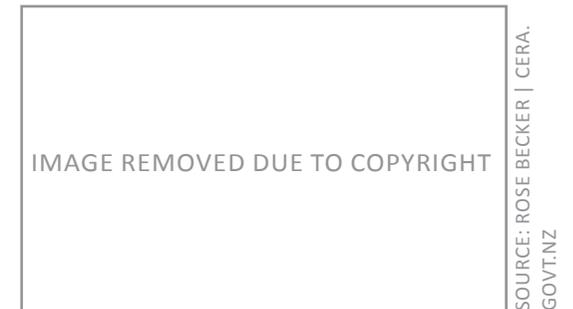


FIGURE 2-17: SAND VOLCANOES COVER THE ESTUARY BED IN THE HEATHCOTE ESTUARY

## MANAGING THE EARTHQUAKE RECOVERY PERIOD

### GOVERNANCE IN CANTERBURY

The politics of disaster have not been well developed in New Zealand as yet (Glavovic et al., 2010). This is perhaps one of the key reasons the current state of governance in Canterbury is difficult to understand and difficult to work with for the people who are trying to help the city recover. Thirty percent of landscape architects who responded to the online survey mentioned bureaucracy, governance structure or politics as a key factor in limiting their involvement in post disaster recovery. It is a common perception not only in post-disaster recovery but in general practice that the innovative ideas for sustainable development, sense of place and resilient 'landscapes' (in every sense of the word) are frequently bogged down in red tape and bureaucracy. In this way, governance is a particularly important issue for landscape architects when it comes to post disaster recovery, when innovation and a thorough understanding of the landscape and holistic perspectives of landscape architects are critical. This section briefly outlines Canterbury's current governance structure and indicates how and why this has implications for landscape architects in the long term recovery of Christchurch.

### RECOVERY GOVERNANCE STRUCTURE

The extended earthquake sequence that has occurred in Canterbury has caused the governance structure to shift as earthquake damages increased. It wasn't until the catastrophic February aftershock that the recovery management task was judged as overwhelming the capacity of local governments and the national government stepped in to manage the whole recovery. As indicated in the first chapter, in the recovery period after the response, it is necessary to shift the governance structure from sole government responsibility to a far more collaborative approach, in order to ensure a successful recovery (IRP. & UNDP, 2010). This is a move that New Zealand Government has only partially embraced as Canterbury has shifted from the response and relief period and into recovery mode.

On the 29th of March 2011, Prime Minister John Key announced the creation of Canterbury Earthquake Recovery Authority (CERA), the new, single government authority which would lead the earthquake recovery for an anticipated 5 years. On Saturday the 23rd of April, the national state of emergency was lifted and Civil defence Emergency Management (CDEM) was deactivated. It was on this day that the responsibility for the February and September earthquake aftermath was handed over to CERA. CERA reports to Canterbury Earthquake Recovery Minister, Gerry Brownlee, who is responsible for coordinating the planning, spending and actual rebuilding work needed for the recovery. Minister Brownlee has the final word on all decisions made to do with the recovery, including those made under the Canterbury

Earthquake Recovery Act 2011 (CERA, 2011). While the Minister has the ability to enforce the Act where he sees necessary, under section 72 of the CER Act, a Canterbury Earthquake Recovery Review Panel (CERRP) has been established as an independent body to oversee the use of his powers. So far the Minister has not enforced his powers and the CERRP has not been required. Even still, CERA has become a powerful body that has major control over management and decisions made in the recovery process.

The Canterbury Earthquake Recovery (CER) Act 2011 came into force on the 19th of April 2011, to override any current legislation that may restrict the earthquake recovery. While the intentions of central government are outlined as being 'to collaborate with local authorities', the new Canterbury Earthquake Recovery Act enforces under the Canterbury Earthquake (Local Government Act 2002) Order 2011, its ability to "relax or suspend specific Local Government Act provisions for Christchurch City Council that may divert resources away from recovery, or may not be reasonably capable of being complied with due to the circumstances resulting from the earthquakes." (CERA, 2011). In less convoluted terms, the Act effectively strips any specific provisions allowed by the Local Government Act from the Christchurch City Council that were previously enabling them to make final decisions about the recovery.

The IRP report (2010) outlines a set of well articulated reasons why local governments need to remain fully effective as contributors to long term sustainable recovery and increased disaster resilience:

- Local governments are more familiar with local social, economic, environmental and political systems. This means that they are frequently better placed to assess the needs of the affected communities and devise more relevant recovery programs and risk reduction measures.
- Local government leaders (particularly when elected) are often more accountable to their constituencies than central governments. This provides them with an incentive to ensure greater quality of recovery services.
- Local governments are typically responsible for development planning of their respective constituencies. Their leadership is critical if 1) recovery efforts are to be effectively aligned with long term development goals, and 2) risk reduction measures are to be mainstreamed in both recovery and development plans.
- Local governments are on-site. Their established presence makes them ideal candidates to coordinate recovery efforts.

(IRP. & UNDP, 2010, pp. 10-11)

The CER Act 2011 was a necessary step for enabling the process of recovery. Nevertheless the Act should not imply that central government 'knows better' than local government about how to recover the region and should not restrict the effectiveness of local government decision making in the recovery phase.

According to the information provided on the CERA website, CERA's key role is in leading and coordinating the recovery efforts in a timely and integrated manner. It has a focus on business recovery and restoring local communities, whilst working collaboratively with the Christchurch City Council; Waimakariri District Council; Selwyn District Council and Environment Canterbury and engaging with Canterbury's communities, Ngai Tahu, and the private and business sectors. Although CERA is assigned the responsibility of leading the recovery, many of the recovery roles and responsibilities so far have been delegated to other government departments, local authorities and agencies, including the local councils (as shown in Table 2-1):

**TABLE 2-1: ORGANISATIONS RESPONSIBLE FOR ASPECTS OF THE EARTHQUAKE RECOVERY, AS DELEGATED BY CERA**

<b>Decision making</b>	<b>Organisation responsible</b>
<i>Governance</i>	<i>CERA / Christchurch City Council</i>
<i>Council decision making</i>	<i>Christchurch City Council (CERA)</i>
<i>Recovery strategy, policy, planning</i>	<i>CERA</i>
<i>Mayoral fund</i>	<i>Christchurch City Council</i>
<b>Communicating with elected representatives</b>	<b>Organisation responsible</b>
<i>MP Liaison</i>	<i>Minister Gerry Brownlee / CERA</i>
<i>Council elected members</i>	<i>Christchurch City Council / Waimakariri District Council / Selwyn District Council</i>
<b>Infrastructure</b>	<b>Organisation responsible</b>
<i>Coordination and planning</i>	<i>CERA</i>
<i>Water and waste issues</i>	<i>Christchurch City Council</i>
<i>Portaloos and chemical toilets</i>	<i>Christchurch City Council</i>
<i>Road and traffic management</i>	<i>Christchurch City Council</i>
<i>State of waterways</i>	<i>Christchurch City Council / Environment Canterbury</i>
<i>Kerb side collections</i>	<i>Christchurch City Council</i>
<i>Water conservation / restrictions</i>	<i>Christchurch City Council</i>
<i>Rodent management plan</i>	<i>Christchurch City Council</i>
<i>Laterals (drain layers)</i>	<i>Christchurch City Council</i>
<i>Power</i>	<i>Orion</i>
<i>Telecommunications</i>	<i>Telcos</i>
<b>Planning / Deconstruction</b>	<b>Organisation responsible</b>

<i>Individual commercial building inquiries</i>	<i>CERA / Christchurch City Council</i>
<i>Individual residential building inquiries</i>	<i>Christchurch City Council / CERA</i>
<i>Cordons (within four avenues)</i>	<i>CERA</i>
<i>Business communications</i>	<i>CERA / Councils</i>
<i>Access schemes (business, temporary and residents)</i>	<i>CERA – still issued at same site (portacoms at the Christchurch Art Gallery)</i>
<i>Earthquake prone building policy</i>	<i>Christchurch City Council</i>
<i>Demolitions</i>	<i>CERA</i>
<i>Heritage</i>	<i>Christchurch City Council</i>
<i>Debris management - demolition</i>	<i>CERA</i>
<i>CBD Business cleaning</i>	<i>Christchurch City Council</i>
<i>Cashel Mall Restart</i>	<i>CERA</i>
<i>LIMs and PIMs</i>	<i>Christchurch City Council</i>
<i>Resource consents</i>	<i>Christchurch City Council / Councils</i>
<i>Variation 48 / Section 172</i>	<i>Christchurch City Council</i>
<b>Economic Recovery</b>	<b>Organisation responsible</b>
<i>Economic recovery coordination</i>	<i>CERA</i>
<i>Skills/workforce planning</i>	<i>CERA</i>
<i>Labour market</i>	<i>Department of Labour</i>
<b>Welfare</b>	<b>Organisation responsible</b>
<i>Welfare rebuild coordination</i>	<i>CERA</i>
<i>Welfare / employment assistance</i>	<i>Ministry of Social Development</i>
<i>Temporary housing</i>	<i>Department of Building and Housing</i>
<i>Health messaging co-ordination</i>	<i>Canterbury District Health Board</i>
<i>Education</i>	<i>Ministry of Education</i>
<i>Emergency repairs</i>	<i>Earthquake Commission (EQC)</i>
<i>Heating installation</i>	<i>EQC</i>
<b>Insurance</b>	<b>Organisation responsible</b>
<i>Insurance claims</i>	<i>EQC / Insurance Companies</i>

<i>Insurance issues</i>	<i>EQC / Insurance Council / Companies</i>
<b>Individual projects</b>	<b>Organisation responsible</b>
<i>Land remediation</i>	<i>CERA</i>
<i>Hillside suburbs</i>	<i>CERA / Christchurch City Council</i>
<i>Central City Plan</i>	<i>Christchurch City Council</i>
<i>Kaiapoi, Pines Beach and Kairaki Streetscape Plans</i>	<i>Waimakariri District Council</i>

It is interesting to note that in this table there is very little reference to any activity that is directly related to environmental, cultural and design fields, suggesting that this is purely not a priority for CERA. While the City Councils each have their own landscape architects, urban designers and landscape planners that will no doubt be involved in Council related projects, top down decision making is heavily dominated by CERA who has employed no designers or planners at all to contribute to decision making.

#### IMPLICATIONS OF GOVERNANCE FOR LANDSCAPE ARCHITECTS

If we were to think again about the patchwork quilt, the governance structure would effect the decisions made about the management of the quilt repair project. This includes decisions made about the budget for repair work, who is involved in repairing projects, where and when repairs take place and in what order, the quality of fabric and stitching selected for the repairs, the new patterns formed in the quilt - all aspects of the major repair job. While some people might be experienced with coordinating the large numbers people involved in such extensive projects, it is critical that major decisions about the repair work are made collaboratively with *master quilters* to ensure repairs contribute to character and quality of the envisioned quilt. Even decisions about where to start repair work and which patches to invest in higher quality fabrics are critical decisions that affect the long term outcomes for the precious quilt.

Without basic principles of cultural identity and sustainability at the decision making table, it is unlikely they will be prioritised or implemented effectively throughout the recovery. Therefore, the exclusion of landscape architects and other spatial and strategic thinkers (who hold these principles) at the top level of decision making is likely to have major flow on effects at every scale of recovery. The CERA management team consists of managers who have had extensive experience in government departments or management roles. However, none of the managers have worked with a post disaster recovery situation before, and not all of them appear to understand or prioritise sustainability principles. There is an awful lot to learn and understand in a very short space of time about the region, the scale of the disaster and the ideal management of a holistic recovery, when decisions are critical and the implications of decisions made are long term. Instead of working as an assistant to the local governments in the recovery, CERA has stripped the local governments of their decision making powers. Now it is highly unlikely that council landscape architects and landscape planners will have a voice when it comes to making big picture decisions.

While it is critical that CERA seeks expert knowledge on sustainability, particularly with regard to making short term decisions that affect long term outcomes, it appears they have not done so. Without strong principles for cultural and environmental well being among the leaders, it is unlikely landscape architects, their principles and their practices will be utilised to their full potential in the recovery. In other words, at a time when the patchwork quilt is undergoing a rapid period of change, CERA is prepared to make critical decisions independently without consulting the master quilters about the implications of their decisions on the quilts overall quality, characteristics and values.

Upon analysing the post-earthquake actions of local and central governments, as well as stakeholders, experts and the community after the recent earthquakes in Canterbury, it is alarmingly obvious that post disaster recovery is going to be a complex and demanding process. It is one that is going to require incredible courage, leadership, patience and expertise from all stakeholders. As New Zealand's second most fatal natural disaster and one of the world's most costly disasters to date, the Canterbury earthquakes will go down in history as one of the most devastating events in New Zealand history.

## CHAPTER SUMMARY

The response period to the earthquakes have proven that the effectiveness of well prepared civil defence emergency management procedures. The search and rescue operations carried out after the February 22nd event has been recognised as one of the most well organised responses in the world by the experienced British Urban Search and Rescue team leader, Peter Crook (Chang, 2011). Now eleven months on from the first earthquake event in September 2010, the recovery period is well underway – the period that requires the most collaboration. While civil defence emergency management personnel are considered experts of the response period, unfortunately there no real experts available to guide the long and complex recovery period. As a general overview it appears decision made in the recovery since the February event has been predominantly made by members of the inexperienced government with some collaboration among authorities and acknowledgement of community consultation as required by law. There are issues with the current governance structure that are likely to limit Canterbury from undertaking a holistic and collaborative recovery, and it is hoped that the government will do more to enable the local authorities to make decisions and actively engage the community and other stakeholders in their decision making.

Almost every category of the earthquake impacts have had implications for landscape. There is no doubting the Canterbury earthquakes have had major impacts on the city that will change it's character and identity. Whether it's a shift in urban spatial patterns or the approach to regenerating underground infrastructure or transport, landscape and it's form, function and character are also impacted, which calls for the need to consult with landscape architects throughout the recovery process at every scale. The following chapters investigate an overview of the recovery efforts in Canterbury to date and the ways in landscape architects have been a part of the process so far. By comparing current practice with international examples it is possible to suggest ways in which landscape architecture as a discipline can be better utilised in the recovery process to ensure Canterbury is *built back better*.



chapter  
three

THE ROLE OF LANDSCAPE ARCHITECTS IN EARTHQUAKE  
RECOVERY AT THE BIG PICTURE SCALE

# QUILT PLANNING

Quilt planning is the practice of overseeing the evolution, process, management and future design of the entire quilt. It involves coordination of the pattern, form, layout, and the colour and texture palette to form a unique and harmonious arrangement in the patchwork. Quilt planners hold strong principles in design and quality, and a clear vision of how those principles should affect future changes. They do this by ensuring any new colours, textures and patterns are strategically selected, implemented and managed in a way that contribute to the overall style, character and quality of the collectively envisioned quilt through time.

Quilt planning refers to the mentality of considering the big picture landscape and the practice of being strategic when planning development at a macro (regional) scale. While every landscape architect appreciates the importance of the big picture landscape and will thread this into the work they do at every scale, some will specialise in the practice of Landscape Planning. Landscape Planners, are those master quilters who specialise in landscape assessment and planning the land-use and development patterns at a regional/greater city scale. They focus on the spatial relationships, strategies, and policies that best support the 'want-to-be' of the landscape and those who occupy it. Due to the fact they are typically dealing with many stakeholders and different land-uses, Landscape Planners are well experienced with community and private sector interaction. Of the landscape architect specialisations, Landscape planners are best suited

to being involved in decisions about the disaster recovery big scale re-development, as they are well practised when it comes to thinking about the big picture, and have experience with understanding the process of developing and implementing strategic, long term objectives at a regional scale.

There is no doubt that the landscape planners can see the opportunity in repairing the patchwork quilt as a masterpiece that is even more superior to the quilt that existed only less than a year ago. The vast scale of the damages has meant the master quilters are having as much of hard time as anyone else figuring out where to begin. Many individual patches require complete replacement while other parts of the quilt will need whole sections of patchwork redone. What patches require complete replacement? What groups of patches need a complete redesign to avoid the same damages happening again? What damages have been made to the underside and the stitching of the quilt that are going to need to be replaced? What opportunities are there to redesign parts of the patchwork to make them even better than before? And how should all of this repair work be considered in the big picture? These are all issues that can be most effectively addressed by landscape planners, as demonstrated in this chapter.



SOURCE: STUART AYRES

FIGURE 3-1: QUILT PLANNING IS THE PRACTICE OF PLANNING THE QUILT IN THE BIG PICTURE (QUILT BY ROBIN CLARKE )



IMAGE REMOVED DUE TO COPYRIGHT  
GO TO LINK:  
[HTTP://WWW.LUCAS-ASSOCIATES.CO.NZ/CHRISTCHURCH-BANKS-PENINSULA/CHRISTCHURCH-ECOSYSTEMS/](http://www.lucas-associates.co.nz/christchurch-banks-peninsula/christchurch-ecosystems/)

SOURCE: LUCAS ASSOCIATES | LUCAS-ASSOCIATES.CO.NZ

**FIGURE 3-2: CHRISTCHURCH ECOSYSTEMS MAP.** THIS MAP, CREATED BY LOCAL LANDSCAPE ARCHITECT DI LUCAS, SHOWS THE HISTORICAL ECOSYSTEMS THAT ARE NOW MOSTLY HIDDEN BY THE URBAN DEVELOPMENT OF CHRISTCHURCH. IT SHOWS THAT THE CHRISTCHURCH CBD IS LOCATED ON TOP OF A WET OLDER PLAINS ECOSYSTEM.

## ADDRESSING THE BIG PICTURE ISSUES FOR LANDSCAPE: THE ISSUES OF GENERAL PRACTICE (PRE-EARTHQUAKE)

### **HISTORICAL URBAN DEVELOPMENT PLANNING AND HAZARD MITIGATION IN CANTERBURY AND NEW ZEALAND**

Before explaining how the big picture issues for landscape are currently being addressed in the Canterbury recovery, it is first useful to highlight the way New Zealand (and Canterbury in particular), has managed big picture issues prior to the earthquakes. This background information is important for demonstrating current practice in urban development planning and why business as usual will not suffice in Canterbury's recovery.

Historical land-use decisions that were ignorant of the 'want-to-be' of the landscape, have had detrimental consequences for Canterbury, and for Christchurch in particular. Christchurch is located upon a historic swampland. Like many cities around the world, the pioneering settlers saw the fertile land and access to water as an attractive place to build their city. But back in the 1800s when Christchurch was first settled, pioneers were naive about the consequences for not cooperating with nature. Instead of responding to the natural landscape, they drained and compacted the land to stabilise it for development and continued to 'mitigate' the effects of natural hazards by further intervention. Now most of Christchurch is constructed on buried wetland systems that continue to naturally fluctuate below the surface. It is was the high water table and natural soil types combined with intense shaking that caused so much of the damage to Christchurch in the earthquakes. It is a bitter sweet lesson to learn, that land-use planning is critical to hazard mitigation.

As a country prone to tectonic movement, since 1978 New Zealand government has enforced a strict building code that requires buildings to be built or reinforced to withstand earthquakes. Without these regulations, the death toll from the earthquakes is thought to have been a lot more significant. Even still, 182 were killed in buildings that collapsed, more than half of the buildings in the CDB were damaged beyond repair, and thousands of people's home have been destroyed. Many of these had been constructed prior to 1978 but most had been reinforced and some were even built since. The most significant problem however was not the strength of the building, but the land beneath it, which had given way in many cases causing major structural failure. This goes to show that even modern engineering practices are not always enough to protect us from the most powerful acts of Mother Nature, suggesting that current practice needs to prioritise land-use planning as a more effective tool for hazard mitigation.

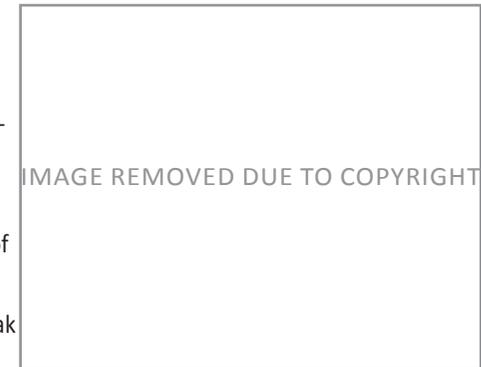
In more recent decades there has been an increasing awareness of natural hazards and the importance of land-use and urban development planning, particularly recognised in New Zealand's institutional and legal setting (Glavovic et al., 2010). As part of this inclination, local governments of the Canterbury Region have recently collaborated on developing the Greater Christchurch Urban Development Strategy

(GCUDS). The GCUDS was released in 2007, and set out a “bold and ambitious plan for managing urban development that protects water, enhances open spaces, improves transport links, creates more liveable centres and manages population growth in a sustainable way.” (CCC., et al., 2007). While the intentions of the strategy are very positive and the document indicated a huge step in the right direction for the local governments of Canterbury, there has still been critique by various experts that the strategy still lacks effectiveness when addressing bold landscape oriented issues, particularly to do with sustainable development and land-use decisions that attend to natural hazards such as sea level rise and river flooding (Swaffield, 2011). This is still a prevailing issue across New Zealand, as (up until the recent earthquakes) there is still a general trend towards relying heavily on expensive infrastructure strengthening and government insurance for hazard preparedness, in place of major land-use decisions (Glavovic et al., 2010). While earthquake mitigation was not a top priority pre-September, the concept of ‘resilience’ was highlighted. Even still, the GCUDS lacked strength in defining specific strategies towards increasing local resilience to hazards as well as peak oil and sea level rise.

Natural hazard risk reduction (or mitigation) is an aspect of emergency management that is frequently critiqued and discussed by the planning field, who argue that land-use planning deserves a more critical role in hazard reduction and disaster resilience (Glavovic et al., 2010; Smith, 2010). In their paper ‘Land-use planning for natural hazards in New Zealand: the setting, barriers, ‘burning issues’ and priority actions’, (Glavovic et al., 2010) the authors reflect on New Zealand’s current planning and risk management choices as being strongly influenced by the legacy of historic land-use decisions. They note that New Zealand’s current legislation in the form of the Resource Management Act 1991; the Local Government Act 2002; and the Civil Defence Emergency Management Act 2002 together provide a solid foundation for guiding disaster resilience and sustainable development. However, they also believe that the Acts are not prescriptive enough about how to effectively implement hazard mitigation in practice. Consequently, building sustainable, resilient communities in New Zealand is an elusive pursuit. In previous work, Glavovic has identified four key barriers that currently stand in the way of planning sustainable, hazard-resilient communities:

- Public tend to prioritise issues of direct impact rather than taking steps to reduce hazard risks.
- Poor alignment of policies and laws at local level and higher levels of planning has tended to discourage as opposed to promote more effective and integrated natural hazards planning.
- It is difficult to develop coordination and collaboration across different spheres of government and between many role players involved in natural hazards planning.
- Prevailing societal values, political imperatives and regulatory provisions promote economic growth over community safety and sustainability. Consequently, local authorities tend to facilitate rather than restrict property development in high-risk locations.

Each of these barriers needs to be taken into consideration for the recovery of Christchurch if the city is to fully embrace the opportunity to mitigate future hazards.



**FIGURE 3-3: OPTION C FOR URBAN DEVELOPMENT PATTERNS.** THE GCUDS EXPLORES A NUMBER OF POTENTIAL DEVELOPMENT SCENARIOS FOR THE FUTURE DEVELOPMENT OF CHRISTCHURCH AND OUTLINES AN URBAN GROWTH LIMIT FOR THE NEXT 50 YEARS.

SOURCE: GCUDS | CCC.GOV.T.NZ

In fact, proof of ineffective land-use decisions has been demonstrated very well in Canterbury. Liquefaction has been the most widespread feature of the earthquake, affecting built form and infrastructure in Christchurch city as well as the Waimakariri towns of Kaiapoi and the Pines Beach. While liquefaction of this scale has never really been a problem for Christchurch before, the likelihood of an earthquake and the potential risks of liquefaction were well known by local governments. A scientific assessment based on soil types and water tables was carried out by Environment Canterbury (the regional council) and published in 2008, one year after the release of the GCUDS. (see Figure 3-4 overleaf). These predictions proved to be incredibly accurate after the February earthquake, proving that predictions based on natural soil typology and water tables should be well respected by decision makers. It is interesting to note that even in places where the land had been remediated using stone columns and compaction in an attempt to avoid the effects of liquefaction, subsidence was still a major problem. For example, the ground beneath AMI Stadium was reinforced with stone columns, but suffered the effects of liquefaction regardless, and is now undergoing major structural repairs. This goes to show that hazard mitigation goes beyond engineering solutions and must consider land-use more seriously.

So what does current practice mean post-earthquake? The earthquakes have presented a real opportunity to change current practice. Now is the time to take the earthquake impacts as proof that current practice is not sufficient for dealing with hazard mitigation, and that land-use planning deserves a far more critical role in emergency management mitigation practice. Now that New Zealand appears to have the emergency period fairly well refined, it's time to focus on getting to the root of the problem and avoiding the risks in the first place. This is a job for landscape planners who have for a long time emphasised the need to respond to natural processes in order to avoid the negative effects of our more angry mother nature. Furthermore, the earthquakes have presented the city with an opportunity to revise strategies for coping with all of the pre-existing big picture issues, such as urban sprawl, poor city circulation and lack of an integrated open space network. So the next question is has current practice changed?...

***“By planning for and managing land use to enhance sustainability, we can reduce our vulnerability to disasters, if not eliminate them.”***

**Raymond J Burby**

*(Burby, 1998: 1)*

## **THE REGIONAL SCALE ISSUES**

After a major disaster, populations tend to shift around as people are forced to retreat to safer areas. This rapid shift in population patterns is going to have a major effect on resources, infrastructure, circulation, communities and the local economy, which is why it is important to reconsider growth management and urban development plans. Successful international experience reported in disaster recovery literature indicates that broad scale urban development planning is critical in effective reconstruction planning following a disaster, and requires (among other things) sound land-use planning, future hazard mitigation, understanding of the relationships between land uses as well as active community engagement in developing goals and objectives (WorldBank, 2008).

SOURCE: ECAN.GOV.T.NZ/PUBLICATIONS/GENERAL/SOLID-FACTS-CHRISTCHURCH-LIQUEFACTION.PDF

IMAGE REMOVED DUE TO COPYRIGHT  
GO TO LINK:  
[HTTP://ECAN.GOV.T.NZ/PUBLICATIONS/GENERAL/SOLID-FACTS-CHRISTCHURCH-LIQUEFACTION.PDF](http://ecan.govt.nz/publications/general/solid-facts-christchurch-liquefaction.pdf)

**FIGURE 3-4: THE SOLID FACTS.** IN A DOCUMENT CALLED **THE SOLID FACTS** PRODUCED BY ENVIRONMENT CANTERBURY IN 2008, SCIENTISTS PREDICTED THE EFFECTS OF LIQUEFACTION IN THE EVENT OF AN EARTHQUAKE. THE MAP IN THE TOP RIGHT CORNER SHOWN PREDICTIONS FOR LIQUEFACTION IF AN EARTHQUAKE OCCURED WHEN THE BELOW SURFACE WATER TABLE WAS HIGH. THEIR PREDICTIONS WERE VERY ACCURATE WHEN ASSESSED NEXT TO THE TRUE LIQUEFACTION MAP AFTER THE FEBRUARY EARTHQUAKE.

## THE ROLE OF LANDSCAPE ARCHITECTS IN ADDRESSING THE BIG PICTURE ISSUES IN DISASTER RECOVERY

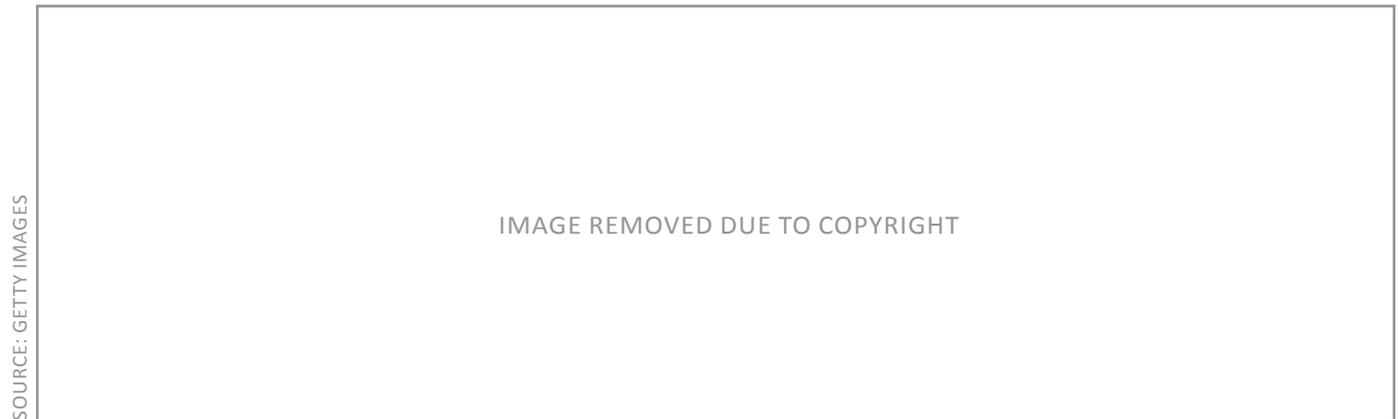


FIGURE 3-4: THE DUST CLOUD OVER CHRISTCHURCH CITY AS SEEN FROM THE PORT HILLS JUST MOMENTS AFTER THE FEBRUARY EARTHQUAKE

For Canterbury, reconsidering the current urban development plans is going to be a huge, but critical task. While a lot of the focus of earthquake damage has been on Christchurch City, there was widespread damage across the greater city and central plains region. The primary and secondary consequences of that damage will continue to affect Canterbury for a very long time yet. The issues present at the regional or greater city scale are issues that affect every subsequent scale below, which is why it is essential that they are planned carefully and strategically in a post-earthquake urban development plan. The issues for urban development at this greater city scale are to do with:

- residential development patterns density and function;
- the location, function and inter-connectedness of the suburban centres;
- transport systems, circulation and nodes;
- open (public) space frameworks;

- ecological (green and blue) networks and ecosystems;
- and the integration, form and function of the new central city within the greater city.

The issues listed above are aspects of the landscape that should be dealt with through a holistic understanding of appropriate land-use, interrelationships and connectedness, cultural and natural processes, mitigating the negative effects of natural hazards, and urban form that allows people to live sustainable urban lifestyles. (Note: issues to do with the underground horizontal infrastructure networks are also present at this scale and planning of this infrastructure should be integrated with landscape issues, however they are not issues that are typically dealt with by landscape architects in urban development planning).

It is important that planning the recovery for these broad scale issues is considered holistically. This is going to require a holistic assessment of the earthquake impacts and the development of a strategy for recovery for the region. Within the strategy should be a set of recovery principles and goals, visions, prioritised lists of recovery activities, timeframes, budgets and urban development spatial plans. In typical (non-disaster) practice, this is known as strategic (sustainable) urban development planning which takes into consideration future development plans for growth management in both time and space. In the post-disaster setting, the urban development plan should be contained within or referred to as a Recovery Strategy. The next section goes on to outline how these big picture issues for landscape are currently being addressed in the Canterbury recovery and uses international examples to demonstrate the potential role of landscape architects in dealing with these issues through their role in Urban Development Planning.

### **OVERVIEW OF CURRENT PRACTICE FOR ADDRESSING THE BIG PICTURE ISSUES**

Overall, survey results support the suggestion by much of the literature that post disaster urban development planning is an area that most landscape architects currently have limited involvement. Every respondent believed landscape architects should be contributing more to every aspect of post-disaster urban development planning. The reasons for their exclusion could be due to current emergency management practice, issues of governance, public awareness, or the pro-activeness of the discipline itself. It is beyond the scope of this research to suggest why landscape architects are excluded; instead I will focus on the reasons why they *should* be included.

Landscape architects/planners should have a critical role in addressing the big picture issues in post-disaster recovery planning. It is therefore a major concern that CERA has not included landscape architects in their Recovery Strategy development team. At the moment, it is very difficult to know who is dealing with the big picture issues and how they are going about it. CERA has taken responsibility for preparing The Recovery Strategy, which is intended to provide the road map for recovery of the Greater Christchurch area and affected Canterbury

Region. It is assumed that CERA is dealing with the big picture issues for landscape through the Recovery Strategy. However, CERA has no landscape planners, designers on their team, and recent decisions made by CERA have made it clear that the recovery is not being well thought about in the picture. Decisions to begin recovery planning at the community scale before city wide spatial and circulation plans have been released suggests they are not taking the opportunity to address pre-existing macro scale issues. For this reason it is justified to assume that it is very unlikely they intend to change current practice.

While intentions of CERA are for a timely, integrated, collaborative recovery, as in the case of many centralised authorities set up to manage a disaster recovery, their ability to succeed with such an onerous planning task in a holistic, integrated manner on their own is highly doubtful. There is great concern, particularly from members of the planning world, about their ability to change current practice for Urban Development Planning. It is worth noting that CERA's process for developing the Recovery Strategy has so far lacked transparency, so it has been difficult to understand or critique how they have gone about developing the Strategy. It is anticipated that CERA will use this opportunity to build on existing goals previously developed by local government, while engaging with landscape architects and other land-use specialists in a way that allows them to more efficiently influence the land-use, growth management and priority decisions set out in the Strategy. Without their contribution, it is unlikely the Strategy will be effective in achieving maximum potential for hazard mitigation, sustainable urban regeneration and resilience in the future.

## **THE ROLE OF LANDSCAPE ARCHITECTS IN ADDRESSING THE BIG PICTURE**

As indicated in the previous section, developing a Recovery Strategy involves dealing with multiple interconnected landscape issues in the big picture. Landscape architect/planners are trained not only to identify the issues but to think laterally and in four dimensions (the fourth dimension being temporal as well as spatial) to address the issues. This big picture mentality is critical to disaster recovery when trying to comprehend the scale and consequences of a disaster's impacts on environmental, economic, social and cultural wellbeing.

In addition to addressing the issues that are identified as critical concerns to the discipline of landscape architecture, landscape architects/planners can also help address the issues confronted by other disciplines. Disaster recovery literature has revealed a number of important trends, obstacles and enablers to achieving holistic disaster recovery, as indicated in Table 1-1 in the first chapter. The findings are remarkably similar to the trends, obstacles and enablers that landscape architects are familiar within general practice. They are therefore in an excellent position to help deal with these issues in disaster recovery, or at least join the fight to overcome them. The following table outlines the role of landscape architects in influencing the obstacles, enablers and trends affecting holistic disaster recovery.

TABLE 3-1: POTENTIAL ROLE OF LANDSCAPE ARCHITECTS IN ADDRESSING OBSTACLES AND ENABLERS TO HOLISTIC DISASTER RECOVERY

<b>Obstacles (Philipsborn, 2001)</b>	<b>Potential role of landscape architects</b>
<i>A lack of awareness of what the true redevelopment possibilities are</i>	LAs have the knowledge and creative vision to raise awareness and produce visual examples of what the redevelopment possibilities are for a community
<i>The degree of damage inflicted on the community</i>	While LAs can't influence the extent of physical damage, they are well suited to holistically analysing the full extent of the damage as it exists in context, in order to cope with degree of damage strategically.
<i>Searching for the extraordinary solution to what appears to be an extraordinary problem</i>	Creative visioning and the ability to think holistically about multiple aspects and processes at once mean that LAs have the ability to think of innovative solutions to what appear to be overwhelming problems.
<i>The lack of political will to "do the right thing"</i>	If given the opportunity, LAs can encourage authorities to "do the right thing" by educating them about best practice in sustainable development, ecological infrastructure, and urban regeneration by helping them to envision what a sustainable recovery and redevelopment looks like in reality.
<b>Enablers</b>	<b>Potential role of landscape architects</b>
<i>Vision of where the community wants to "be" in the future</i>	LAs can educate community about innovative solutions and best practice. They also have the design skills to translate the thoughts and visions of a community into diagrammatic and interpretive sketches. In this way, LAs help enable communities to establish a vision of where they want to "be" in the future.
<i>Stakeholder perception about the decisions made in the recovery, generally enhanced by including all stakeholders in decision making</i>	LAs are experienced in understanding different perspectives and realise the importance of a collaborative, multidisciplinary approach to any development. Therefore they make excellent facilitators in workshop discussions and enable active participation in decision making.
<i>Establishing priorities that allows community to order it's actions to maximise their outcomes and "double up" on achieving goals</i>	LAs are accustomed to thinking about the interdependencies of systems and processes throughout time and space. Therefore they can suggest innovative strategies for community actions that meet achieve multiple goals with a single, strategic action.
<i>Political will to analyse the issues, evaluate the alternatives and protect the long term public interest over short term goals</i>	LAs can advise and encourage authorities about the concept of sustainable regeneration (as it occurs through time and space) and to think about the big picture when making decisions for the short term.

TABLE 3-2: POTENTIAL ROLE OF LANDSCAPE ARCHITECT INFLUENCE IN ADDRESSING TRENDS OF DISASTER RECOVERY

<b>Trend - from (Haas et al., 1977)</b>	<b>Potential role of landscape architects</b>
<i>Cities will typically rebuild in the same location in a character that remains familiar to its residents, and is usually built back safer but not as improved as it could have been</i>	LAs could help overcome this trend by having the ability and expertise to innovatively yet realistically visualise the city in its optimum state. LA's are one of the few disciplines that understand what needs to change in order to improve the city far beyond its previous condition.
<i>Those with wealth will recover faster than those who were not financially stable before the disaster</i>	While wealthy communities are likely to be able to invest their own resources into recovery, poorer communities are likely to be left behind. Creative LAs would be able to help the poorer communities find innovative ways to recover without a big budget.
<i>There is a wide range of factors that influence the speed of recovery including availability of resources, leadership, community consensus and the existence of prior plans</i>	Getting LAs involved in pre disaster preparedness activities is one way to ensure community betterment happens quickly post disaster. LAs are also suitable in roles of facilitation, providing unbiased leadership to help communities make decisions.
<i>Ongoing urban trends such as decentralisation (sprawl) tend to accelerate after disaster</i>	LAs are forever fighting negative urban trends in their everyday practice. They are therefore well accustomed to finding effective solutions to these trends and arguing against decisions that allow them to accelerate.
<i>The opportunity to comprehensively re-plan the city is not often fulfilled due to the costs involved in a time of uncertainty.</i>	LAs advocate the importance of comprehensive development (re)planning and are therefore another stakeholder that would argue for budget allocation to comprehensive re-planning

Ideally, to be most effectively engaged, landscape architects should be brought in soon after the emergency response to begin assessing the implications for people, their places and prosperity in order to help with planning the recovery process and future mitigation strategy for the whole region or greater city. Unfortunately, the skills and expertise of landscape architects in this early stage of recovery have been mostly excluded in Canterbury. In fact, it appears that in many international disaster recoveries, landscape architects are rarely engaged in roles of big picture thinking and overseeing development of the big picture recovery strategy.

## **THE PROCESS OF DEVELOPING AN URBAN DEVELOPMENT PLAN (RECOVERY STRATEGY)**

Ideally, planning a strategy for dealing with a recovery process as a means of disaster preparedness ahead of time, is the most effective way of ensuring deliberated decisions are made quickly and effectively in the recovery period (Olshansky et al., 2005; Schwab, 1998). However in most cases, recovery and mitigation plans are completed in the high pressure post-disaster setting as is currently being experienced by Canterbury. Either way, the recovery process should be seen as a catalyst for long-term goals and priorities for community betterment. If well executed, a holistic recovery strategy has the potential to enable a disaster stricken place to regenerate far beyond its pre-disaster condition.

A big picture recovery strategy involves development of:

- **an assessment of the (big picture) problem situation and identifying the opportunities**
- **a collaborative vision and set of objectives and goals**
- **a big picture (urban development) plan/strategy**
- **a prioritised action plan for implementing the strategy**
- **an ongoing evaluation (indicator) programme**

The following sections demonstrate that landscape architects have a critical role to play in the Recovery Strategy development at each of these stages.

## PROBLEM ASSESSMENT AND IDENTIFYING OPPORTUNITIES

### CURRENT PRACTICE IN CANTERBURY

So far in developing the Recovery Strategy, CERA and the CCC along with their associated authorities and organisations have taken on the role of assessing the impacts of the earthquake. A holistic problem assessment that takes into account all of the disaster impacts, consequences and opportunities has not been released by CERA. The Land Acquisition Programme is the only land-use assessment strategy at present. In this programme, land-use and infrastructure decisions have been made (by engineers and surveyors) based on post earthquake damages to the land and there is little evidence to reveal the involvement of landscape planners. Nothing has been done specifically to address where these people will be relocated to, and there are no other holistic problem assessment programmes that I am aware of.

### THE ROLE OF LANDSCAPE ARCHITECTS: LANDSCAPE (PROBLEM) ANALYSIS

Landscape assessment and analysis is often what landscape architects would call *reading the landscape*. In this practice, a good understanding of the relationship between natural and cultural processes means that landscape architects are more likely to understand the effects and consequences of damages in a cultural, physical, spatial, and temporal context as opposed to assessing physical damages in isolation from one another. From this analysis they also have the innovative ability to identify the opportunities presented by the problem.

Current damage assessment is carried out by surveyors and engineers, and lacks this holistic approach that takes into account the consequential effects of disaster impacts on cultural and ecological dimensions. Landscape architects are experienced in landscape assessment and contextual analysis of the ecological and cultural issues and opportunities present in a landscape and therefore comprise valuable skills in post-disaster holistic assessment.

In both Chile and Japan following each of their devastating recent disasters, landscape architects were actively involved in problem assessment work (see good practice example (GPE) 3-1). As recognised in these countries, disaster recovery is as much about understanding what exists in the past and present as it is about what exists in the future. Even in Chile where Dr Paula Villagra has reported landscape architecture is a relatively new profession, landscape architects have been involved in the study of risk assessment and in determining a strategy for addressing local masterplans. The work done in these countries provides an appropriate model for problem assessment practice in the Canterbury recovery.

***“Worthy regional planning starts with an understanding of human needs and the landscape”***

*(Simonds & Starke, 2006)*

GPE BOX 3-1:

**GOOD PRACTICE EXAMPLE:  
TOHOKU, JAPAN  
DAMAGE ASSESSMENT | POST-EQ/  
TSUNAMI | 2011**

The Japanese Institute of Landscape Architecture organised a reconstruction support committee for the 2011 Tohoku earthquake, and conducted the primary site survey beginning in Late April and throughout early May. Survey findings of their damage assessment were presented at a meeting with the Ministry of Land, Infrastructure and Transportation, The Environmental Ministry, and the Agency of Cultural Affairs where suggestions and observations were made. A second site survey based on the suggestions has been planned, and a symposium for Reconstruction Support for the Eastern Japan Earthquake is planned for this autumn, where the second site survey findings will be presented and discussed further.

(Source: IFLA Newsletter. No. 93, June 2011)

SOURCE: JAPANSOCIETY.ORG.UK



FIGURE 3-5: TOHOKU EARTHQUAKE AND TSUNAMI AFTERMATH

**GOOD PRACTICE EXAMPLE:  
ARAUCANIA, CHILE  
STUDY OF RISK | POST-EQ/  
TSUNAMI | 2010**

Dr Paula Villagra at the Universidad Austral de Chile is a landscape architect who has been actively involved in the 2010 Chile Earthquake & Tsunami recovery efforts. Dr Villagra has been involved developing an empirical risk study called a 'Study of Risk: Earthquake Report of the Araucania Region, Chile to inform the modifications that city planners need to address in six localities in the Araucania Region, and to inform decision makers on appropriate land use. The third and fourth stages of the project are currently underway, which involves identifying the areas of the existing master plans that need to be modified based on the Study of Risk analysis. Dr Villagra has also led a project to develop design guidelines and characteristic elements for Lebu Bio Bio Region, Chile. This project was part of the re-design of master plans for 18 localities on the coast of central-south Chile that were affected by the tsunami.

(Source: Personal Communication, May 2011)

CRE BOX 3-1

## CANTERBURY RECOVERY EXAMPLE: LAND ACQUISITION PROGRAMME LAND-USE DECISION MAKING (CERA)

### CERA: LAND ACQUISITION PROGRAMME

The liquefaction caused by the earthquakes has led to such extensive damage in some suburbs of Christchurch that geotechnical engineers have recommended to CERA that the land should be retired. This means that all of the houses on the worst liquefaction prone land are 'red stickered' and are to be abandoned. Property owners of red stickered houses are given the option of having the government purchase their property. Of the properties that have been assessed so far, 5100 houses in the Greater Christchurch area have been confirmed as requiring demolition without rebuild, after the Government declared the first stage of 'red zone' areas that have been deemed unsafe/uneconomical to rebuild on. More than 10,500 properties are classified in the 'orange zone' and are still waiting to hear of their outcome, many of which will also be declared abandoned. As of August 2011, the hill suburbs have not yet been assessed (NZPA, 2011a). It is important to note that these land-use decisions are being made by geotechnical engineers.

SOURCE: 3NEWS.CO.NZ

IMAGE REMOVED DUE TO COPYRIGHT

**FIGURE 3-6: THE RESIDENTIAL RED ZONE MAP.** RESIDENTS IN THE RED ZONE WILL HAVE TO ABANDON THEIR HOMES AND RELOCATE TO OTHER PARTS OF THE CITY. GREEN ZONES ARE SUITABLE FOR REDEVELOPMENT AND ORANGE ZONES ARE UNDERGOING FURTHER ASSESSMENT. WHITE ZONES HAVE NOT YET BEEN ASSESSED

## SETTING BIG PICTURE GOALS AND OBJECTIVES

### CURRENT PRACTICE IN CANTERBURY

Reconciling short-term, narrow interests with longer-term community interests remains an underlying challenge for those advocating hazard risk reduction, sustainability and community resilience in New Zealand (Glavovic et al., 2010). There is concern that while CERA may acknowledge the community's goals and concerns, incorporating these into the Strategy in a way that ensures they are implemented is questionable. During the month of July, the Canterbury community was asked to give their views on the recovery of: community wellbeing; the economy; the built and natural environments; and culture and heritage in the greater Christchurch area. The community engagement project named "Having a Voice". Just over 500 people attended eight community workshops across the region and 600 people provided online and written submissions. A summary of the community perspectives are shown in CRE Box 3-2 on the adjacent page.

While CERA Chief Executive Roger Sutton reported that "*We received really solid information from our five partner organisations, stakeholder groups and the wider community,*" put in perspective, just over 1000 members to the Canterbury community submitted their views for the Recovery Strategy, and realistically their perspectives were mostly predictable and unspecific. This is a major concern considering the importance and implications of the Strategy for the future of the city. While the community could be accused for not making the most of the opportunity to be involved, it should be more of a reflection on CERA and the way they went about gaining active participation. The fact that many people don't even know that CERA is creating a Recovery Strategy implies that even less of the community knows they should be submitting their perspectives on big picture strategies. Furthermore, there is no evidence as yet that the consultation process will be effectively utilized in the recovery planning and implemented as the rebuilding begins, and there are questions of whether it will be, as the Canterbury community has no decision making powers at present.

### LANDSCAPE ARCHITECTS AND SETTING GOALS AND OBJECTIVES

Landscape architects have a role to play in facilitating active community engagement. They are not the sole players in the process, but they are experienced at community workshop facilitation and have the knowledge to educate a community to help them set constructive goals and objectives for a scale that is usually difficult for a lot of people to comprehend. Although referring to a different scale, the Christchurch City Council's *Share and Idea* project to gather community ideas for the central city redevelopment is a very good example of the type and level of engagement that should have been used by CERA for setting the big picture goals and objectives. This example is outlined in the next chapter however as it is dealing with the next scale down. I have been unable to find any other good practice methods of setting goals and objectives for this scale of disaster recovery.

CRE BOX 3-2

## CANTERBURY RECOVERY EXAMPLE: HAVING A VOICE - SUMMARY COMMUNITY ENGAGEMENT (CERA)

In a summary of the information received in 'Having a Voice':

- The recovery of the built environment featured most strongly in comments from the community, with an emphasis on the recovery of people's homes.
- Timely, well-communicated and fair processes were sought.
- Restoring sewerage and roading systems and taking the opportunity to rebuild resilient, well-planned infrastructure networks were thought to be important
- Community wellbeing was considered crucial in the recovery effort, as were a range of community and social service responses to prevent long-term harm from quake-related issues.
- Emphasis on multi-purpose community facilities and to cluster services to help build community resilience.
- Need for tackling quake-related unemployment and job disruption
- In general, the economic recovery related to the restoration of the built environment, infrastructure and having people back in their homes, businesses and communities.
- Comments were made that insurance and EQC processes could hamper economic recovery.
- There was wide-ranging support for sustainable building design. Sustainability was also thought to be important in transport recovery planning, with enthusiasm for excellence in public transport, a cycling infrastructure and less dominance by cars
- There were many submissions on culture and heritage, including a range of practical recommendations for the revival of Christchurch's vibrant performing arts scene and sporting prowess.
- Participation in sport, recreation and the arts were seen as having a vital role to play in the region's economic and emotional recovery.
- Heritage buildings such as the Cathedral were highly valued, but people felt there needed to be ongoing debates on the extent and timing of restoration/ rebuilding efforts.
- Opportunities to restore and enhance Canterbury's relationship with the natural environment were identified as growing out of the earthquakes, with economic, recreational and ecological benefits to be derived from better water management, improved air quality, restored biodiversity and better land use in line with the existing ecology.

([cera.govt.nz](http://cera.govt.nz))

## DEVELOPING THE POST EARTHQUAKE URBAN DEVELOPMENT STRATEGY

### CURRENT PRACTICE IN CANTERBURY

At the time this is written, CERA's Recovery Strategy (CRE Box 3-3) has not yet been released to the public, and it is therefore difficult to comment on their long term plans for urban development. It is anticipated that CERA will be reviewing the current Greater Christchurch Urban Development Strategy (GCUDS) when considering the future plans for action. Although the GCUDS was prepared before the earthquakes, it gave a good vision and set of objectives for the future of Canterbury development. In the mean time though, CERA has had to make some hasty decisions that have major implications for the effectiveness of their post-earthquake urban development strategy. Although it is understandable that decisions had to be made quickly and changes of the GCUDS were likely, making these decisions without consulting landscape architects/planners and other stakeholders who understand the big scale issues has major implications for development decisions. CERAs approach to developing the strategic action plan for implementing the recovery strategy is discussed in the next section.

### THE ROLE OF LANDSCAPE ARCHITECTS IN (POST-EARTHQUAKE) URBAN DEVELOPMENT PLANNING

Urban Development Planning involves designing spatial configurations of land uses, which are widely accepted as a key factor in planning for sustainable use of resources, land uses interrelationships, hazard mitigation, and ecological networks. Consistent with the disaster recovery literature, landscape architects/planners regularly emphasise the importance of urban development planning. For a long time the landscape architecture discipline has emphasised the same principles as best practice disaster recovery when addressing typical landscape problems: that urban development planning and collaborative formation of a strategic vision is vital to ensuring sustainable future development and reducing vulnerability to disasters. In this process landscape architects offer valuable expertise in land-use and resource planning, strategy planning, writing public policy and community engagement. A well schooled landscape architect should have a generalised knowledge of the natural sciences. No other profession is trained in this vital aspect of comprehensive land-use and urban development planning (Simonds & Starke, 2006). The principles and experience held by landscape architects are critical to the success of a post-disaster urban development planning process.

Within the landscape architecture discipline, there are multiple methods for approaching landscape planning. It is not the purpose of this report to highlight all of those methods, but the following two case study examples demonstrate landscape planning practice that responds to the want-to-be of the landscape in places where urban development is at high risk of being affected by natural hazards.

### ***An analogy for understanding landscape architecture principles in regional planning...***

*An astute farmer would study the land until he or she came to understand it – its nature, constraints, and possibilities. The farmer would then lay out (and continually adjust) the working components – living quarters, barn, pens, fields, orchard, and lines of connection – so as to bring them into best relationship to each other and to the land-water holding. The farmer would plan the whole farm and each new element in such a way to conserve and take full advantage of the land's best features: the ground forms, the woodlot, the spring, the drainage ways, the soil, and the natural covers.*

*Not only is such a farm (region) more productive...*

*Not only is it more efficient...*

*Not only is it more agreeable as a place to live and work...*

*It is also the best possible investment for the farmer, the farmer's spouse and their heirs.*

*(Simonds & Starke, 2006)*

## CRE BOX 3-3

## CANTERBURY RECOVERY EXAMPLE: THE RECOVERY STRATEGY ADDRESSING THE BIG PICTURE ISSUES (CERA)

According to the CERA website, The Recovery Strategy will set out the overarching long term vision and objectives plus the action plan for the recovery, working with the community and partner organisations Te Runanga Ngai Tahu, Environment Canterbury, Christchurch City Council, Selwyn and Waimakariri District Councils to achieve its vision.

The process for developing the Recovery Strategy is broken down in to three broad stages: Evaluating the problem situation and identifying the opportunities; Setting goals; and exploring the alternative strategies and planning for action.

The Recovery Strategy is breaking down the problem situation in five key areas of recovery:

- Community Wellbeing: “Communities need to be supported, so they can rebuild their strength and resilience for present and future generations.”
- Culture and Heritage: “Restoring culture and heritage is an important aspect of the recovery, for community wellbeing and the economy, and our identity as a city and region.”

- Built environment: “The recovery presents an opportunity to improve the resilience of buildings and infrastructure and also create an enhanced built environment that improves economic productivity and quality of life.”
- Economy: “Key issues for economic recovery include attracting and retaining investment as the region rebuilds, working with insurers, providing suitable accommodation for businesses in both the short and long-term, identifying labour requirements and developing sector plans to coordinate recovery efforts across public and private sectors.”
- Natural Environment: “The rebuilding and enhancement of infrastructure and buildings provides a significant opportunity to fix these [earthquake consequence] issues and potentially deliver an enhanced natural environment that will make the region a great place to live.”

(cera.govt.nz)

### ***An Ecological Infrastructure Approach***

Ian L. McHarg (1920-2001) published the book *Design with Nature* in 1969, which is still influential in the landscape architecture discipline, particularly in philosophical terms. In his book, McHarg describes a way of regional planning that lets natural processes guide urban development patterns. His theory became the beginnings of what is now commonly referred to as a system of urban development planning called an Ecological Infrastructure (comparable to basing development on urban infrastructure). Ecological Infrastructure uses an overlay of three categories of processes to achieve a framework for urban growth: Abiotic processes (the main focus is flood control and storm water management); Biotic Processes (Native species and biodiversity conservation); and Cultural processes (including heritage protection and recreation need).

Professor Kongjian Yu is a key promoter of Ecological Infrastructure (also referred to as 'the negative approach'). His work in demonstrating this method of urban development planning in a rapidly urbanising Chinese city prone to hazards is outlined in GPE Box 3-2 on the adjacent page.

### ***Planning with nature***

Michel Desvigne is a French landscape architect that frequently works with large scale urban development planning projects in Europe and abroad. While the project I have selected as a case study is only in design stages and is not an example of disaster recovery, the concept driving the project is one which demonstrates mitigating the risks of natural hazards through a creative yet practical response to the 'want-to-be' of the landscape. Desvignes creative concept offers valuable inspiration for dealing with the Christchurch landscape and uses principles that are inherent to landscape architecture (see GPE Box 3-3 overleaf).

***“Landscape architects and planners should lead the way in urban development by identifying and designing a landscape infrastructure that is critical in safeguarding the ecological processes, and the cultural heritages that gave us our cultural identity and feed the spiritual needs, before the development plan evolves.”***

***Kongjian Yu***

*(Yu & Padua, 2006) p23*

GPE BOX 3-2

## GOOD PRACTICE EXAMPLE: TAIZHOU CITY, CHINA UDP: ECOLOGICAL INFRASTRUCTURE (TURENSCAPE) | FLOOD RISK MITIGATION | 2009

### THE GROWTH OF TAIZHOU CITY BASED ON ECOLOGICAL INFRASTRUCTURE | KONGJIAN YU AND DIHUA LI

Taizhou city is a rapidly urbanising city on the southeast coast of China. The urban population of Taizhou City rose from 700,000 in 2006 to 900,000 in 2010 and is expected to reach 1.3million by 2020, and 1.5million in 2030. Influenced by its monsoon climate and location within close proximity to the coast, flooding has been a major hazard of this city. Throughout history, Taizhou has managed the flood risk through shaping the landscape in a network of water courses that integrate the natural water courses, wetlands and artificial channels. This water network landscape that safeguarded the city from the floods is now under major threat from rapid urbanisation that began in the early 90s.

In response to this hazard threat Taizhou City contracted Landscape Architects Kongjian Yu and Duihua Li to develop a regional plan that would guide the city's growth in the years to come.

The landscape architects used a strategic approach based on ecological infrastructure to identify the suitable future development areas. The ecological infrastructure was identified based on spatial representation and overlay of abiotic, biotic and cultural processes. Overlays were simulated using a GIS model which allowed a variety of scenarios to be produced: the adjusted sprawl scenario (low quality EI), the aggregated scenario (medium quality EI) and the scattered scenario (high quality EI). As expected, the aggregated scenario (medium quality EI) was selected by the council, as it was less difficult to realise than the high quality EI scenario. In order to demonstrate the strategy, the ecological infrastructure was defined at the large (regional) scale, the medium (community/district) scale and the small (local) scale.

(Yu & Padua, 2006)

SOURCE: YU & PADUA, 2006: 68

IMAGE REMOVED DUE TO COPYRIGHT

FIGURE 3-7: LARGE SCALE FLOOD SECURITY PATTERNS

SOURCE: YU & PADUA, 2006: 75

IMAGE REMOVED DUE TO COPYRIGHT

FIGURE 3-8: URBAN GROWTH SCENARIO: URBAN PATTERN BASED ON THE EI AT A MEDIUM SECURITY

## GPE BOX 3-3

## GOOD PRACTICE EXAMPLE: BIESBOSCH STAD, ROTTERDAM, THE NETHERLANDS UDP:PLANNING WITH NATURE (DESVIGNE) | FLOOD RISK MITIGATION | 2005

BIESBOSCH STAD, ROTTERDAM, THE NETHERLANDS | MICHEL DESVIGNE

*"It was a paradoxical assignment: make room for water in a kind of re-naturalising of the delta and, at the same time, create scenarios for the massive construction of residential neighbourhoods." p21*

This project demonstrates the way landscape architects see comprehensive landscape planning as the science and art of arranging spatial relationships. Situated in a prime location that constitutes valuable land for the necessary development of Rotterdam, the site presents an incredibly challenging design programme:

- The project requirement is to make the land suitable for housing development.
- The land is situated at the confluence of the Rhine and the Meuse Rivers, and is under constant threat from heavy floods.
- The land has been heavily manipulated in the past and large parcels have been drained to create large dry units used for farming, The parcels of agricultural have been surrounded by dikes; streams that were part of the delta branches were covered up; and the boggy ground, deprived of its water has now sunken below the former meandering stream beds. The resulting land formation is one that represents a kind of curious inversion of the natural delta patterns.

Desvignes solution to the design programme works closely with the existing modified landscape to innovatively arrange new residential development on a river delta that is allowed to function more naturally in a flood event. His idea is to break the dikes to allow the water to spill out over the farmland in the case of a flood event. The materials from the dismantled dikes

would be placed on the dry stream beds, raising and accentuating this network of historical streams. The widest areas of the remaining dikes would become the spaces upon which to build (as opposed to behind them) while the raised stream beds would form the interconnecting network between neighbourhoods. The result would be a kind of playful archipelago arrangement where dense residential neighbourhood units are surrounded by green spaces that are still farmed, but are liable to natural flooding therefore reducing the flood risk to neighbourhoods. Three basins that currently supply potable water for Rotterdam are maintained, but new pathways for water are created allowing them to flood at maximum capacity, thereby reducing the flood threat to the neighbourhoods at their banks. (Basdevant, 2009)

IMAGE REMOVED DUE TO COPYRIGHT

SOURCE: BASDEVANT, 2009: 22

**FIGURE 3-9:** "THESE NEIGHBOURHOODS, BECAUSE THEY OCCUPY A SMALL PORTION OF THE LAND, LEAVING ROOM FOR INCREASES IN THE WATER LEVEL AND FOR FARMING, ARE NECESSARILY DENSE. THEY ARE LITTLE ISLANDS OF URBANITY CREATING A PLAYFUL ARCHIPELAGO, A CONSTRUCTED AND INVERSE MEMORY OF THE OLD DELTA." P25

## DEVELOPING THE STRATEGIC ACTION PLAN

### CURRENT PRACTICE IN CANTERBURY RECOVERY

Whilst CERA has been developing the Recovery Strategy, they have had to make some hasty decisions about immediate big picture issues such as demolition and debris management, fast tracking consent for green-field development that was not planned for in the pre-existing GCUDS, and making incredibly tight deadlines for the completion of master plans for the Central City and badly affected suburban centers *before* the Recovery Strategy is even released.

From an urban development perspective, the most significant disadvantage of excluding landscape architects in decisions about the short term action plan for recovery, is that CERA has failed to embrace the opportunity to make strategic decisions about city structure before addressing individual communities. Instead, the decision was made to go ahead with the Central City Plan and the Suburban Centers Masterplans which are now being developed in isolation from one another. Furthermore, they are selected for replanning based on their earthquake damages as opposed to how they sit within the wider vision for the city. The suburban centers that remain relatively unharmed after the earthquakes are in fact as much in need of a masterplan as the damaged centers to cope with the immediate period of growth. For example, the decision to do a masterplan for Sydenham was made almost immediately based on the fact that its buildings had been severely damaged. This decision makes sense to some degree, however while Sydenham became deserted, Riccarton and Addington were experiencing an overload as people had to retreat to the unharmed centers. Addington underwent a burst of new (mostly unplanned) development as central city businesses rebuilt new premises, while Riccarton's centre became the only chaotic hive of public activity in the city. I am suggesting that hasty decisions to begin recovery planning at this scale before making strategic decisions at the regional scale about the location and nature of the recovered centers, are going to make it a lot harder to regenerate the city as a whole, and it is less likely that the city will become more connected, more sustainable and more resilient than before the earthquakes. Riccarton and Addington will continue to evolve without a masterplan, while a few of the most badly affected centers (in ad hoc locations around the city) will be brand new.

From a sustainability perspective, there are concerns that in an attempt to initiate a hasty recovery on a limited budget that is seen to be producing visible results, CERA is prepared to sacrifice some of the important aspects of ensuring a sustainable recovery. The amount of waste accumulated after a destructive disaster such as an earthquake, can be truly overwhelming, and its disposal puts huge pressure on the environment. Huge quantities of concrete, brick, steel, plastic and wood remain in the heaps of rubble where buildings once stood. New Zealand has laws around the dumping of waste. Hence, CERA has created a Debris Management Policy to manage the disposal of debris from the earthquakes. According to the CERA website, recycling of building material is considered:

*"We are currently working to ensure that building material is reused and recycled as much as practicable **given contractor resource limita-***

**tions and recovery time frames.”** However, what is considered as much as practicable by CERA is highly unlikely to be considered as much as practicable by those who are truly concerned with sustainability such as landscape architects.

Short cutting collaboration on the immediate issues as CERA has done, is detrimental to the sustainability of the recovery process and makes future collaboration efforts far less effective. As emphasised by Philipsborn, (2001), achieving a holistic, sustainable disaster recovery process involves recognition of short term and long term action plans in disaster recovery. Un-deliberated short term decisions for action made by CERA proves there is no one in CERA that fully understands the concept of a sustainable recovery. The importance of big picture decisions are not prioritised, nor the implications and opportunities for addressing the big picture issues in both the short term and long term disaster recovery. Unfortunately, the likelihood of them changing current practice to collaborate with landscape architects and other sustainability experts in addressing the big picture issues, is becoming highly unlikely.

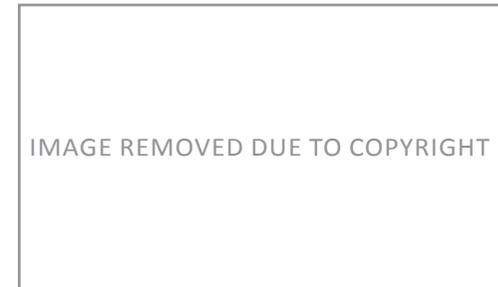
### THE ROLE OF LANDSCAPE ARCHITECTS IN DEVELOPING THE STRATEGIC ACTION PLAN

Creating the urban development plan is only half way to completing the Urban Development *Strategy*. Coming up with a *strategic action plan* ensures that the Urban Development Plan, its’ objectives and principles are properly implemented over space and time. On the topic of sustainability, landscape architects can help to create innovative action plans that far more environmentally conscious and productive. While sorting through the rubble for re-usable material sounds like an arduous and time consuming task, there are huge benefits to salvaging materials and recycling them in new development. Aside from the sustainability issues to do with embodied energy and reducing the overall amount of additional waste deposited in the environment , reclamation and re-use of materials – particularly those of important and historical buildings, is important for restoring (sustaining) cultural values and qualities in new development (Beltran del Rio, et al 2010). This is especially relevant in cities such as Christchurch which are characterised by historical architecture. The recycling of particularly characteristic materials such as bricks and stone is more favourable than using new, cheaper materials, as they help to maintain a layer of history that would otherwise be lost.

It is interesting to recognise that in poor countries that suffer from a major disaster, a far higher percentage of the rubble is recycled. Following the great Tangshan earthquake in 1976, a lot of the debris - bricks, wire, plumbing - was re-used in the reconstruction, while the recycling process created immediate local job (Chang et al, 2006). Make It Right landscape architect Tim Duggin also reports from his experience of working with the disaster recovery in New Orleans after Hurricane Katrina:

***“Another important idea [about working with disaster recovery] is that waste equals food. Figure out every opportunity where you can create things out of what was previously there before.”***

*(Tim Duggin, MIR; asla.org)*



**FIGURE 3-10: DEMOLITION OF 150 YEAR OLD FLOUR SILO IN ADDINGTON.** A CONTRACTING COMPANY HAD BEEN ARRANGED BY THE OWNERS TO “DECONSTRUCT” THIS DAMAGED SILO AND REUSE ITS HISTORIC MATERIALS, BEFORE URBAN SEARCH AND RESCUE TEAMS ORDERED IT TO BE COMPLETELY DEMOLISHED. PRIVATELY CONTRACTED ENGINEERS HAD EARLIER TOLD OWNERS THE BUILDING WAS SAFE TO DECONSTRUCT, YET HASTY DECISIONS BY GOVERNMENT CONTRACTED ENGINEERS OVER RULED THEIR JUDGEMENT AS IT WAS DEEMED A THREAT TO SURROUNDING BUILDINGS. (FOX, 2011).

SOURCE: JOHN BISSET |  
TIMARU HERALD

CRE BOX 3-4

## CANTERBURY RECOVERY EXAMPLE: DEBRIS MANAGEMENT POLICY (CERA)

### CERA DEBRIS MANAGEMENT

Debris management is currently organised by CERA who is directing the removal of demolition material to the Burwood and Kate Valley Landfills, as well as the Lyttleton Port which is being expanded with infill of demolition waste. There are laws that exist in New Zealand around dumping waste and these laws still exist post-earthquake.

A Debris Management Policy has been developed to help guide the overall direction of debris management. The policy goals are to:

- Protect public and worker health and safety
- Enable the rapid and affordable recovery of Christchurch
- Avoid or mitigate the harmful effects of waste
- Maximize the efficient use of resources
- Sensitivity in the handling of buildings and vehicles where fatalities have occurred
- Identify and protect heritage items
- Establish transparent and equitable processes

*"We are currently working to ensure that building material is reused and recycled as much as practicable given contractor resource limitations and recovery time frames."*

Source: [www.cera.govt.nz](http://www.cera.govt.nz)



SOURCE: ADAM HUTCHINSON

**FIGURE 3-11: HUGE PILES OF DEBRIS FILL THE CHRISTCHURCH CBD STREETS IN PLACE OF BUILDINGS. THE EARTHQUAKES HAVE LEAD TO AN OVERWHELMING AMOUNT OF WASTE THAT WILL BE DEPOSITED IN OUR ENVIRONMENT**

What this emphasises to me is that richer countries are less likely to prioritise sustainability principles over economic objectives. Countries that *have* to be sustainable to survive are far more likely to be conscious of recycling waste than those that are abundant in resources (such as New Zealand). So when it comes to prioritising action plans for recovery, here in New Zealand we are more likely to prioritise a quicker (more wasteful) recovery process, over a more careful, sustainably conscious one. Landscape architects have a way of thinking innovatively and strategically about the management and re-use of rubble and are therefore valuable in helping to decide a more sustainable action plan for debris management.

In terms of the action plan for urban development, landscape architects have a critical role to play in turning the urban development objectives into spatial strategies. In other words, they have the ability to take an ideal picture and translate it into a workable spatial and temporal action plan. The City of Charlotte and Mecklenburg County, North Carolina is a case study that demonstrates the application of a good strategic action plan following a natural disaster. It was selected as an appropriate example for Christchurch which has recently faced a similar phase of land acquisition in response to liquefaction prone land (typically on local flood plains near the Avon River). It is a case study that suggests just one constructive action plan model that could be used in Christchurch.

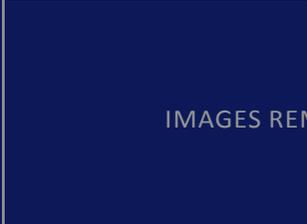
GPE BOX 3-4

## CASE STUDY EXAMPLE: CITY OF CHARLOTTE & MECKLENBURG COUNTY, NORTH CAROLINA STRATEGIC ACTION PLAN (COUNCIL) | POST-FLOOD | 1995

### THE CITY OF CHARLOTTE AND MECKLENBURG COUNTY, NORTH CAROLINA

After a major flood event in 1995, the city and county decided to adopt a new planning approach that applied improved land-use practices, collaborative processes and integration of hazard mitigation into the recovery. Landscape (land-use) planning and environmental specialists were both actively involved in the collaborative planning process which involved citizens, developers, scientists and local government officials. The strategy has so far succeeded in: reducing future flood-related losses through enhanced water storage capacity; improving water quality through the restoration of wetlands; and enhancing existing recreational opportunities through converting acquired land back into open space. Each have been identified as components of larger plan that links disaster resilience and sustainable development (Smith, 2010). Today, the City of Charlotte and Mecklenburg County still runs a Floodplain buyout programme. More than 500 families have been voluntarily moved out of local floodplains and into safer parts of the city and county. Fourty four restoration projects have been completed while a further 52 are currently underway.

Table adopted from the Charlotte-Mecklenburg Storm Water Services website: <http://charmec.org/stormwater/kidsteachers/Pages/Whyfloodplainsarebeneficial.aspx> (CMSWS, 2011)

HOW WE MANAGED FLOODPLAINS BEFORE 1990:	HOW WE MANAGE FLOODPLAINS NOW:
<ul style="list-style-type: none"> <li>• Removed trees and other vegetation</li> <li>• Straightened stream paths</li> <li>• Lined stream banks with rock (rip rap)</li> <li>• Focused only on flood control</li> </ul>	<ul style="list-style-type: none"> <li>• Preserve/replace vegetation</li> <li>• Restore natural meanders of streams</li> <li>• Only use rip rap at edge of stream</li> <li>• Acquire floodplain property through a voluntary buy-out program that leverages grant money to remove structures at highest risk of repeated flood damage</li> <li>• Focus on reducing flood losses, erosion control, filtering out pollutants, and providing habitat for aquatic life and wildlife</li> <li>• Enforce regulations that limit or ban new construction and other development in mapped floodplains</li> </ul>
	

IMAGES REMOVED DUE TO COPYRIGHT

## CHAPTER SUMMARY

Landscape architects feel they are under utilised in post-disaster urban development planning and hazard mitigation practice in New Zealand, and it appears they are not involved in the current development of the Canterbury Recovery Strategy being prepared by CERA at present. In comparing the Canterbury recovery to international case studies, it is clear that current practice has neglected the importance of involving landscape architects in big picture recovery planning. While certainly not perceived as the sole actor in the process, the principles, skills and knowledge of landscape architects make them well suited key roles of planning and developing the Recovery Strategy. Landscape architects appreciate the complexity of such a process, they are experienced in landscape assessment (problem analysis), land use planning for hazard mitigation, and they are experienced in thinking holistically about the interconnections that occur in such dynamic processes and systems.

The earthquakes in Canterbury have taught everyone incredibly valuable lessons in urban resilience, land-use planning and the importance of cooperating with nature. These lesson needs to be actively acknowledged by CERA's Recovery Strategy, the Central City Plan and the Suburban Centres Recovery Programme, while at the same time remaining sensitive to the cultural effects of community relocation. Communities that might have survived relatively unscathed by the earthquake but remain in hazard risk areas (such as the coastlines) shouldn't be forgotten either, and longer term strategic decisions should be made to ensure those communities are made more resilient to other hazards. While there are many severe issues that need to be prioritised in the revised in the Recovery Strategy, it is more important now than ever before to focus on ensuring strategic land-use planning decisions are made and followed through particularly with increasing pressures on urban limits and green field developments.

Good practice notes on urban development planning outlined in disaster recovery research aligns with similar basic principles embedded in landscape architecture literature, and each discipline shares comparable objectives of sustainable development. The only real difference in principle that exists between disaster recovery and landscape architecture is that landscape architects emphasise this as being important for every day practice, not just disaster recovery. Even in normal circumstances, many landscape architects believe they are not sufficiently engaged in the process of urban development planning. Landscape architecture literature frequently emphasises the critical contribution of landscape architects in roles of land-use planning, responding to natural processes, designing spatial relationships, and identifying community needs. This leads to a valid argument that previous strategies developed without acknowledging the expertise of landscape architects have been ineffective in true natural hazard mitigation and resilience. Surprisingly, it appears that either discipline is yet to explicitly

recognise the crossovers that exist between their ideologies around urban development planning. Thus, it appears both disciplines are on the same page when it comes to urban development planning and a lot could be learned and strengthened through combining work on the topic. In cultivating a strong relationship between the two disciplines and their research, there may be greater potential for increased application of best practice in recovery situations and urban development planning and hazard mitigation in general.

